THE KENYA NATIONAL ICT MASTERPLAN

TOWARDS A SMARTER KENYA

2013/14 – 2017/18

APRIL 2014

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THE KENYA NATIONAL ICT MASTERPLAN APRIL 2014

2013/14 – 2017/18

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LIST OF ACRONYMS AND ABBREVIATIONS

4G:	Fourth Generation
BPO:	Business Process Outsourcing
CAK:	The Communication Authority of Kenya
CCK:	Communications Commission of Kenya
CoE:	Centres of Excellence
CUE:	Commission for University of Education
CSFs:	Critical Success Factors
CRA:	Commission on Revenue Allocation
DMS:	Document Management Systems
GCCN:	Government Common Core Network
GDC:	Government Data Center
GII:	Global Innovation Index
GOEs:	Government Owned Entities
GOK:	Government of Kenya
EPZ:	Export Processing Zones
ERP:	Enterprise Resource Planning
GITS:	Government IT Services
HEIs:	Higher Education Institutions
IaaS:	Infrastructure as a Service
IFMIS:	Integrated Financial Management Information Systems
IPC:	Investment Promotion Centre
IPR:	Intellectual Property Rights

Tax:	integrated Tax system
ITO/ITES:	IT Outsourcing and IT Enabled Services
iCMS	Integrated Customs Management System
IEEE:	Institute of Electrical and Electronics Engineers
ISIC:	International Standard Industrial Classification
KENET:	Kenya Education Network
KIE:	Kenya Institute of Education
KITOS:	Kenya IT Outsourcing Society
KNSDI:	Kenya National Spatial Data Infrastructure
LAIFOMS:	Integrated Financial and Operations Management System
MCDA:	Ministries, Counties, Departments and Agencies
MDAs:	Ministries, Departments and Agencies.
MDM:	Master Data Management
MTPs:	Medium Term Plans
NCST&I:	National Commission of Science Technology and Innovation
NOFBI:	National Optic Fibre Backbone Infrastructure
NESW:	National Electronic Single Window
NRI:	Network Readiness Index
PPP: Public Private Partnership	
RFID:	Radio-frequency identification
SaaS:	Software as a Service
SAGAs:	Semi-Autonomous Government Agencies

SLAs:	Service Level Agreements
SMEs:	Small and Medium Enterprises
SWSO:	Single Window Sign On
TIMS:	Transport Information Management System
TSA:	Transportation and Safety Authority

Kenyatta
National
Hospital
MEDRAD
PHILIPS

FOREWORD

Fred Okengo Matiang'i
Cabinet Secretary
State Department of ICT

Access to information is crucial for socio-economic growth. Information and communication technology (ICT) offers a powerful tool that, if deployed equitably, can ensure citizens are empowered and Government can deliver services more efficiently, effectively and in a transparent and accountable manner. Information is vital for the efficient delivery of public and private sector products and services that are responsive to the needs of citizens and businesses and key for capacity creation.

For a variety of reasons, Kenya has not in the past taken advantage of the great potential of ICTs to stimulate socio-economic growth and development. The potential of ICTs has been greater than the development outcomes realized. This ICT Master Plan is designed to ensure that this potential is harnessed a lot more. The vision of the ICT Master Plan is to make Kenya a regional ICT hub and transition the country into a knowledge economy.

The Master Plan, which is aligned to Vision 2030, the Jubilee Manifesto and other policy documents will, among other things, help to create an enabling policy, legal and regulatory environment; provide e-government services that are simple to use and convenient for citizens and businesses; increase the productivity, efficiency and effectiveness of critical economic sectors; stimulate the setup and growth of ICT-related businesses to enhance employment creation; enable and scale up ICT innovation; and develop a dynamic and robust ICT sector that will enhance socio-economic growth.

'the Master Plan is aligned to Vision 2030'

The Government will partner with the private sector and development partners to fund the variety of flagship projects planned for implementation during the plan period. I urge all the stakeholders to be committed and to play their part to ensure successful implementation of the ICT Master Plan for the benefit of all in this beautiful country, Kenya.

EXECUTIVE SUMMARY

This Information and Communication Technology Master Plan is derived from multiple stakeholder consultations; review of documents from both private and public institutions; review of Master Plans from other countries; and comparison and benchmarking various development indices with other developed and developing countries.

The purpose of this Master Plan is to review and update the Connected Kenya Master Plan launched in February 2013 with a view to extend stakeholders participation and take into account changes in the Jubilee digital Government.

This includes alignment with key documents such as: the constitution, particularly the realities of devolved Government; Jubilee Manifesto; and the new laws enacted in between November 2012 to January 2013 such as Science, Technology and Innovation Act 2013, TIVET Act 2013 and Universities Act 2012. This is in recognition of the fact that ICT has a critical role in driving the economic, social and political development of Kenya as espoused in Vision 2030; and it is a roadmap to a knowledge economy and society that will lead to real socio-economic growth. It is therefore imperative to address key challenges that may hinder the ICT sector from playing its rightful role in national development.

ICT theme: "strengthening the foundation for a knowledge-based economy".

The Kenya Vision 2030 is the national long-term development blue-print that aims to transform the country into a modern, globally competitive, middle income country offering a high quality of life for all citizens by the year 2030.

It is guided by a Vision of "a globally competitive and prosperous nation with a high quality of life by 2030"with an overall theme of "transforming Kenya: pathway to devolution, socio-economic development, equity and national unity". The ICT theme, which is one of the foundations for national transformation in the first medium term plan (MTP) (2008-2012) is "strengthening the foundation for a knowledge-based economy". Taking into consideration Vision 2030 and its MTPs, the vision of this Master Plan is "Kenya as an ICT hub and a globally competitive digital economy" with the following six guiding principles: partnership; equity and non-discrimination; technology neutrality; environmental protection and conservation; good governance; and incentivizing.

This Master Plan has three foundations and three pillars. The foundations are the critical things that need to happen in order to lay a basis of Kenya transitioning to a Knowledge Society and positioning the country as a regional ICT hub while the pillars are meant to facilitate the achievement of socio-economic growth and Vision 2030 targets.

The first foundation of this Master plan is ICT human capital and workforce development which aims at developing quality ICT human resources as a pre-requisite to the development of a viable ICT sector. Key to this being ensuring that ICT development, implementation and exploitation are an integral and sustainable component of development. The second foundation is Integrated ICT infrastructure, which seeks to provide the integrated infrastructure backbone required to enable cost effective delivery of ICT products and services to Kenyans; and the third foundation is Integrated information infrastructure which aims at improving the quality of e-Government services

and enable the country to transition to a knowledge-based society. This is through ensuring maximum access to information held by public authorities by all Kenyans and that public information is readily available through consolidated portals in an affordable and secure way.

The first pillar of this Master Plan is E-Government services, which aims at ensuring provision of e-Government information and services as key to improving productivity, efficiency, effectiveness and governance in all key sectors. The second pillar is ICT as a Driver of Industry, which aims at transforming key Vision 2030 2nd MTP economic sectors to significantly enhance productivity, global competitiveness and growth; and the third pillar is Developing ICT Businesses that can produce and or provide exportable quality products and services that are comparable to the best in the world.
For each of the foundation and the pillar, the Master Plan identifies the driving forces, desired outcomes by 2017, the objectives and the strategies for realizing the objectives. Flagship projects that will be implemented in the next five years have been identified, the main once being: enabling legal and regulatory framework; persons data hub and associated systems; assets data hub and associated systems; national spatial data infrastructure (NSDI) and associated systems; affordable and quality broadband infrastructure to underserved areas; five Centers of Excellence in ICT education and training; 1-2 year intensive structured training and attachment program producing 500 high-end ICT graduates per year; school network; health network; Science & Technology park and an ITES centre in Konza Technocity connected to other innovation hubs; national electronic single window system; national payment gateway; and national agriculture commodity exchange.

With the implementation of this Master Plan, the following outcomes are expected by 2017:

- 8% ICT contribution to GDP;
- Creation of 180,000 direct jobs;
- 37 successfully commercialized ICT applications with at least two transformative;
- 55 ICT companies established two of which will have a customer base of over 5 million;
- Improved global competitiveness by moving up 15 points on GII, e-Government and NRI ranking;
- Recognition of Kenya as a regional ICT hub;
- Increased public value of e-Government services with 50% of adults accessing at least one e-Government service; and
- ICT is classified as a standalone economic sector by 2016.

'E-Government services ensure provision of e-Government information and services which are key to improving productivity, efficiency, effectiveness and governance in all key sectors'.

01

INTRODUCTION

1.0 INTRODUCTION

This Master Plan reviews the Connected Kenya 2017 ICT Master Plan. It regards Information and Communications Technology (ICT) as a range of technologies for gathering, storing, retrieving, processing, analysing, and transmitting information. It recognizes that dynamic market and technology developments have led to convergence where boundaries between previouslyseparate ICT services, networks, and business practices have eroded.

The Master Plan takes into account the local, regional and global changes that have an influence on the ICT sector. At the local level, Kenya enacted a new constitution in 2010, which established a system of devolved Government with 47 lower level County Governments. The operation of the County Governments started in March 2013 after the elections, which included the election of County governors, deputy governors and representatives. The 47 County Governments are now in charge of overseeing some functions such as the provision of health care and maintenance of local roads which were previously the responsibility of Kenya's National Government. With the devolvement, ICT infrastructure and services are prerequisites to development in each County Government. Kenya's Commission on Revenue Allocation (CRA) which advices on revenue division between the National Government and the County Governments has already indicated that 84.5 percent of the revenues will be allocated to the National Government while 15 percent will be allocated to County Governments. The remaining 0.5 percent is designated as an equalization fund. Following this emerging changes, it is imperative that the Master Plan considers the role of ICT not only at the National level, but at the County level and how the infrastructure and services can be integrated to better serve all the citizens.

'The Master Plan takes into account the local, regional and global changes that have an influence on the ICT sector.'

In addition, the Kenyan Government has underscored universal access to ICTs as a major objective of Vision 2030, which is Kenya's economic blueprint that is aimed at propelling Kenya from a developed to a middle-income country (see Section 2.1). There has been tremendous growth in the ICT sector particularly in the mobile sector, which by September 2013, had 31.3 million subscribers and a penetration of 76.9 per cent. At the same time, there were 25.1 million mobile money subscribers and an estimated 19.1 million Internet users with 47.1 per 100 inhabitants having access to Internet services (CCK, 2014). This is an indication that Kenyans are ready to embrace information and communication technology as long as it enhances their perceived quality of life.

At the regional level, Kenya aims at improving its trade of goods and services with fellow East Africa Community (EAC) members. ICT has a major role to play in regard to facilitating communication and engagements among the members. There are various planned integrations such as implementation of the customs union, common market, monetary union and political federation including the legal, regulatory, and policy reforms required to accomplish the plans. Seamless ICT infrastructure and info-structure within the community is crucial to address the emerging mobile and cyber security issues perpetuated through ICT and fueled by the borderless nature of the services delivered though the technologies.

'Kenya's ICT potential has not been leveraged to its maximum'

'How the country steers ICT development over the next four or so years to 2017 and beyond will greatly impact on the achievement of the country's Vision 2030'

At the global level, Kenya is a participant and a signatory to a number of international conventions and standards relating to ICT. It is an active member of the International Telecommunications Union (ITU). It is also spearheading issues of Internet Governance in the region, which is the development and application by governments, the private sector and civil society, in their respective roles, of shared principles, norms, rules, decision making procedures, and programmes that shape the evolution and use of the Internet (WGIG, 2005). Kenya is active at the Internet Corporation for Assigned Names and Numbers (ICANN) headquartered in the United States which is responsible for the coordination of the global internet's systems of unique identifiers and, in particular, ensuring its stable and secure operation.

In addition, Kenya's Internet Exchange Point (KIXP) has been used as a successful model of public private partnership and is being emulated by other countries developing their own Internet Exchange Points. Kenya enhances its competitiveness through investor friendly arrangements such as Export Processing Zones (EPZ) programme which offers attractive incentives to export oriented investors, and the Investment Promotion Centre (IPC) which promotes all other investment in Kenya. These conditions have created a conducive environment for the growth of the ICT sector, changing the nature of doing business in many sectors including finance, tourism, agriculture and health.
Based on institutional and situational analysis, the Master Plan is inrecognizance of the fact that Kenya's ICT potential has not been leveraged to its maximum to drive social and economic development. Currently, it is not clear how much ICT is contributing to GDP despite its exponential growth in the last couple of years. The economic survey reports clusters ICT as a subset of 'Transport, Storage and Communications' sector making it a challenge to determine its actual contribution to GDP. Further, the ICT

professionals have not yet managed to form a credible and legally recognized professional body to recruit and regulate ICT professionals, and to set standards and code of ethics for its members.

Finally, it is the expectation of the taskforce that the implementation of this ICT Master Plan will unlock the high potential of the ICT sector in the country. This will create a digital society and economy that is able to exploit the global, regional, national and local opportunities presented by the dynamic sector of information and communication technologies to advance its socio-economic growth leading to an enhanced quality of life by all the people of Kenya.

1.1 RATIONALE FOR DEVELOPING THE NATIONAL ICT MASTER PLAN

ICT has a critical role in driving the economic, social and political development of Kenya as espoused in Vision 2030. How the country steers ICT development over the next four or so years to 2017 and beyond will greatly impact on the achievement of the country's Vision 2030. There is a need to align the National ICT Master Plan to the devolution reality and address key challenges that may hinder the ICT sector from playing its rightful role in national development. The reasons that led to the review of Connected Kenya 2017 ICT Master Plan launched in 2013 are as follows:

a) To validate by an independent team of professionals;
b) To involve the key stakeholders more;
c) To align it with the constitution;
d) To align with the Jubilee Manifesto; and
e) To take into account the realities of devolution.

1.2 TASKFORCE TERMS OF REFERENCE

Prof. Timothy Mwololo Waema chaired the taskforce and the list of the taskforce members are shown in Annex 1. The assignment for the taskforce was to review the existing National ICT Master Plan and realign with the strategic direction of the country, the final product being a National ICT Master Plan for Kenya for the period 2013 to 2017. The following were the terms of reference for the taskforce:

a) To review the strategic objectives of ICT in the public sector as articulated in the E-Government strategic plan and leading public sector organizations.

b) To review the Connected Kenya 2017 Master Plan and associated support documents and identify any important gaps.

c) To develop a revised Connected Kenya 2017 Master Plan with appropriate vision, objectives, outcomes and other important aspects of a plan.

d) To conduct stakeholder consultation sessions to validate the revised Master Plan and to ensure alignment with the Constitution of Kenya and Vision 2030.

1.3 METHODOLOGY

The taskforce adopted organizational and participatory approaches to strategic planning. Organizational approach ensured that key critical success factors (CSFs) and drivers for the National ICT Master Plan are aligned with the objectives as identified through the context analysis. The participatory approach entailed taking care of the soft issues which are critical to strategic planning and management, such as attitude, creating enthusiasm and motivating all stakeholders to rally behind the implementation of the Master Plan. The detailed methodology used to achieve these outcomes is detailed in ANNEX 2. A critical component of this methodology was extensive consultation of stakeholders, as required by the Constitution. About 300 stakeholders were consulted in the process of developing the Master Plan, including the public forum, as shown in Annex 6.

1.4 OUTLINE OF THE REST OF THE MASTER PLAN

This Master Plan has seven chapters, including this chapter. Chapter two gives an overview of ICT context in Kenya. This includes the Vision 2030, which is Kenya's development blue print; the first national ICT policy of 2006; the regulatory environment; the national ICT infrastructure; ICT services and ICT human capacity in the country; and innovation in the ICT sector. The chapter ends with an overview of ICT industry contribution to the GDP.

'The taskforce adopted organizational and participatory approaches to strategic planning'

Chapter three discusses the vision and guiding principles for this Master Plan with the Vision being Kenya as a globally competitive digital economy and a regional ICT hub. Six guiding principles are identified in this chapter.

Chapter four lays down the three foundations of this Master Plan namely human capital and workforce development; integrated ICT infrastructure; and integrated information infrastructure. For each of the foundations, four key areas are discussed, namely: setting the context; key drivers; desired outcomes by 2017; and objectives, strategies and flagship projects.

Chapter five describes the three pillars of this Master Plan, namely E-Government services; ICT as a driver of industry; and developing ICT businesses. Similar key areas as those indentified in chapter four are discussed.

Chapter six discusses this Master Plan implementation framework. The institutional framework that includes the institutional capacity and proposed governance structure of ICTA required for its implementation are discussed. Monitoring and evaluation framework and how the ICT Master Plan will be financed including risks that must be managed and critical success factors are discussed too. A recommended guide to successful ICT project implementation is outlined. The chapter ends by discussing the policy and legal framework, including gaps and recommended action.

Chapter seven presents a list of the flagship projects and the framework of implementing these projects. It also outlines the criteria used to select flagship projects. The ICT indicators as per the International Standard Industrial Classification (ISIC), the methodology used for this Master Plan and a list of stakeholders consulted are also given in this chapter, all presented as annexes one to six. The Master Plan ends by giving a reference of the sources consulted.

02

OVERVIEW OF ICT CONTEXT IN KENYA

2.1 KENYA'S DEVELOPMENT VISION 2030

The Vision 2030 is the national long-term development blue-print that aims to transform the country into a modern, globally competitive, middle income country offering a high quality of life for all citizens by the year 2030. The Vision is being implemented through a succession of five year Medium Term Plans (MTPs). The first MTP (2008-2012) implemented the first five years of the Vision. The Vision comprises of three key Pillars: Economic, Social, and Political. The economic pillar aims to achieve an average economic growth rate of 10 per cent per annum and sustaining the same until 2030. The social pillar seeks to engender just, cohesive and equitable social development in a clean and secure environment, while the political pillar aims to realize an issue-based, people centered, result-oriented and accountable democratic system.

'The MTP gives priority to devolution'

The theme of the second MTP, (2013-2017) which coincides with the coming into power of a new Government after the 2013 elections, is "Transforming Kenya: Pathway to Devolution, Socio-Economic Development, Equity and National Unity". The MTP gives priority to devolution as spelt out in the Kenya 2010 constitution and to more rapid socio-economic development with equity as a tool for building national unity. The Second MTP also aims to build on the successes of the first MTP, particularly in increasing the scale and pace of economic transformation through infrastructure development, and strategic emphasis on priority sectors under the economic and social pillars of Vision 2030.

ICT is one of the foundations for economic development in the second MTP of Vision 2030, with the theme, "strengthening the foundation for a knowledge economy". ICT is a critical tool in Kenya's vision of knowledge based economy, which aims at shifting the current industrial development path towards innovation where creation, adoption, adaptation and use of knowledge as the key source of economic growth are key. As a foundation of the second MTP, ICT would be concerned with:

a) upgrading the national ICT infrastructure;
b) improving public service delivery;
c) developing the ICT industry; and
d) upgrading ICT capacity.

2.2 CONSTITUTION

Kenya enacted a new Constitution in 2010. The Constitution brings with it significant changes to the political system of governance of Kenya, expands the rights and fundamental freedoms, and introduces a new system of public finance, among other changes.

ICT is one of the most effective methods to attain some of the objectives of the Constitution. This includes realizing democracy through participation of citizen as defined in the Constitution; efficiency of the Government; effective method to provide public service; and citizen's right to know. Specifically, ICT is imperative for the cost-effective achievement of constitutional requirements.

In particular, Article 6 (3) on equitable delivery of public services to Kenyan citizens regardless of their domicile; Article 232 on quality service delivery by the public service; Article 35 on the correctness of information held by the state as well as ensuring public access to the information; and other articles concerning accountability of public officers, transparency of Government and participation of citizens in Government processes.

'ICT is one of the most effective methods to attain some of the objectives of the Constitution.'

2.3 NATIONAL ICT POLICY

Kenya produced its first National ICT Policy in 2006. Its vision is a prosperous ICT-driven Kenyan society, while its mission is to improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services. This policy was guided by the need for infrastructure development, human resource development, stakeholder participation and appropriate policy and regulatory framework. It focuses on IT, broadcasting, telecommunications, postal services, radio frequency spectrum, universal access and institutional framework for implementation. The country has not updated this policy for close to eight years, a period when the world has witnessed various technological developments and many changes have taken place in the ICT sector in Kenya. The policy therefore needs to be updated to take into account the changes including Vision 2030; the Constitution; new sectoral strategies; and other realities that have emerged since 2006. The ICT State Department has developed a draft ICT policy which needs to go through the various stages of policy development and finalised as soon as possible.

2.4 REGULATORY ENVIRONMENT

ICT matters fall under several pieces of legislation, including the Kenya Communications Act (KCA) of 1998; Science and Technology Act (Cap. 250) of 1977; and Kenya Broadcasting Corporation (KBC) Act of 1988. Kenya's information and communication regulatory issues are under the umbrella of the Communication Authority of Kenya (CAK), formally Communication Commission of Kenya (CCK). A major catalyst in the development and expansion of ICTs has been the liberalization of the market, which began in 1999 when the Kenya Post and Telecommunications Corporation was split int o five entities namely:

- The Postal Corporation of Kenya;
- Telkom Kenya Ltd (later privatized);
- The Communications Commission of Kenya (CCK) the industry regulator;
- The National Communications Secretariat (NCS) to advise on policy issues; and
- An Appeals Tribunal for arbitrating in cases where disputes arise between parties.

'A major catalyst in thedevelopment and expansion of ICTs has been the liberalization of the market'

Kenya Communication Act 1998 has now been amended to the Kenya Information and Communications (Amendment) Act, 2013 (no. 41A). In 2008, the CCK, implemented a framework of technology-neutral unified licensing framework (ULF). Under the ULF, operators and service providers are licensed according to three broad types of provision to the ICT market:

- network facilities provider (NFP) – provides infrastructure systems for long-distance transmission and for local access;

- applications service provider (ASP) – provides all forms of services to end-users, using the network services of an NFP provider; and

- content service provider (CSP) – provide services such as broadcast (TV and radio) content, and other information and data processing content services.

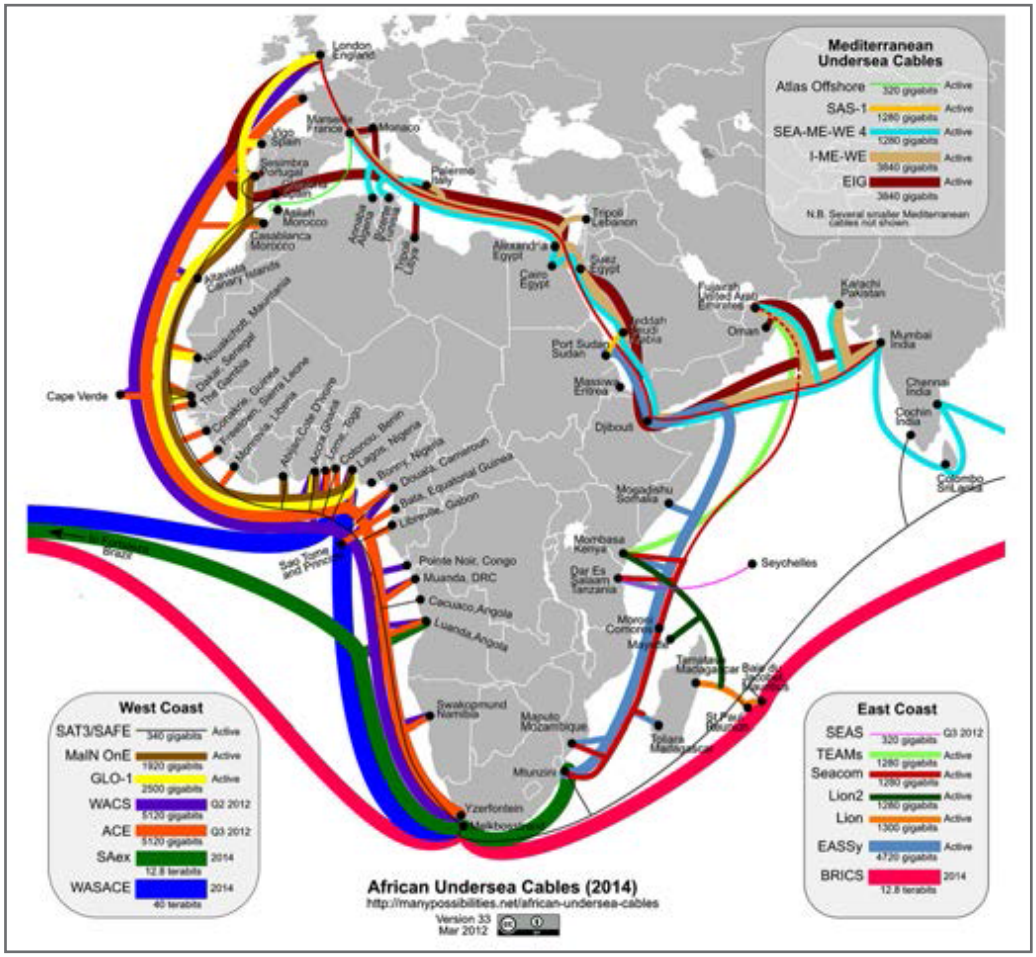
With the implementation of ULF, the licensing procedures have been simplified, new applications developed, and there has been increased penetration and availability of mobile internet as well as increased infrastructure investment. The unified licence has, allowed the mobile operators to become Kenya's biggest providers of internet services.

2.5 NATIONAL ICT INFRASTRUCTURE

Until mid 2009, Kenya like the rest of the East African countries, relied solely on satellite for internet connectivity and international communication. Subsequently, the country is connected to the international broadband highway through the SEACOM, TEAMS, EASSY, and LION undersea fibre cables as shown in Figure 1.

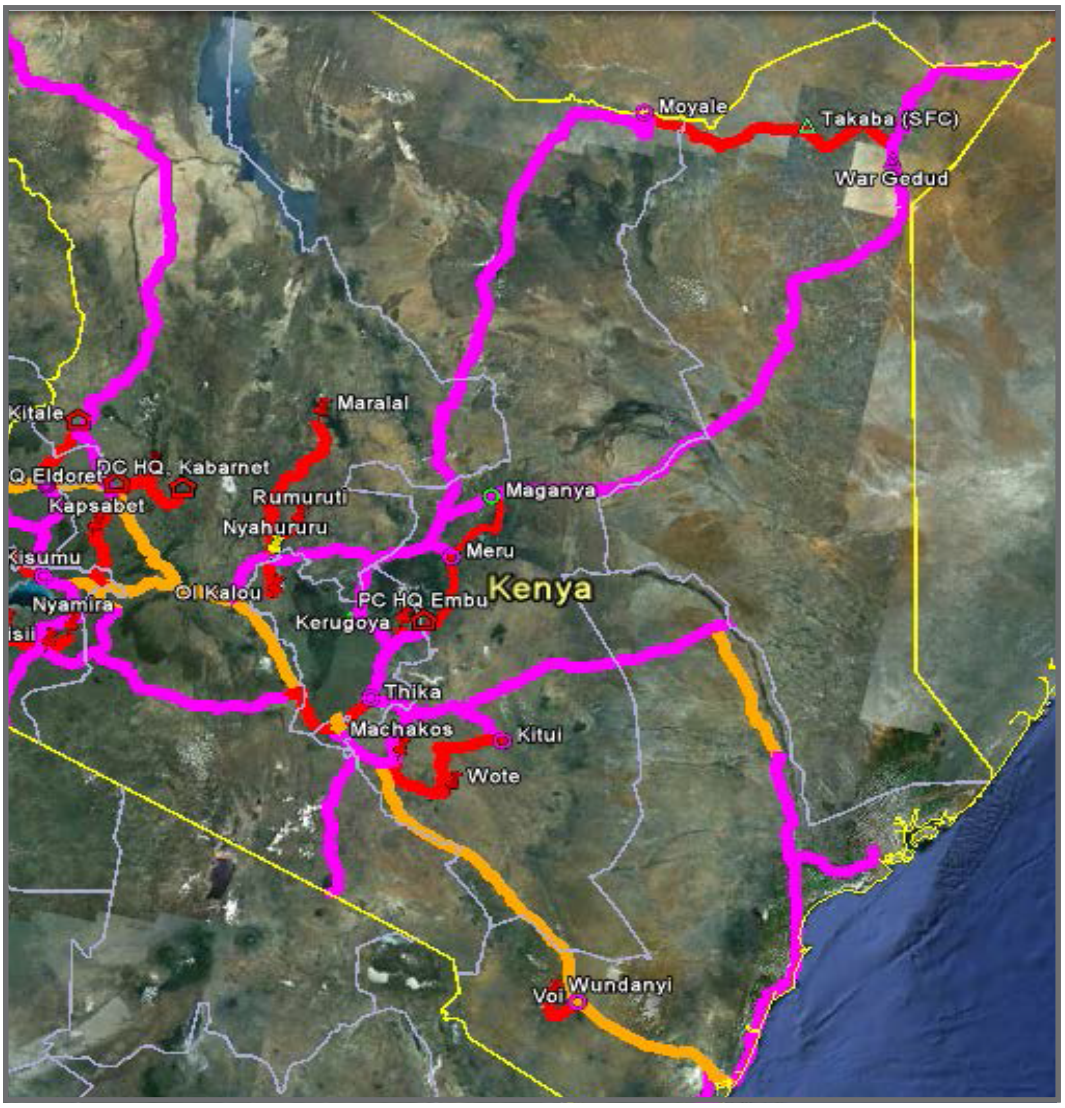
youths on a video set using broadcasting technology

Figure 1: Undersea Fibre Cables in Africa



Source: manypossibilities.net/african-undersea-cables

Most major towns in Kenya are connected through the National Optic Fibre Backbone Infrastructure (NOFBI) (see Figure 2). In order to extend fibre capacity to all parts of the country, the Government is reviewing NOFBI with a view of extending and building additional links to enhance redundancy. To complement NOFBI, the ICT State Department is discussing with stakeholders a framework to develop a wireless broadband network.



Source: National broadband strategy

NOFBI Phase1

NOFBI Phase 2 (on going)

The Government has also developed a Government Common Core Network (GCCN). This is meant to serve as a shared and secure interoperable Government-wide ICT architecture. The system will not only integrate work processes and information flows, but also improve inter-ministerial sharing of databases and exchange of information to eliminate duplication and redundancies, improve public access to Government services and ensure responsiveness in reporting, monitoring and evaluation (Kenya e-Government Master Plan, 2013). Figure 3 shows the network diagram of GCCN.

Figure 2:
NOFBI Diagram

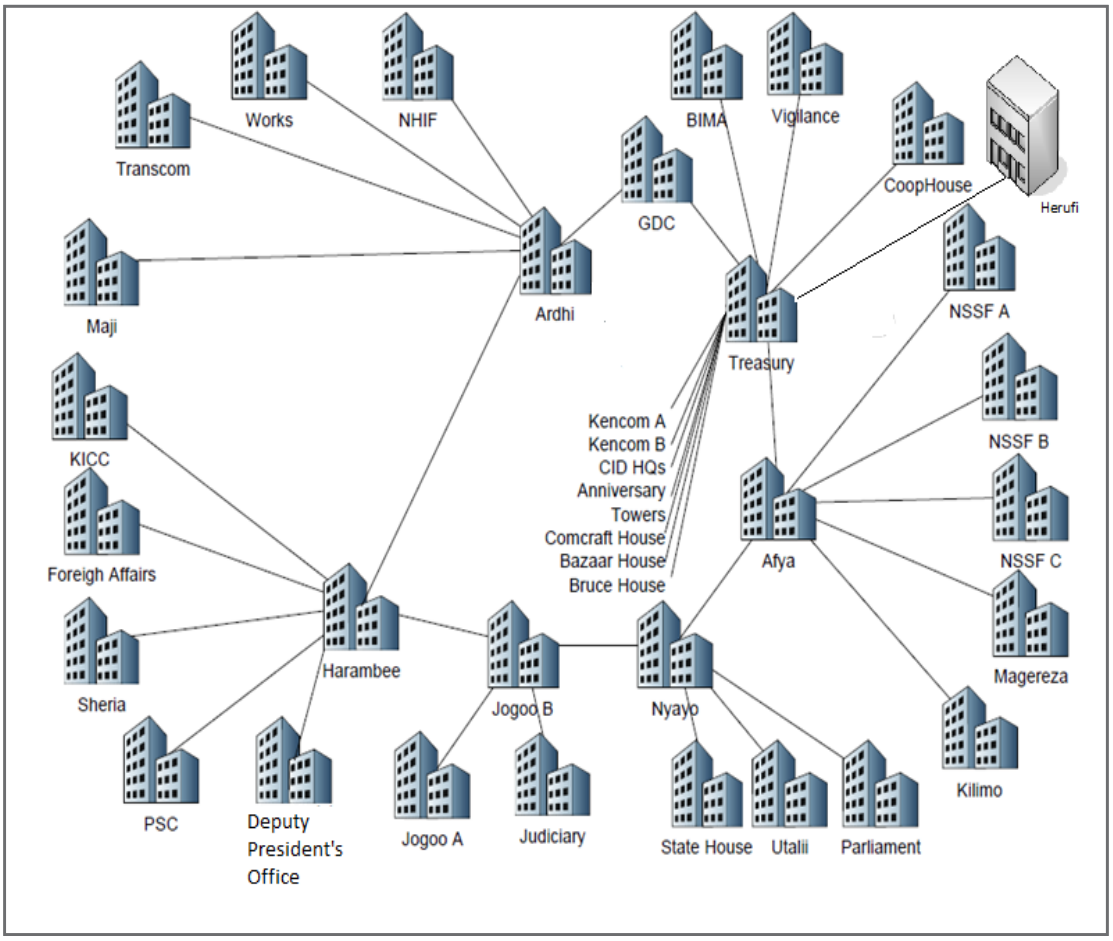


Figure 3: Network Diagram of GCCN

Source: Adapted from National ICT Sector Master Plan 2008-2012

In addition, the Government developed the tier-2 Government Data Center (GDC) infrastructure to ensure security of Government data and applications. Bandwidth support to Government offices has been steadily growing.
Furthermore, the Government through the national treasury is implementing a disaster recovery facility for data and systems as part of the business continuity plan. This will ensure that the Government services continue to be provided even in case of any disaster at the primary sites. This facility will also offer an environment for cloud computing to offer services by the County
Governments.

Although most County Governments have not yet started developing their ICT infrastructure, NOFBI can be used to connect the National Government to the County Governments and interconnect the latter to share data and information, as shown in the envisioned connectivity between NOFBI and GCCN (see Figure 4).

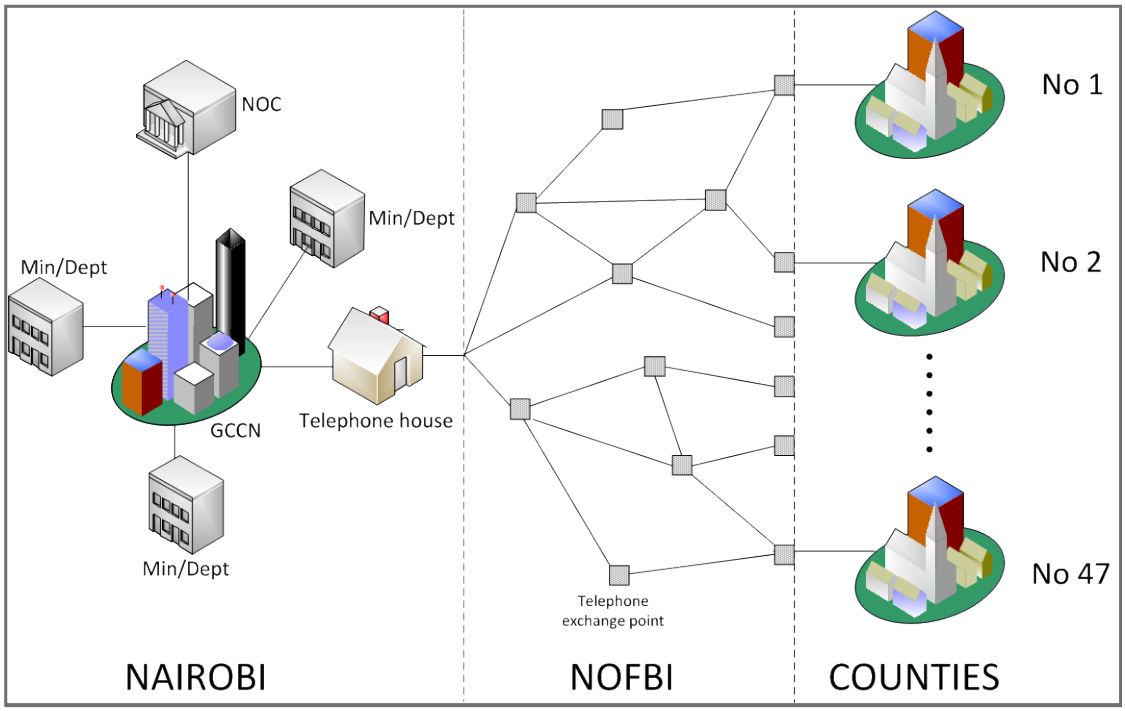


Figure 4: NOFBI GCCN County Connectivity

Source: County connectivity project, 2014

Apart from the Government ICT infrastructure, operators in the private sector have been busy developing their own national ICT infrastructure. In particular, the mobile and data sub-sector has resulted in extensive and aggressive deployment of infrastructure in most parts of the country by the competing telecommunications businesses (Orange Telkom, Safaricom, Airtel and Essar). In addition, large data infrastructure operators, including Jamii Telecom, Liquid Telcom, Access Kenya Group, Wananchi Group, Kenya Education Network (KENET), MTN, Internet Solutions, amongst others are developing infrastructure.

Infrastructure deployment by many operators has resulted to competition leading to a relative reduction of tariffs and increased usage of mobile phones and internet. By September 2013, there were 31.3 million mobile subscribers and mobile penetration of 76.9 per cent. At the same time, there were 25.1 million mobile money subscribers. Estimated internet users were 19.1 million with 47.1 per 100 inhabitants having access to internet services. The International internet bandwidth available was 60,900Mbps of which 41.8 per cent was being utilised (CCK, 2014).

2.6.1 E-Government Services

'Infrastructure deployment by many operators has resulted to competition leading to a relative reduction of tariffs and increased usage of mobile phones and internet'

The Government of Kenya has implemented electronic systems in various State Departments and other state-owned institutions, including national tax systems, immigration information system, legal information system, the integrated financial management system and education system. Most of these systems are to be found in the National Treasury, Kenya Revenue Authority, Home Affairs State Department and Immigration Office. In addition, information is manually exchanged by and between departments and institutions using fax, e-mail and electronic media. These systems provide partial electronic services to citizens and businesses through Government portals. Figure 5: Generic Model of e-Government.

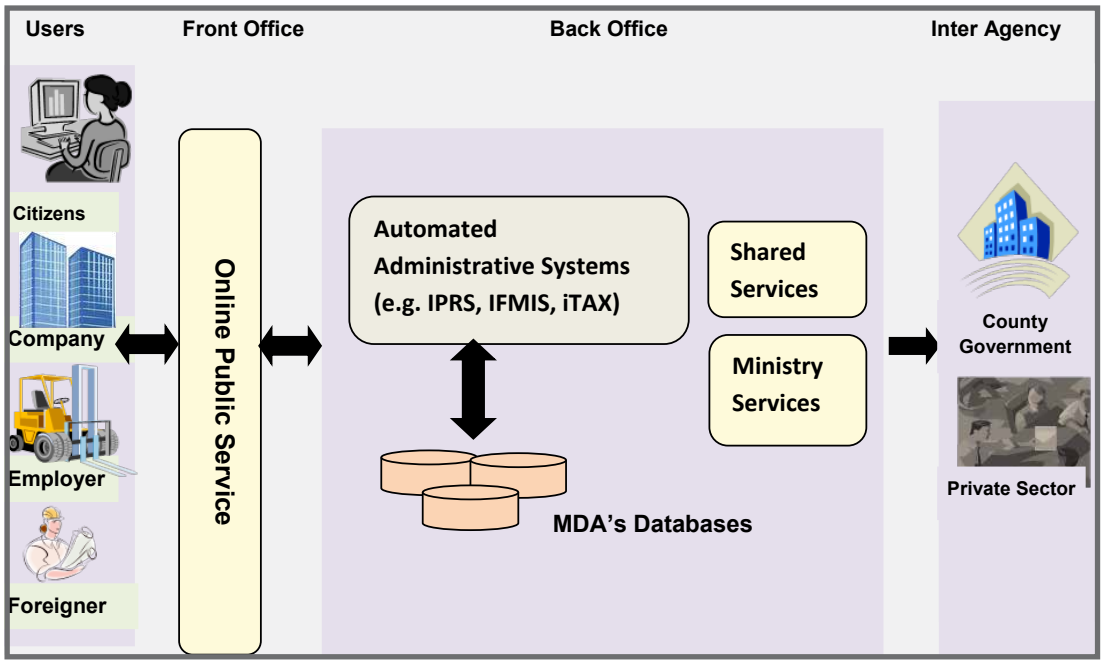


Figure 5: Generic Model of e-Government

Source: Authors, 2014

County Governments are taking ICT as an important tool for delivering services to citizens and businesses. There are few electronic governance systems, most focusing on revenue collection based on Local Authorities Integrated Financial and Operations Management System (LAIFOMS), the system used by the local authorities that preceded the creation of County Governments. Most Governments at this level have began developing County ICT Master Plans, which will need to be aligned to this National ICT Master Plan. At the ministry level, all departments have been mandated to use IFMIS.

Figure 6 shows Kenya's online services compared with two countries in the lower middle income (Ghana and Senegal), two countries in the upper middle income (South Africa and Brazil) and one country in high income (Portugal).

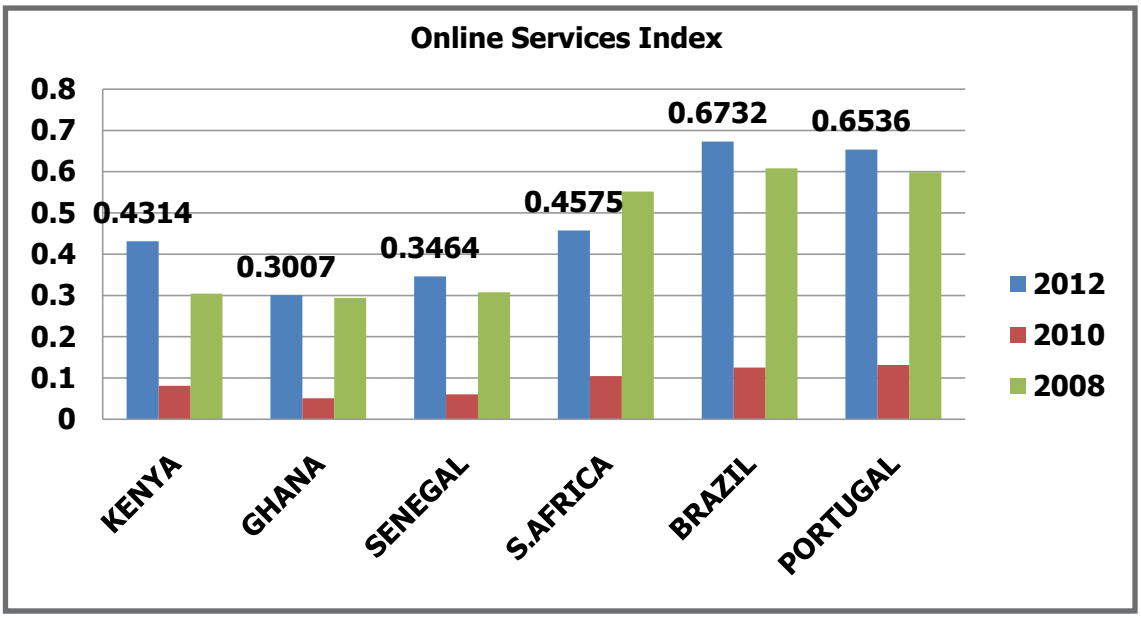


Figure 6: Online Services Index

Source: Global e-Government Survey, 2008, 2010 & 2012

Online services index, which is one of the three components of the United Nations' e-Government development index, attempts to capture country's performance in a single internationally comparable value using a four-stage model.

The model assumes that countries typically begin with an emerging online presence with simple websites. It progresses to an enhanced state with deployment of multimedia content and two way interaction. Then advances to a content and two way interaction, a transactional level with many services provided online and governments soliciting citizen's input on matters of public policy and finally to a connected web of integrated functions, widespread data sharing and routine consultation with citizens using social networking and related tools. As noted, Kenya lags behind South Africa but it is slightly ahead of Ghana and Senegal. Brazil and Portugal are way ahead and Kenya should aim at improving its online services to their level or ahead.

2.6.2 Other Services

Kenya has emerged as an African ICT hub, in innovative technologies particularly in the mobile sector. The implementation of mobile transfer services from in 2007 has put Kenya on the world map. Currently, all the four mobile operators and two licensed content service providers (Mobikash Africa and Mobile Pay) are offering mobile money transfer services. Furthermore, with mobile phones collaborating with the banking sector, new mobile banking products have emerged. In addition, most bills from public and private institutions ranging from electricity, water, insurance, travel and NHIF and NSSF contributions among others can now be paid via mobile phone platforms.

2.7 ICT INNOVATIONS

Kenya has been among Africa's finest in ICT innovation with mobile money transfer services, leading to increased financial inclusion. The recent explosion of local ICT development groups such as iLab, iHub, Nailab, University of Nairobi's C4DLab and infoDev's mlabs in Kenya has set the stage for innovation of applications and information services such as Drumnet, mFarm, Ushahidi, etc. Over the years, Kenya has been home to multiple African Regional hubs including, IBM's first African Research lab, Nokia's Africa Headquarters and Google's first Sub-Saharan Africa office (outside of South Africa).

Figure 7 shows Kenya's capacity for innovation compared with two countries in the lower middle income (Ghana and Senegal), two countries in the upper middle income (South Africa and Brazil) and one country in high income (Portugal).
As noted, in terms of capacity to innovate, Kenya is at the same level with South Africa and Portugal, which are middle and high-income countries respectively. This shows that Kenya has a high potential to be a leader in innovations which if well directed can be her competitive edge and steer economic growth.

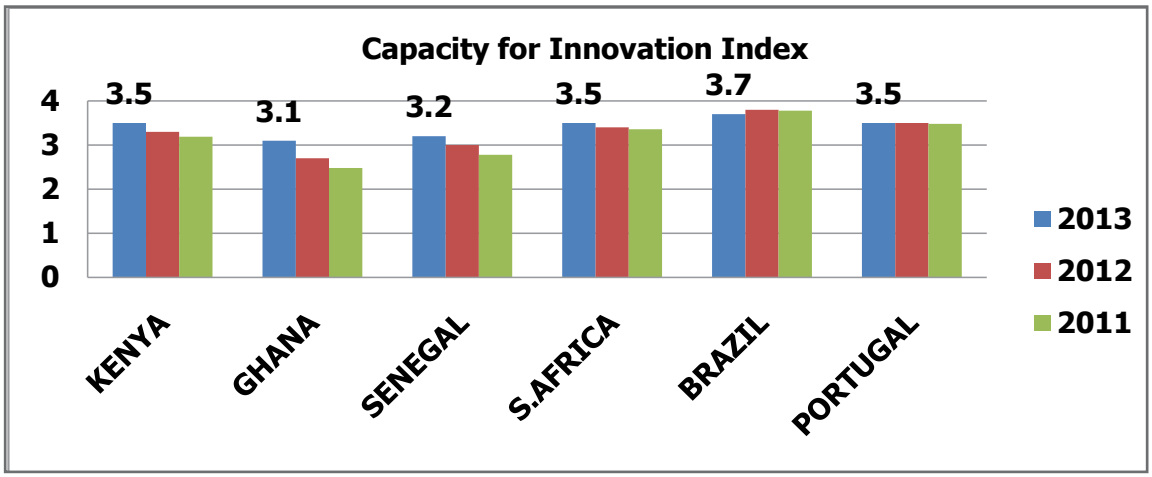


Figure 7: Capacity for Innovation Index

Source: The Global Information Technology Report, 2013, 2012, & 2011

2.8 ICT HUMAN CAPACITY

While the Government and the private sector have been investing heavily in the ICT infrastructure as outlined above, there has comparatively been little investment in the human resources required to design, develop and operate this infrastructure and the associated e-applications. With the increasing sophistication of ICT and its applications, high-end skill sets are increasingly required and availability presents a challenge to growth and to achieving the vision of this Master Plan.

The local universities and tertiary colleges continue to develop ICT human capital and workforce that is neither guided by a human resource development policy nor well aligned to the industry needs, especially at the high end. This Master Plan suggests mechanism for developing and sustaining high-end talent by removing the skills gap between industry requirements and the capabilities of the local workforce. This includes reducing the need for foreign expertise in ICT projects, retaining current high-end talent, and creating a mechanism for effective skills transfer and training.

2.9 ICT INDUSTRY CONTRIBUTION TO GDP

According to Mckinsey (2013), the internet sector contributed 2.9% of Kenya's GDP, and 3.5% of Senegal's GDP in 2012, both out performing South Africa whose contribution to the GDP was 1.4%.

Table 1 shows spending in various aspect of IT in Kenya compared to Senegal, South Africa, Brazil and Portugal. As noted, Kenya spent 9.3% of its total ICT budget on computer software and services. South Africa ranks highest with 22.4% of its ICT budget going to computer software and services while Senegal spends only 3.1%.

Table 1: Comparative Table of ICT Spending

	ICT Spending in $ millions				Computer software and services spending		
	Total	Software	Services	Computer, software and services	As a percentage of total ICT spending	As a percentage of GDP	Year
Kenya	3,178	111	184	295	9.3%	0.8%	2009
Senegal	2,570	28	50	78	3.1%	0.6%	2009
	37,524	2844	5574	8417	22.4%	2.2%	2010
Brazil	104,466	3069	9310	12,379	11.9%	0.7%	2010
Portugal	16,299	1,387	1,408	2,795	17.2%	1.1%	2010

Source: Information economy report, 2012

In Kenya, ICT is not yet considered as a sector in the yearly economic survey reports. It is classified under 'Transport, Storage and Communications' as in ISIC Rev. 4. It therefore becomes very difficult to track the contribution of ICT to development as a single sector unlike in many countries where ICT is defined as a stand-alone sector. The most popular classification used to define ICT as a sector in all economic activities is the International Standard Industrial Classification (ISIC) Rev. 4. Kenya National Bureau of Statistics (KNBS) and has started migrating to ISIC Rev. 4 and would, in collaboration with Communications Agency of Kenya (CAK), carry out a national data collection on ICT indicators based on this classification in 2014/2015. This Master Plan recommends that ICT be set up as a stand-alone sector and comprehensive ICT indicators be used to monitor the growth of the sector. Annex 3 shows the recommended ICT indicators. The KNBS/CAK data collection and analysis in 2014/2015 and in subsequent years should be guided by Annex 3.

03

VISION, THEME AND GUIDING PRINCIPLES

Fabrication Lab, (Fablab) at University of Nairobi

3.0 VISION, THEME AND GUIDING PRINCIPLES

This chapter defines the vision, theme and guiding principles of the National ICT Master Plan informed by stakeholders' consultations and analysis of documents.

3.1 VISION

The vision of this National ICT Master Plan is: Kenya as a regional ICT hub and a globally competitive digital economy.

3.2 THEME

The theme of this Master Plan is: Towards a smart Kenya.

3.3 GUIDING PRINCIPLES

The following key principles will guide the implementation of this National ICT Master Plan:

a) Partnership – Conscious/deliberate efforts to engage and collaborate with private sector, academic institutions, County Governments and local and international partners in implementing the National ICT Master Plan.

b) Equity and non-discrimination – Equitable and non-discriminate availability of and access to ICTs across County Governments, urban and rural areas, gender, women, youth and disadvantaged communities.

c) Technology neutrality - Use of common, interoperable standards and protocols must be encouraged.

d) Environmental protection and conservation - All institutions involved in ICT Master Plan implementation to adhere to the green ICT concept by environmentally friendly equipments that are cheaper and easy to implement and ensuring there is no e-waste dumping.

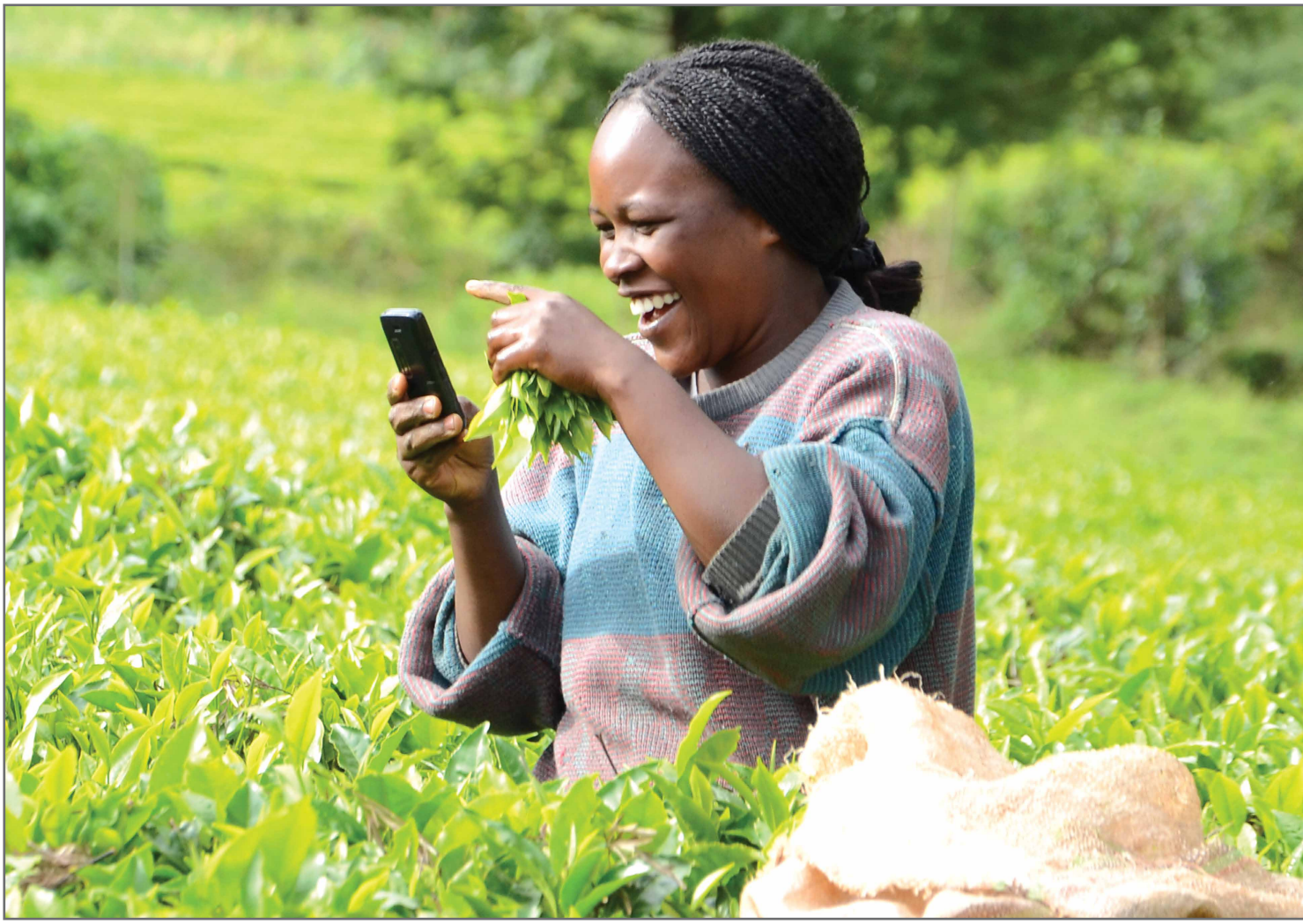
e) Good governance – All institutions and persons involved in procurement of ICTs and the implementation of the ICT Master Plan to adhere to the highest standards of good governance and ethical behaviour.

f) Incentivize – Incentivize local private sector to provide ICT solutions.Encourage use of local solutions by public and private sectors, entrepreneurship, culture of research and development and value addition.

'Guiding Principles of the Masterplan;
- Partnership
- Equity and non discrimination
- Technology neutrality
- Environmental protection and conservation
- Good governance
- Incentivizatition'

04

FOUNDATIONS



4.0 FOUNDATIONS

The foundations are the critical actions that need to be undertaken in order to lay a basis of Kenya transitioning to a Knowledge Society and positioning the country as a regional ICT hub by developing quality ICT infrastructure, developing integrated and secure information infrastructure and developing critical mass of high-end ICT human capital. The following three foundations have been developed from the situational analysis.

'The foundations are the critical actions that need to be undertaken in order to lay a basis of Kenya transitioning to a Knowledge Society'

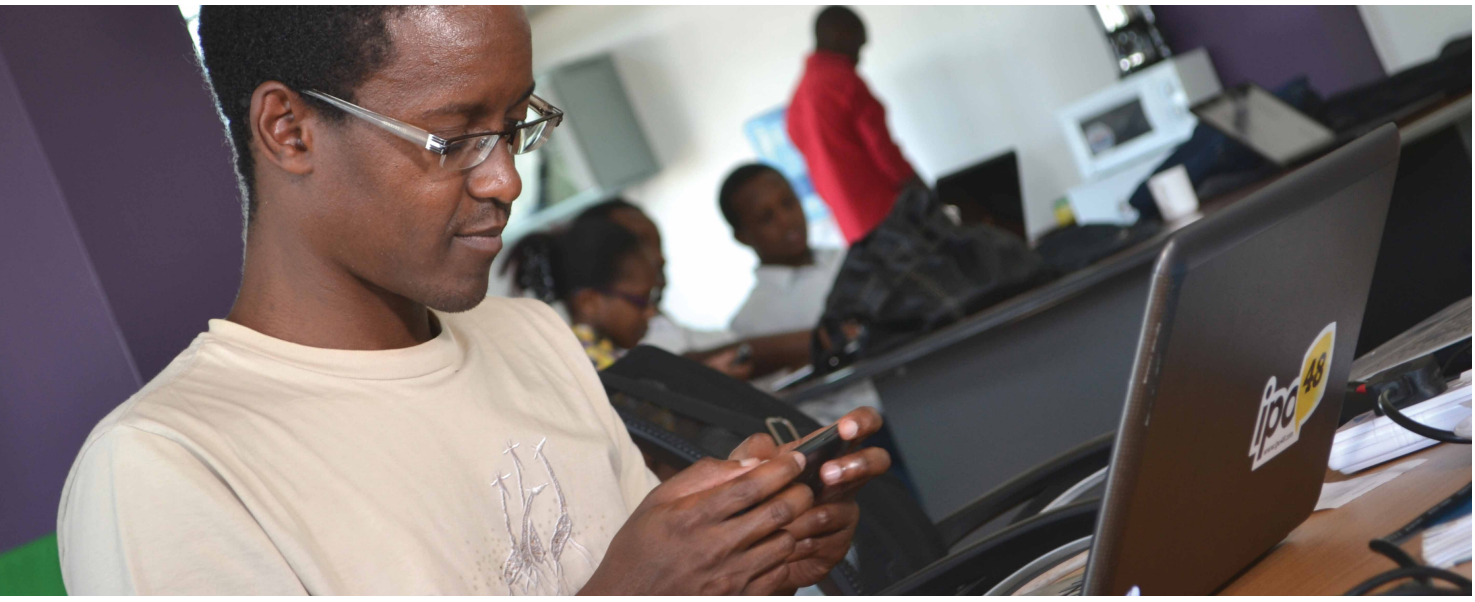
a) ICT human capital and workforce development. The development of quality ICT human resources is a pre-requisite to the development of a viable ICT sector. It ensures that ICT development, implementation and exploitation are an integral and sustainable component of development.

b) Integrated ICT infrastructure. ICT infrastructure is a key foundation necessary for the successful implementation of other foundations and pillars. It seeks to provide the integrated infrastructure backbone required to enable cost effective delivery of ICT products and services to Kenyans, businesses and other stakeholders.

c) Integrated information infrastructure. The remit of this foundation is the provision of more and better information from the public sector. The objective is to ensure that there is maximum access to information held by public authorities to all Kenyans and that public information is readily available through consolidated portals in an affordable and secure way. This will in turn improve the quality of e- Government services and enable the country to transition to a knowledge -based society.

Under each of the three foundations, the following four areas are discussed.

a) Setting the context, including challenges
b) Key drivers
c) Desired outcomes by 2017, with targets
d) Objectives, strategies and flagship projects



A citizen working on a project to develop mobile applications

4.1 ICT HUMAN CAPITAL AND WORKFORCE DEVELOPMENT

4.1.1 Setting the Context

Several studies by KICTB (Julisha, 2011 and Haruta et al., 2011) have shown that Kenya does not have sufficient local high end skills, resulting in the local industry importing such skills. High-end skills set are found in ICT professionals such as ICT projects managers, network engineers, network administrators, system administrators, application developers, and information system analysts who manage complex system design, development, and integration.

All the 21 chartered public universities and 14 private universities in Kenya offer at least one ICT degree program, which can be classified as follows:

a) Electrical Engineering degree programs and their equivalents (e.g., computer engineering, electronic engineering or telecommunications engineering).

b) Computer Science or equivalent degree programs (e.g. Computer science, Applied computer science, Mathematics and computer science).

c) Information Systems and Information Technology degree programs (e.g. Information systems, Information technology and Computer technology).

'studies by KICTB (Julisha, 2011 and Haruta et al., 2011) have shown that Kenya does not have sufficient local high end skills'

Graduates of any of the above degree programs can be developed to high- end ICT professionals for the ICT industry in Kenya. It is high-end ICT professionals that design, deploy and maintain complex information systems and network infrastructures envisaged in this Master Plan.

Electrical and Telecom m unications Engineering Education
As of November 2013, 10 public universities in Kenya were offering electrical engineering degree programs (Kashorda, 2013). The quality of engineering education in Kenya is regulated by the Engineers Act 2011 that came into effect on September 14, 2012. The Engineers Act 2011 enhanced the powers of the Engineers Registration Board to include approval and accreditation of engineering degree programs in public and private universities or other tertiary institutions like university colleges. The objective of the law is to enhance the quality of engineering education in Kenya using an accreditation process. The Universities Act 2012 also makes it mandatory for universities to obtain institutional accreditation from the Commission for University Education. Thus, it is expected that quality of engineering education will continue to improve in the future.

'There are very few industry firms that provide structured on-the job training for new ICT graduates'

Although electrical engineering degree programs admit some of the top high school students in Kenya, the lack of facilities and the high student to faculty ratios has had a negative impact on quality of graduates according to a study by IBM Corporate Social Corps consultants (Haruta et.al., 2011). The main weakness was identified as the lack of hands-on experience obtained through laboratory exercises and student projects. Moreover, the curriculum at the leading universities had not been regularly reviewed to introduce, for example, courses in network engineering and general education subjects like communications. The lack of structured internship and graduate training programs by local industry has also reduced the pool of well-trained engineering graduates.

Computer Science and I nform ation System s Education
All the 21 public universities and 14 chartered private universities offer computer science, information systems or IT degree programs. The four year degree programs have technical and business components and prepare graduates who develop, deploy and administer organizational information systems and networks. However, there is general lack of PhD holders in these programs, raising concerns about the quality of graduates.

'There is no approved structured ICT professional training program in Kenya.

Unlike the engineering degree programs, there is no law or professional body that provides professional accreditation of computer science or information systems degree programs. This means that the quality of computer science, information systems or IT graduates depends only on the internal quality assurance mechanisms of an individual university. In addition, the ICT curriculum is in need of urgent review to include general education courses (communications, economics and development studies, and foreign languages) as well as new specialized courses (e.g., network engineering, software engineering and testing, and mobile computing). The lack of modern laboratories for teaching means the students have had limited exposure to modern equipment and development platforms. Further, the ICT faculty do not have industry experience and are not active researchers due to limited funding, very high teaching loads and lack of active doctoral degree programs. Due to rapid increase in the number of universities, there is inadequate number of doctoral-level and high-quality ICT faculty. Further, there are limited industry-university linkages in terms of attachments and joint projects.

In addition, there are very few industry firms that provide structured on-the job training for new ICT graduates. Most graduates are left to develop themselves, for example by studying and sitting for the various industry certification programs. Finally, the public lacks the ICT literacy skills to use and exploit ICT resources.

I CT PROFESSIONAL DEVELOPM ENT IN K ENYA

Globally, ICT has been shown to have impacts on economic and social development, and one of the indicators that has gained global recognition is the Network Readiness Index (NRI), that includes skills as a critical pillar for nations to exploit ICT for development. According to the Global Information Report (2013), the skills pillar gauges the ability of a society to make
effective use of ICT. Existence of basic educational skills is captured by the quality of the educational system, the level of adult literacy, and the rate of secondary education enrollment.

The Kenyan ICT industry view of fresh ICT graduates is that of low quality, not only in terms of technical content but also in terms of communications, analytical and critical thinking skills. This has meant that post-graduate ICT professional training by ICT industry takes longer than necessary. Consequently, there is a limited pool of high-end ICT professionals in Kenya and this has forced companies to import the high-end ICT professionals from India or Europe for project implementation at very high cost (Haruta et.al., 2011).

'anecdotal evidence suggests that ICT degree graduates remain unemployed for extended periods or get employed as low-end ICT technicians.'

There is no approved structured ICT professional training program in Kenya. Public and private organizations simply offer organization-specific training and professional development programs for freshly recruited graduates of ICT degrees. The training and professional development is often through mentoring by senior ICT professionals and a series of training programs tailored to specific industries. This means that the professional development outcomes after approximately three years of experience are not uniform and depend on the specific company.

The lack of structured ICT professional development is especially acute in Government and many not-for-profit public sector institutions (e.g., universities, schools and hospitals). This is partly because of the inability of these institutions to attract and retain high-end ICT professionals that could then mentor and train junior professionals. This also means that such Government departments or institutions do not have a career growth plan that can be matched by the private sector in terms of training and remuneration.

There are a number of professional certification programs available for graduates. These are normally vendor or product specific. For example, CISCO certifications are popular with network professionals. Leading ERP companies also provide their own certifications (e.g., SAP, Oracle, Microsoft certifications). Some companies also arrange for boot-camp training of ICT professionals. However, most of the certification programs are too expensive for Kenyan ICT professionals, particularly in the public sector and for Government ICT staff.

Although professional ICT associations like IEEE Kenya chapter, the Computer Society of Kenya or the newly formed ICT association aim to promote professional development, most of the ICT graduates do not join any of the associations possibly because they perceive there is nothing to gain from joining these associations.
Apart from the limited and varied professional development opportunities, anecdotal evidence suggests that ICT degree graduates remain unemployed for extended periods or get employed as low-end ICT technicians. Some ICT graduates attempt to start their own businesses but because of limited business training and/or ICT industry training, most of the enterprises remain very small and are not successful.

4.1.2 Driving Forces

In Kenya, many factors are driving the demand for high-end ICT professionals including the following:

'there are many factors driving the need for high-end ICT professionals'

a) Increased demand from the national and County Governments that aim to provide e-Government services and to automate their internal processes.

b) Increased demand from public institutions (e.g., universities, schools, hospitals etc) that are in different stages of automating business processes to improve service delivery and to increase efficiency of operations often by deploying information systems and networks.

c) The need to create employment opportunities in the ICT sector by creating new ICT companies to develop new applications and provide support services to businesses and the Government. The employment opportunities include business process outsourcing and IT enabled services to local and international organizations.

d) Increased demand from large local firms and SMEs that are automating their operations. This include the mobile operators, data companies, broadcasting companies, financial institutions, manufacturing enterprises, agricultural enterprises, tourism among others.

e) Increased demand for ICT professionals from the large multi-national corporations and ICT companies that are setting up their Africa headquarters in Nairobi. This includes Airtel Africa, IBM, Oracle, and Google among others.

f)High labour cost of high-end ICT professionals.

4.1.3 Desired Outcomes and Targets by 2017

The master plan seeks to improve the ICT human capacity in Kenya with the following outcomes:

a)Availability of sustainable local high end ICT skills to meet the needs of the industry;
b)Adequate workforce to transform and innovate business using ICT; and
c)ICT literate population capable of exploiting ICT products and services for improved quality of life.

4.1.4 Objectives and Strategies

A) SCALING UP ICT HUMAN CAPITAL AND WORKFORCE DEVELOPMENT
OBJECTIVE 01: DEVELOP A CRITICAL MASS OF LOCAL HIGH-END ICT SKILLS

The following strategies have been identified for scaling up ICT professional development.

Strategy S1: Institutionalize at least 5 sustainable CoEs for ICT high end skills development and scholarship program

Strategy S1: Institutionalize at least 5 sustainable CoEs for ICT high end skills development and scholarship program. The establishment of at least five Centers of Excellence in five universities that teach electrical engineering, computer science and information systems to develop high end ICT talent. This shall include new teaching laboratories, employment of at least 75% doctoral level faculty in computer science, engineering and information systems. In order to retain the high-end faculty there will be a need to introduce new reward systems, attract expatriates from other countries and provide doctoral and masters-level scholarships.

This strategy can be realized using the following actions:

a) Institutionalize ICT industry-driven capacity building fund

b) Institutionalize industry-driven high-end capacity support initiatives

c) Formalize internship programmes

d) Avail scholarships to bright students to be admitted into the CoEs, e.g. by capturing more scholarships in ICTs from MoEST and other ministries.

e) Incentivize students to follow ICT programs in CoEs

f) Creation of an educational cluster of universities running ICT degree programs in Konza

g) Form and manage an effective partnership with KENET, Commission of Higher Education, Kenya Innovation Agency, local and international universities and other academic partners to promote production of quality manpower for the ICT sector.

Strategy S2: Collaborate with the Commission of University Education (CUE) and Industry to strengthen ICT degree programs in all Kenyan Universities

Strategy S2: Collaborate with the Commission of University Education (CUE) and Industry to strengthen ICT degree programs in all Kenyan Universities. A pre-requisite for high-end ICT professional development is good ICT degree programs. Although there is a large number of an ICT graduate, local industry has complained about the quality of entry-level ICT employees from the universities as earlier noted.

All of the universities will therefore be required to develop detailed plans for addressing each of the above challenges. For example, the shortage of doctoral level faculty and the low PhD throughput of local universities in ICT areas, particularly in computer science and electronic engineering, will initially require recruiting expatriate staff from neighboring countries, Diaspora or some of the Asian countries like India or China. The lack of advanced teaching facilities will require massive investments by the Government and private sector.

Strategy S3: Strengthen and structure ICT professional development in Kenya.

The Commission for University Education (CUE) shall inspect all ICT departments within the first year of launch of the Master Plan to ensure compliance with approved regulations for ICT degree programs. From this collaboration the Master Plan will achieve the following:

a) Increased PhD throughput of local universities in the areas of computer science, information systems and electrical/electronic engineering by at least 100 per year by 2017. 30-40% of the ICT faculty in local universities would have doctoral degrees and would be active researchers.

b) A common ICT course in all university programmes to ensure that all graduates have ICT literacy skills.

Strategy S3: Strengthen and structure ICT professional development in Kenya. This strategy requires development of guidelines for training of ICT graduates by companies with certification. In engineering, this will be developing a graduate engineering training program for at least one year. At the end of the industry training, the ICT graduate trainees will be required to pass some locally developed certification programs for different areas of ICT. In the software development area, Chipuka program has developed certification for entry-level professionals. Implementation of this program will require a strong ICT professional association. This association must be established by law in a similar fashion to ICPAK, IEK or LSK. Such an association would run e- learning continuing education courses for all ICT professionals. This is a role taken up by institutions like IEEE in some parts of the world.

B) ICT WORKFORCE DEVELOPMENT AND PUBLIC DIGITAL LITERACY OBJECTIVE 02: DEVELOP ICT READY WORKFORCE

Strategy S1: Collaborate with relevant policy makers and regulators to integrate ICT into education and training at all levels. One of the most effective and efficient method of developing the ICT workforce is to integrate ICT in schools, colleges and universities curriculum for non-ICT subjects. The following are the pre-requisites for success in the integration of ICT in education:

Strategy S1: Collaborate with relevant policy makers and regulators to integrate ICT into education and training at all levels.

a) Achievement of minimum ICT readiness for the schools, colleges and universities. The minimum readiness is a computer lab with internet access. This not only requires physical building infrastructure to secure the lab but availability of electricity.

b) Trained ICT teachers capable of enhancing teaching of primary and secondary school children with technology. This requires changing the way teachers are trained in colleges and universities.

c) Development of digital content for all education levels using multimedia technologies.

The use of ICT in education increases the cost of education and requires more committed and better trained teachers. To address this strategy, the following would be imperative:

a) Integrate ICT in teacher training institutions (universities and colleges) starting the year 2015. This will require ICT infrastructure investments by the institutions and capacity development of the lecturers and instructors of teacher training colleges.

b) School-based capacity development of primary and secondary school teachers. This would start by launching a school-based ICT training for all secondary school teachers followed by primary school teachers. An e-learning module for training teachers with technology would be introduced at the same time to ensure that the teachers stay current and develop their skills on a continuous basis. It would also prepare teachers to integrate ICT in secondary schools starting the year 2016 and in primary schools in 2017 with the following targets:

- 100% integration of ICT in teacher education in all teacher training institutions and universities.

- Availability of locally relevant multimedia content for use in primary and secondary schools. This would be available through a regulated national educational portal.

One of the critical flagship projects that is being implemented is the school laptop project beginning in 2014. Provision of laptops as teaching and learning tools for pupils entering standard one will transform education and help to create a knowledge society.
This project must include:

- review of school curriculum
- conversion of courseware into digital form
- ICT training for teachers
- broadband internet connectivity to the schools

Strategy S2: Work with industry to develop structured ICT training for professionals in all areas. The Government and industry must work together to finance a one to two year intensive structured training and attachment program for up to 500 high-end ICT staff per year in selected areas of ICT. The program would also pay for certification for the trainees. In addition, all medium-sized public and private companies would have approved structured ICT professional development programs of at least one year, with opportunities for local and international ICT certifications.

Strategy S2: Work with industry to develop structured ICT training for professionals in all areas.

OBJECTIVE 03: INCREASE DIGITAL LITERACY OF CITIZENS

This objective will be realized by pursuing two strategies:

Strategy S1: Continuous communication on the role of ICT in national development.

Strategy S2: Implement awareness programs on the role of information and ICT for quality life.

With these two strategies, we expect a 50% increase in ICT digital literacy of adult citizens by 2017.

C)BUILDING CAPACITY OF ICTA
OBJECTIVE 04: STRENGTHEN THE LEADERSHIP AND ICT HUMAN CAPACITY OF ICTA

The implementation of the ICT Master Plan shall begin with building the capacity of ICTA, the institution that shall provide national ICT leadership during implementation. The capacity challenges that ICTA faces include:

a) ICTA does not yet have the project management, engineering, and information systems capacity required for providing procurement support services to the Government and public institutions.

b) The advanced ICT and engineering project management capacity required in the large projects envisaged by the Master Plan is also lacking.

c) Capacity is lacking for the information systems professionals required to operate the information systems and networks to be deployed. This is in the area of ERP deployment, network engineering and administration, data center support engineers and cyber security administrators.

'The implementation of the ICT Master Plan shall begin with building the capacity of ICTA'

The above challenges will be addressed through the following strategies.

Strategy S1: Competitive and strategic recruitment against ICTA's new organizational structure.

Strategy S2: Build technical and leadership capacity in ICTA. It will be necessary to develop and implement a staff development program for professional ICT staff and a leadership and management program for all ICTA senior managers.

Strategy S3: Review the terms of service of ICTA staff and make them competitive. These terms should be reviewed to make working at ICTA comparable to working in leading public parastatals like Kenya Revenue Authority, Central Bank of Kenya or Communications Authority of Kenya. The terms of service shall require that all new graduates undergo a two-year professional development.

Strategy S4: Institutionalize a performance evaluation system at all levels of ICT professional staff.

4.2 INTEGRATED ICT INFRASTRUCTURE

4.2.1 Setting the Context

Kenya currently boasts of being one of the most connected countries on the Eastern Coast of Africa. There are four submarine cables; TEAMS, EASY, SEACOM and LION that offers connectivity to the rest of the world via redundant routing. Inland, the NFOBI has cut across the country and reaches more than half the 47 County Governments.

The most utilized and accessible ICT infrastructure in Kenya is the mobile phone. By the end of 2013, there were four licensed mobile operators with a total subscriber base of 30,549,422. There were 80,894 and 12,775 second and third generation mobile cellular system transceivers respectively across the country. There were 18 tier 2 and 13 tier 3 network facility providers; 3 authorized satellite providers who have the ability to provide internet transit; 39 BPO operators; and 219 telecommunications vendors.

The infrastructure providers have an infrastructure sharing code of practice with clear guidelines that is agreed upon by the operators. It is the spirit of infrastructure sharing that the operators keep local traffic local via the Kenya Internet Exchange point; centrally monitor network security via the industry computer security response team and have a central manager for the country code top-level domain name .ke. The above shared infrastructure is regionally and globally recognized as best practices.

'The most utilized and accessible ICT infrastructure in Kenya is the mobile phone'

The Government and parastatals are using online platforms to provide services to the citizens. For instance, the Kenya revenue authority has been able to effectively deploy an integrated tax management platform through which individuals and businesses are able to file tax returns online. The provision of Government services online to the citizens will drive demand for infrastructure across all Counties and put pressure on network providers to deliver quality and reliable infrastructure for effective service delivery.

Kenya faces a number of challenges in developing and providing infrastructure across the country. A key challenge is the limited coverage of national fibre infrastructure and limited internet penetration, especially in the rural areas. A second challenge is the provision of last mile infrastructure connectivity, which if appropriately addressed can leap frog the country into a knowledge economy. Internet access in homes, schools, social centers and villages should be key drivers to ensuring a knowledge economy. The high cost of ICT (infrastructure, applications, end-user equipment, recurrent cost of internet, etc.) for businesses, households and individuals is also a challenge. Other challenges include limited sharing of communication infrastructure by infrastructure operators, inadequate and high cost power infrastructure and limited uptake of ICT in SMEs. This ICT Master Plan will address some of these key challenges preventing the country from transitioning into a knowledge economy.

'The Government and parastatals are using online platforms to provide services to the citizens'

Figures 8 and 9 compares Kenya with two countries in the lower middle income (Ghana and Senegal), two countries in the upper middle income (South Africa and Brazil) and one country in high income (Portugal) on two indices that have a relevance for ICT infrastructure:

- e-infrastructure index (or telecoms infrastructure index) – This is an arithmetic average composite of five indicators: estimated internet users per 100 inhabitants, number of main fixed telephone lines per 100 inhabitants, number of mobile subscribers per 100 inhabitants, number of fixed internet subscriptions per 100 inhabitants, and number of fixed broadband facilities per 100 inhabitants. This index can be taken as proxy for ICT infrastructure index.

- Infrastructure and digital content - Measures five variables: mobile network coverage, international internet bandwidth, secure internet servers, and electricity production as well as the accessibility of digital content.

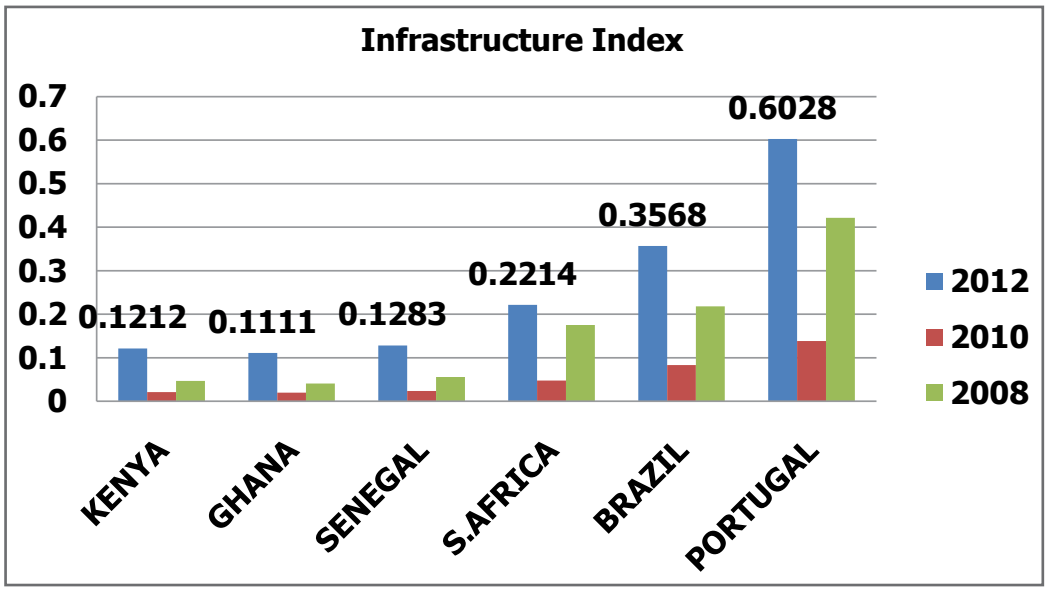


Figure 8: e-Infrastructure Index Comparison

Source: Global e-Government Survey, 2012, 2010 & 2008

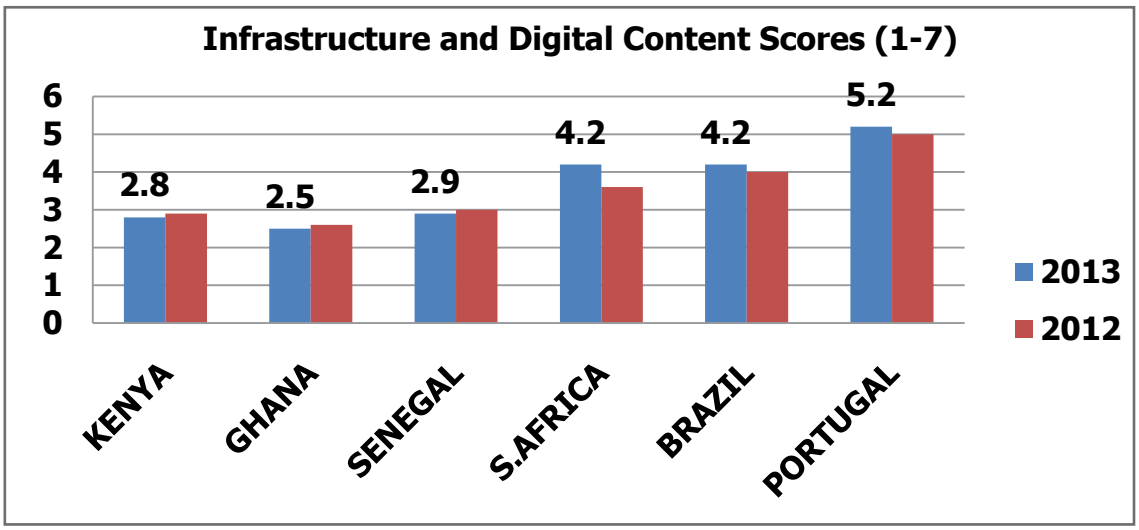


Figure 9: Infrastructure and Digital Content Comparison

Source: Global information technology report, 2013 & 2012

In both comparisons, Kenya is within the LMIC range. This means that Kenya is doing relatively well on the ICT infrastructure. An improvement during this Master Plan period would ensure Kenya stands a better chance of transitioning to a middle income country, at least lower middle income category.

From an ICT affordability perspective, Figure 10 shows how Kenya compares with the five countries. Three variables assesses the cost of accessing ICTs, either via mobile telephony or fixed broadband internet, as well as the level of competition in the internet and telephony sectors that determine this cost. It can be noted that Kenya is within LMIC and close to South Africa. However, Ghana does better than UMICs on ICT affordability. Kenya therefore needs to make ICT more affordable in order to improve the chances of moving towards middle income.

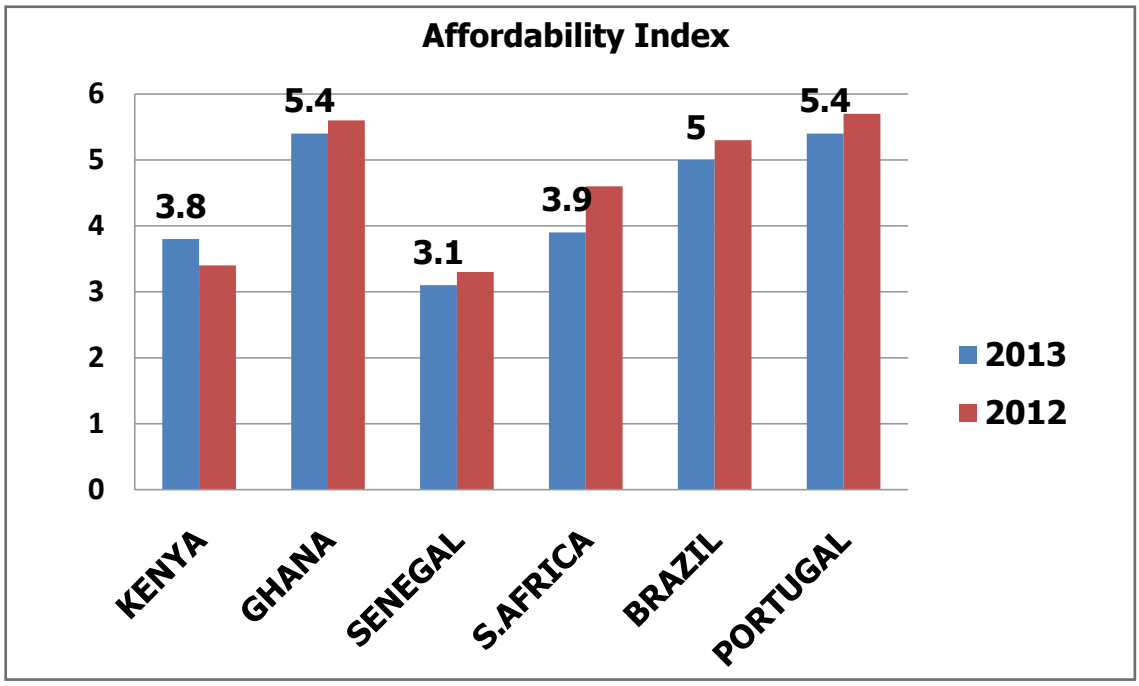


Figure 10: ICT Affordability Comparison

Source: Global information technology report, 2013 & 2012

4.2.2 Driving Forces

Key drivers for an integrated ICT infrastructure are:

a) Stewarding the development and provision of national ICT infrastructure that promotes inclusion and indiscriminate right of access to Government services in conformance with the Constitution of Kenya;

b) Increasing demand for accessible infrastructure to drive high volume data/internet services that are accessible everywhere in the country;

c) Emerging reliance by Government, businesses and citizens on reliable,and secure ICT infrastructure for business applications and value added services;

d) Increasing demand for access to affordable infrastructure by citizens; and

e) Lowering operational cost for Ministries, Counties, Departments and Agencies (MCDA's) by sharing integrated infrastructure.

'Despite the progress made so far, there is need to step up development to the next generation of ICT infrastructure'

4.2.3 Desired Outcomes by 2017

A robust ICT infrastructure is mandatory in facilitating the development of ICT enabled economy. Despite the progress made so far, there is need to step up development to the next generation of ICT infrastructure that is robust, trusted, and promotes integration and sharing of ICT infrastructure.

The outcomes envisaged in this Master Plan are:

a) Increased coverage of the national broadband infrastructure especially in the rural areas to achieve the National Broadband Strategy targets:

- 35% broadband penetration to households
- 100% broadband availability in schools
- 100% broadband availability in health centres

b) High quality of broadband (99.99% availability, high reliability and secure (can be trusted);

c) Affordable broadband for citizens (cost of broadband as a proportionof disposable income is benchmarked against middle income countries); and

d) Additional 2.5% contribution to GDP. This is possible given the huge increases in penetration of broadband, going by the Worldbank's estimate that very 10% increase in internet penetration results in 1.3% increase in economic growth.

4.2.4 Objectives and Strategies

'The Government has set up the Universal Access Fund'

OBJECTIVES 05: SUPPORT PROVISION OF RELIABLE, SECURE AND AFFORDABLE CONNECTIVITY ACROSS THE COUNTRY TO ALL CITIZENS

Strategy S1: Promote inclusive broadband connectivity by enabling infrastructure providers to roll out affordable last-mile connectivity. Current infrastructure roll-out has created a 'coverage divide', with the rural areas largely remaining underserved as they are deemed unprofitable to investors. The Government has set up the universal access fund, and in this plan period will facilitate the use of the universal access fund to build infrastructure for the underserved rural Kenya. The Government will fast-track the deployment of broadband in under-served areas using appropriate technologies (e.g. 4G technologies) and ensure integration of ICT infrastructure deployment with other infrastructure deployments while sharing critical infrastructure. In addition, hotspots (using unlicensed spectrum) will be implemented in universities, colleges, schools, hospitals, town centres, bus stations, and other public spaces. This would enhance affordable access, especially by the youth.

Strategy S2: Develop, implement and institutionalize a cyber security management framework. The Government will facilitate the establishment of appropriate institutional and legal framework to safeguard infrastructure, information and applications. The Government will also implement the Cyber Security Master Plan. This will boost ICT enabled economic development by providing trust and confidence to users of available services such as the national payment gateway, electronic commodity exchange and general cyber security.

'The Government will fast-track the deployment of broadband in under-served areas using appropriate technologies'

Strategy S3: Consolidate, develop and implement shared infrastructure and services management policies, standards and structures. There is an urgent need to consolidate all currently deployed Government ICT infrastructure, identifying deployment gaps and implementing shared management policies and internationally recognized standards. These policies, standards and structures will be used to guide the roll out of Government shared services.

The government's National Broadband Strategy articulates in greater detail strategies towards the realization of infrastructure and connectivity in the country.

The flagship projects to be implemented before 2017/2018 are:

a) Providing affordable and quality broadband infrastructure to underserved areas.

b) Creating school and health networks that provide broadband connectivity to all schools and health centres, respectively. In Counties with inadequate coverage of hospitals and schools, the network infrastructure will initially be terminated in strategically located public ICT centres.

c) Providing quality and secure ICT infrastructure to all National and County Government offices, while ensuring maximum sharing of ICT infrastructure.

d) Making Mombasa an international internet exchange point

4.3 INTEGRATED INFORMATION INFRASTRUCTURE

4.3.1 Setting the Context

The information infrastructure foundation concerns itself with the creation, continuous update, accessibility, and archiving of public information and other public accessible information in a manner that eases accessibility, communication, dissemination and processing to promote public service delivery, transparency, accountability, and enable the country to transition to a knowledge-based society.

Currently data and information is created and stored in disparate data formats and media, with the bulk being paper based. As a result, such information is difficult to access electronically. Additionally, in most instances, each Ministry, Department and Agency (MDA) has its own data set concerning a similar entity. For example, when a citizen visits a hospital, the hospital stores the medical information, which is not available to another hospital. This is critical especially during emergencies, which can even lead to loss of life. The scenario is replicated across various sectors resulting in fragmented data sets, duplication of effort, wasted resources and inconsistent data. Similarly, there is lack of data linkages between various data sets in instances where the need for cross reference is required for a service to be completed. For example, when a citizen is applying for utilities such as electricity or water, there is a need to provide KRA PIN number which would be made easily available if the two data sets were linked via a data sharing mechanism.

Citizens are also obligated to reproduce documentation of personal information, which is already in the custody of other Government agencies. On the other hand, the Government does not benefit from intelligence information that other public agencies have, for various enforcement programs.

Kenya has made steps towards e-Government services and enhancing transparency by hosting some of the data on the open data gateway. Indeed, Kenya is ranked 119 in the 2012 UN e-Government ranking , upwards from 124 in 2010. However, updating the available information that is online and provision of e-services is neither continuous, nor real time and therefore the expected benefits to users have been unsatisfactory. On the other hand, the trend in data and information is moving towards business intelligent and data mining of large data sets based on a unique identifier concept for policy, decision making, and wealth creation. This has been facilitated by the institutionalization and implementation of public data hubs. However, a unique identifier across the Government is yet to be embraced.

A public data hub is a database which is populated with data from one or more sources (e.g. ministries, government agencies, banks, schools, hospitals etc.) and from which data is then made accessible to various stakeholders, such as ministries, citizens, or software interfaces.

'Kenya has made steps towards e-Government services and enhancing transparency by hosting some of the data on the open data gateway.'

'This Master Plan proposes that Kenya strategically develops and implements public data hubs based on a unique digital ID'

This Master Plan proposes that Kenya strategically develops and implements public data hubs based on a unique digital ID based on a secure infrastructure for efficient and effective citizen centric services, enhance IT- enable democratic governance, and creation of data markets from the public data and information to spur innovative and commercial services and products. In so doing, the information infrastructure should be guided by the legal and regulatory framework outlined in section 6.6.

4.3.2 Driving Forces

The key drivers that have implications on government services and operations are:

a) The need to steward public data and information in line with constitutional and legal requirements for data and access, protection,information security and adopt best practices for data and information sharing;

b) The need to consolidate Government wide IT programs based on a unique identification number for each citizen and establishment, and to align these programs to the emerging data and information trends of public data hubs, data warehousing, data marts and open data;

c) The need to lower operational cost for MCDA's by sharing data & information, associated infrastructure and capacity; and

d) The need to enhance the international image of Kenya as a digital economy able to offer appropriate digital support to other countries.

4.3.3 Desired Outcomes by 2017

The Master Plan envisages improved governance and public service delivery in addition to making information available to all stakeholders. This is critical to avoid duplication and wastage of resources, and high costs, especially with the devolved system of governance.

'Kenya is currently deploying Huduma centres across the country, in its efforts to provide a one-stop shop service to its citizens'

Kenya is currently deploying Huduma centres across the country, in its efforts to provide a one-stop shop service to its citizens. To enhance further and provide a citizen centric one-stop non-stop model of service (see Figure 11), it is envisioned in this Master Plan that the development of Kenya's public information infrastructure will:

a) Enhance public data integrity that facilitates efficient and effective delivery of government services;

b) Improve Kenya's e-Government ranking in the world by at least 15 places; and

c) Improve transparency and accountability through securely accessible public data and information, thereby promoting the international image of Kenya.

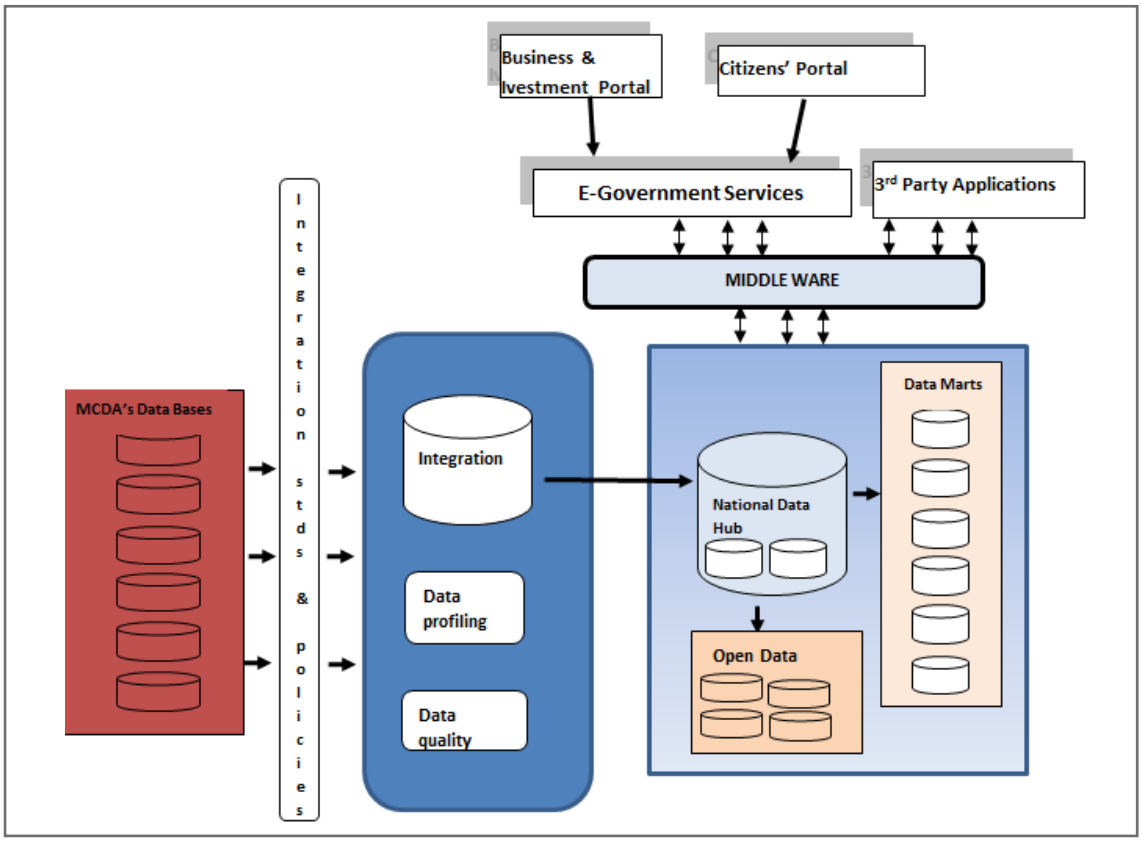


Figure 11: Citizen Centric One-stop Non-stop Model of Service

Source: Authors, 2014

4.3.4 Objectives and Strategies

OBJECTIVE 06: FACILITATE EFFICIENT AND EFFECTIVE GOVERNMENT SERVICES

Strategy S1: Develop and institutionalize an integrated public data and information sharing infrastructure. The Government will focus on continuous improvement and enhancements towards efficient and effective sharing of public data by:

a) Implementing priority national public data hubs (persons, establishments, land and assets), based on the unique identifier concept, and develop middleware API's (standards, processes, policies) to enable information sharing across MCDAs.

b) Developing sustainable automation, digitization and document management programmes for at least 5 priority MCDA's (e.g. Planning & Devolution, Interior & Security, Health, KRA, Education, KIPPRA).

'Strategy S2: Transform public service by developing an environment that values data and information sharing culture, streamline governance structures for managing information sharing'

Strategy S2: Transform public service by developing an environment that values data and information sharing culture, streamline governance structures for managing information sharing (e.g. standards and procedures, management) through a public sector data sharing programme.

a) Data and information sharing culture. Many institutions have not embraced the value of sharing data and information and instead end up duplicating records. They operate in silos, creating their own processes, systems and data centres. All these efforts when considered at a national level, lead to wastage of resources, operational inefficiencies, and in some instances, to lack of human capacity to manage and sustain such highly technical infrastructure. As part of developing the national data hubs, effort will be put to inculcate the culture of data and information sharing.

b) Governance structures for managing shared public data hubs, data warehouses and data marts. Shared information services will require transformation in the aspects of information management, and in line with the mandates of the various MCDA's. In this regard this strategy will facilitate the creation of an enabling environment for the management operations associated with information creation, sharing and enabling updates to the public data hubs.

OBJECTIVE 07: ENHANCE DATA ACCESS AND PROTECTION STEWARDSHIP OF PUBLIC DATA AND INFORMATION.

'Strategy S1: Develop and institutionalize legal framework to enable data and information sharing across Governments'

Strategy S1: Develop and institutionalize legal framework to enable data and information sharing across Governments (Regional, National, and County), citizens, and MDA's. To facilitate the integration of data from the various MDA's, it is essential to implement a legal framework and business processes to support, promote and spur innovation using the public data repository, ensuring operational efficiency by re-engineering processes in Government to eliminate unnecessary bureaucracy and hence enhance efficiency. This will enhance the current open data initiatives, promote the transparency, and create wealth from knowledge in the repositories.

Strategy S2: Develop and institutionalize a middleware platform to enable secure data and information access. This is a soft infrastructure that allows businesses, citizens and other stakeholders to securely access e-government applications, data repositories and information to meet their needs, including analytical and other business needs (see Figure 11 above).

Strategy S3: Develop a cyber security policy. Although there is already a draft cyber security Master Plan, it is necessary to develop a cyber security policy. Such a policy will guide the strengthening of the existing cyber security statutes.

The flagship projects to be implemented by 2017/2018 are:

a) Companies registry database as part of establishments' data hub
b) Integrated persons or civil registry database as part of persons' data hub
c) National spatial data infrastructure (NSDI) as part of land's data hub
d) Assets registry database as part of assets' data hub (e.g. vehicles, buildings, etc.)

05

PILLARS

High school students observe a project at C4DLab, University of Nairobi

5. PILLARS

The pillars are one of the ways of delivering the Master Plan. They are meant to facilitate the achievement of real socio-economic growth and Vision 2030 targets through e-Government services that benefit citizens, businesses and other stakeholders; strengthening local industry using ICT; and creating ICT businesses that help to create a thriving ICT sector. Therefore, three pillars were derived from the situational analysis as outlined below.

a) E-Government Services. Government is by far the biggest player in all key sectors in provision of information and services to citizens, businesses, government employees and other stakeholders. The provision of e-Government information and services is key to improving productivity, efficiency, effectiveness and governance in all sectors.

b) ICT as a Driver of Industry. Transformation of key Vision 2030 2nd MTP economic sectors to significantly enhance productivity and global competitiveness and growth.

c) Developing ICT Businesses. Develop Kenyan ICT businesses that can produce and provide exportable quality products and or services that are comparable to the best in the world. This will in turn help to develop a thriving local ICT sector.

Each of the pillars contains the following:

a) Setting the context, including challenges
b) Key drivers
c) Desired outcomes by 2017, with targets
d) Objectives, strategies and flagship projects

5.1 E-GOVERNMENT SERVICES

5.1.1 Setting the Context

The Government of Kenya (GoK) has been undertaking various initiatives towards an effective and efficient public service delivery. For example, attempts have been made to create an enabling environment for e- Government service delivery that includes improving ICT infrastructure across the country, institutionalizing legal and regulatory Acts and policies, and automation of some services. However, despite these efforts, provision of e- services remains department driven, characterised largely by manual processes with multiple duplications. Even where GoK functions have embraced automated support, the ICT systems are inadequate and segregated with limited sharing of information, hence resulting in inefficient processes and inequitable and ineffective delivery of e-Government services.

'despite efforts by the government, provision of e- services remains department driven, characterised largely by manual processes with multiple duplications. '

To date the key challenges that face Kenya in its quest to provide e- Government services are:

a) Low automation levels of business processes, thus threatening effective service delivery against the backdrop of increasingly high demands for efficiency in Government.

b) Public data and information is stored in silos and disparate non- standard formats that are difficult to access.

c) Silo provision of government services by government agencies that are not citizen centric.

The above challenges will partly be addressed if the one-stop non-stop concept represented in Figure 11 is implemented.

Figure 12 below shows Kenya's e-Government index compared with two countries in the lower middle income (Ghana and Senegal), two countries in the upper middle income (South Africa and Brazil) and one country in high income (Portugal).

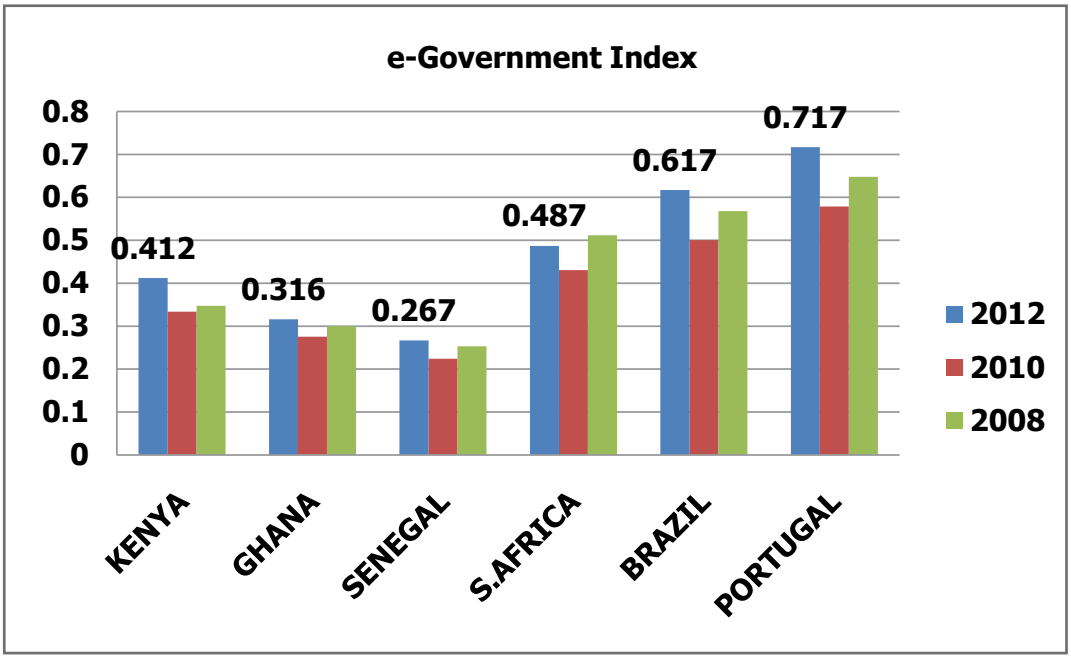


Figure 12:
E-Government Index Comparison

Source: Global e-Government Surveys, 2012, 2010 & 2008

In the e-Government index, Kenya ranks position 119 in 2012 ahead of Senegal and Ghana while South Africa ranks position 101. Brazil and Portugal ranks position 59 and 33 respectively. The e-Government index combines the online services, e-infrastructure index and human capacity index. It is to be noted that Kenya is ahead of LMIC and is close to UMIC level (below rank 100). Development of e-information on policies, laws and an archive section on portals/websites improves the ranking. Kenya will need to improve its e-Government ranking in order to stand a better chance of moving to the middle income country category.

Figure 13 shows Kenya's global rating on ease of doing business compared with two countries in the lower middle income (Ghana and Senegal), two countries in the upper middle income (South Africa and Brazil) and one country in high income (Portugal). As can be noted, Kenya is in LMIC and is ahead of Senegal. Kenya will need to automate certain business processes, especially business registration and investor support processes, in order improve this ranking.

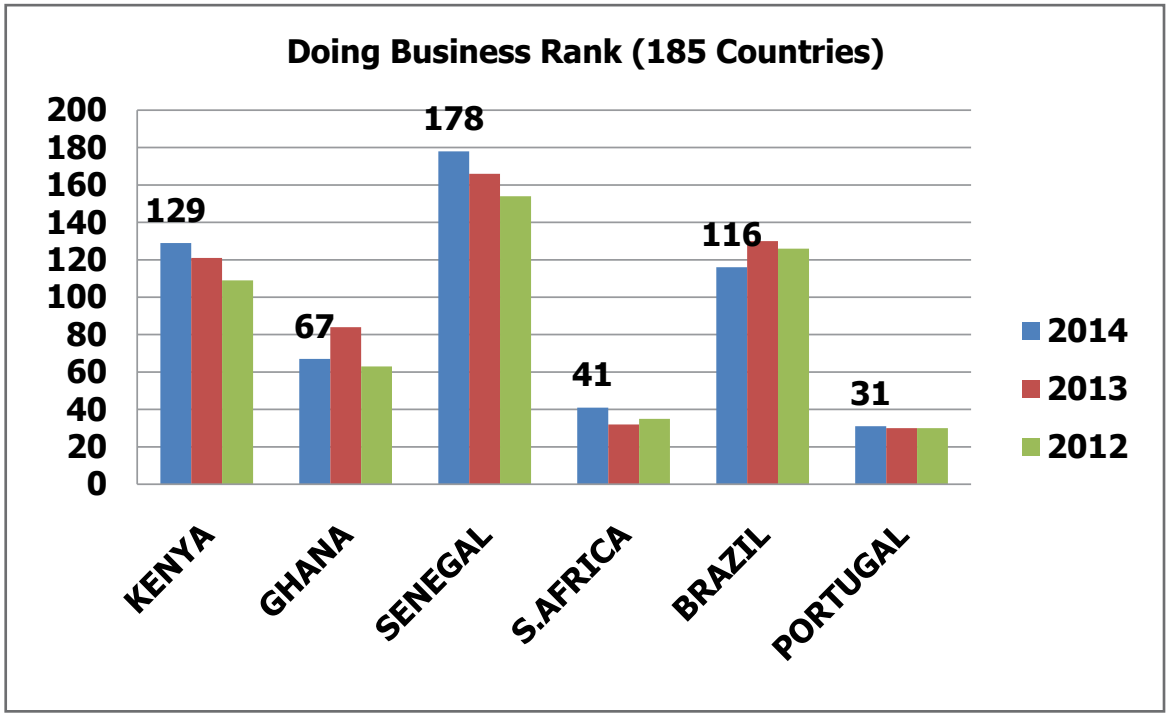


Figure 13: Global Ease of doing Business Comparison

Source: World bank, 2014, 2013, & 2012

5.1.2 Driving Forces

Global trends indicate that Governments have been improving online presence, particularly by, enhancing e-participation of citizens, and provision of e-Government and online services. Within this Master Plan, and in relation to e-Government services, the key driving forces are:

a) ICT will be used to create an inclusive community and to enrich the life of every individual in Kenya by ensuring that Government services conform with Articles 6 and 232 of the Constitution of Kenya 2010;

b) Renewed focus to improve the global image of Kenya, specifically the e-Government ranking and ease of doing business in Kenya to create an economic competitive environment; and

c) Institutionalization of a digital nation, in line with the national agenda and presidential championship for a digital Kenya, for improved efficiency and effectiveness of government operations.

5.1.3 Desired Outcomes by 2017

Kenya's e-Government vision is to provide "a one-stop, non-stop e-Government services"

Under the e-Government services pillar, Kenya's e-Government vision is to provide "a one-stop, non-stop e-Government services", by simplifying government processes and embracing technology neutral operating environments across the entire public sector that support and facilitate inter- agency collaboration in service delivery. The Master Plan intends to achieve the following by 2017/2018:

a) Increased public value of e-Government services with 50% of adults accessing at least one e-service;

b) 8 out of 10 users being 'very satisfied' with the quality of government's electronic services; and

c) Enhanced digital presence & economic competitiveness using ICT, thereby improving the e-Government ranking and ease of doing business rank internationally by at least 15 places by 2017.

5.1.4 Objectives and Strategies

The objectives and strategies over the Master Plan period map out how Kenya will use ICT in service provision across all sectors in pursuit of improved service delivery to citizens and other customers. These are outlined below.

OBJECTIVE 08: OFFER CONSISTENT, INTEGRATED, E-GOVERNMENT CITIZEN CENTRIC SERVICES

Strategy S1: Simplify and automate integrated end-to-end e-Government processes. Majority of citizens' perception of government services is that of cumbersome and redundant processes. In addition, the greatest impediments for investors, both local and international, are the multiple permit requirements and the complexity of the business registration process, which is painstakingly long, inefficient and ineffective at the National and County Governments' levels. The Government will therefore simplify and automate service delivery operations through the respective MDA's, and such processes to be re-engineered, where applicable.

Implementation of integrated systems will provide support for actualization of the one-stop non-stop service model, through the creation of citizens and businesses/ investors portals. These portals will provide for a single point of contact while transacting with the Government. Already some efforts towards this have started in the form of Huduma centres, and Single Window Sign On (SWSO) programs.

There is however an urgent priority to integrate and streamline these efforts into the one-stop non-stop service model. Citizens, investors and establishments will enjoy simpler, convenient and easier interactions with different public agencies seamlessly.

The Master Plan targets to influence the adoption, use and assimilation of ICT by the general Kenyan populace through automating three end-to-end e- Government services

that are regularly used by majority of the Kenyan population and or businesses over the plan period:

a)Universal civil registration system and the associated huduma services.

b)Company registry system and the associated huduma services.

c)National land information management system, relying on a National Spatial Data Infrastructure (NSDI) and the associated huduma services.

Strategy S2: Leverage on e-Government services to create a strategic competitive advantage for Kenya to help boost growth of the private sector. At the National level, the Master Plan will contribute towards creating a strategic competitive advantage for Kenya. The GoK can help boost the growth of the private sector, especially the ICT industry, through partnerships in innovative projects. Its efforts under the Master Plan can also create a pro- business environment that:

Strategy S3: Promote e-Government as theservice channel of choice.

a) Positions Kenya as the preferred transhipment hub in the region for both air and sea cargo;

b) Attracts investors to Kenya; and

c) Promotes Government-to-Government collaborations.

In order to strengthen Kenya's global position as one of the best environments for businesses and to anchor more businesses, the Master Plan proposes a focus on seamless E-Government services for citizens, businesses and investors that includes a citizen portal and a business/investor portal.

Strategy S3: Promote e-Government as the service channel of choice. The Government has embarked on rolling out service delivery centres with dedicated service staff in the County Governments in the form of Huduma centres to reach those without internet access from home or need help to transact electronically. Likewise, statistics indicate a high mobile phone penetration rate in the country. The Master Plan proposes creative exploitation of these facts to improve effective delivery of government services. This will be achieved by adopting IT enabled services (ITES) customer support perspective to support e-service delivery in GoK. To achieve this, an elaborate staff development programme to transform staff to new IT enabled service roles is needed. In this regard, GoK seeks to transform 10,000 public servants to customer contact agents over the plan period; and adopt technology use trends in customer relationship management under a public private partnership model.

'The Master Plan is based on the principle of inclusion and equitable distribution of services'

Youth, gender and vulnerable groups

The Constitution of Kenya recognizes inclusion of all citizens when providing services and mitigating access to services to the youth, gender and vulnerable groups. In relation to the ICT Master Plan, we recognize that the most pressing needs for this category of citizens are access to ICTs at affordable costs and low ICT literacy levels. The Master Plan is based on the principle of inclusion and equitable distribution of services. An overall overriding objective is to provide community based access to ICT infrastructure, use of the Universal Service Fund to bridge the 'digital divide' and develop infrastructure and skills in identified regions that are adversely affected.

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5.2 ICT AS A DRIVER OF INDUSTRY

5.2.1 Setting the Context

The focus of ICT as a driver of industry is to transform the key Vision 2030 economic sectors to enhance their growth, productivity and global competitiveness with special emphasis on SME's.

The current Kenya GDP is US$ 40.70b, which could go higher if SMEs in the various economic sectors driven by ICT can improve their systems and processes through use of technology. The current challenges in using ICT to achieve significant impact on the GDP include:

a) Domination by a small number of favoured local and foreign companies offering ICT solutions to Government and various businesses;

b) Organizations in various economic sectors find it difficult to appropriately use ICT in the business value chain due to inadequate capacity to perform or scale up ICT operations;

c) Inadequate process maturity across the various economic sectors where there is lack of best practice, standards and discipline in use of ICT in the value chain;

d) Limited understanding of the implications of Service Level Agreements (SLAs) to activities of various economic sectors; and

e) A large percentage of informal activities in most economic sectors that are not easily traced and accounted for.

'Energy is one of the key enablers of ICT and has a significant impact on the ability to achieve efficiency in all the sectors.'

With ICT as a driver of industry, it is expected that trade will be an outcome of the ICT adoption in the value chain of the various economic sectors arising from the enhanced efficiency and service delivery in the value chain. Energy is one of the key enablers of ICT and has a significant impact on the ability to achieve efficiency in all the sectors. ICT facilitates the various sectors of the economy resulting to increased knowledge on how the sectors can be improved.

In order to achieve the Vision 2030 objective of driving knowledge economy, the availability, accessibility and affordability of energy to drive the ICT systems is important. Without stable power supply to support ICT value addition in the product and or service delivery processes across the board, the full benefits that ICT brings to the various economic sectors cannot be realised. On the other hand, ICT is also a valuable tool in the efficient generation, distribution and utilization of energy.

The key social and economic sectors which have been selected and whose performance can be enhanced through the use of ICT are outlined below.

HEALTH

Whereas health has been categorized as a social pillar in vision 2030, it is also a key economic sector consisting of service and value addition by various stakeholders. The economic aspect of health significantly contributes towards the growth of businesses in areas such as health insurance, hospital management, pharmaceuticals, medical supply and logistics, patients management and evacuation services. In many rural parts of the country there is an acute shortage of doctors and other health-care providers. Majority of Kenyans lack access to medical care, either because they cannot afford to pay for services or because they must travel long distances to reach the nearest clinic or hospital.

'ICT can be used to facilitate e-health and tele-medicine'

There is an opportunity to use technology to alleviate the shortage of health professionals. For example, ICT can be used to facilitate e-health and telemedicine where facilities such as radiology machines and human resources such as doctors are shared across distributed hospitals. In addition, mobile phone-based applications can be used to provide various medical services. The use of technology in this way will reduce the need for high numbers of health workers.

The flagship project to be implemented is an integrated national health system. This system will integrate the various systems that are developed and implemented in the health sector, including doctors management system, drug supply chain system, and hospital management system for all hospitals. The integration will create a central health data repository shared by all health institutions. It will include a health e-portal that provides services and summary statistics to relevant and authorized stakeholders.

EDUCATION

Education is considered as a social pillar in Vision 2030 but it is also a key economic sector consisting of service and value addition activities by various stakeholders. Its economic aspects touch on service delivery and value addition contributing towards business opportunities in the learning, certification and research processes.

'Due to increased insecurity, the cost of involvement in meaningful economic activities has increased'

The two flagship projects that will be implemented by 2017/2018 are:

- The on-going school laptop project to provide teaching and learning tools for pupils entering standard one in primary schools in Kenya beginning from the year 2014 to transform education and help to create a knowledge society. This project must include: review of school curricula, conversion of courseware into digital form, ICT training for teachers, and broadband internet connectivity to the schools.

- Automation of academic and administrative processes at all levels of education in order to have all education information online. This will include an education e-portal that provides services and summary statistics to the public.

SECURITY

Firms in Africa spend up to 10% of sales on crime and security-related costs. Kenyan businesses spend 4% of sales just on crime insurance. The direct costs of insecurity in the country have had significant impact on asset losses, damage and personal injury.

Due to increased insecurity, the cost of involvement in meaningful economic activities has increased. ICT provides the opportunity to improve on monitoring, evidence capture and reporting, resulting in positive contribution to business growth.

In order to improve security an integrated security, intelligence and surveillance system project will be implemented. Built on the persons data hub, this project will enable the creation of multiple agency database and master data platform, data warehouse, crime analytics, and profiling. The system will provide the police with real time data on incidences and crime suspects providing them with the efficiency required to better manage crime. This project will include the necessary ICT infrastructure to have broadband connectivity in police stations.

AGRICULTURE

The sector has a significant contribution to the GDP of 24% (KNBS, 2012), but the sector is largely informal and inefficient. The indicators of the sector are based on major commodities such as tea, coffee, etc. that are handled with some level of formality. There is an opportunity for using ICT to formalise the sector by collecting data of all farmers on all commodities and to provide a platform to learn about better farming practises to increase production quality and quantity.

A national agriculture commodity exchange will be implemented as a flagship project to facilitate competitive and efficient trade in commodities by providing reliable, timely and accurate marketing information and intelligence to farmers and other stakeholders via mobile phones and other end-user devices and to enable farmers sell their produce through the electronic platform. This platform would enable farmers and producers of primary commodities to access timely and accurate marketing and price information and sell their produce through it. In turn, this action would empower farmers by enabling increased value of their agricultural products and by reduced turnaround time to receive payments (Waema and Katua, 2014). This commodity exchange would include the automation of the tea auction in Mombasa as recommended in a recent study (ibid.). In addition, an electronic animal monitoring system that is able to track livestock ownership for security reasons and feeding practices will be implemented. This will provide end to end data of farm animal produce therefore opening up the global market for Kenyan meat and increased trade opportunities.

'an electronic animal monitoring system that is able to track livestock ownership for security reasons and feeding practices will be implemented'

FINANCIAL SERVICES

Most of the financial institutions are offering mobile banking solutions as a mode of accessing some of the services. The sector has the potential to transform end user adoption of ICT in day-to-day transactions. Over the last three years, Kenya's financial sector has continually raised the bar in terms of innovation and technology use. The commercial banks have been instrumental in opening up opportunity for the marginalized through the extension of innovative services such as, mobile platforms like the M-pesa, mobile banking, micro financing and agent banking.

Kenya is poised to become the financial hub of Eastern Africa. In order to enhance this and increase the contribution of the financial services sector to GDP, a national payment gateway project will be implemented to facilitate secure online payments by supporting multiple financial institutions to carry out electronic transactions and simplify the processing of payments. This will increase the adoption of electronic services especially the internet enabled payments.

TRADE, TRANSPORT AND LOGISTICS

The transport sector grew at a rate of 6.9% in 2010 and 4.0% in 2011 while contributing 8% to the GDP (KNBS, 2012). Transportation in Kenya accounts for 40% of costs of doing business. The current bottlenecks in achieving higher economic growth in the sector are low efficiencies at border points and poor quality of infrastructure. ICTs provide clear tools for improving efficiencies and for tracking and monitoring in this sector. In order to realize development benefits in this sector, the following flagship projects will be implemented:

'Transportation in Kenya accounts for 40% of costs of doing business'

- Single window system to facilitate cross border trade through the submission of regulatory documents such as custom declarations, applications for import/ export permits, certificates of origin, trading invoices, etc on a single entry screen.

- National physical addressing system project that will provide street addressing, numbering and coding of all properties and thereby provide clear logistical support for economic activities, e.g. deliveries.

- Transport integrated management system (TIMS). This includes the automation of key processes in the transport industry, including driver testing, PSV/TLB licensing, traffic violations and prosecutions, motor vehicle inspection, etc. The benefits of this system include:

    - eliminate fraud in the transport industry;
    - improve efficiency and effectiveness in resource utilization;
    - provide a single source of truth on road transportation;
    - improve on compliance to traffic rules and enforcement;
    - enhance access to security of traffic data;
    - enhanced sharing of data within the transport industry; and
    - reduction in accidents and incidents.

5.2.2 Driving Forces for ICT as a Driver for Industry

The following are the drivers for ICT as a driver of industry:

a) The need to automate processes - Majority of processes of institutions as well as economic activities are not automated and therefore creating inefficiencies that can be avoided;

b) Customer preferences for quality products and services. - ICT could provide solutions to challenges of access by enabling greater use of remote access to quality products and services;

c) The need for data and information for policy and decision making on various sectors. - ICT could provide solutions that enable access to data and information on various economic sectors; and

d) Lack of data for informal businesses and the need to formalize the operations of the sectors. - ICT could formalize the operations and activities of various sectors leading to increased contribution to the GDP.

'to contribute directly and indirectly to an additional 1.5% to Kenya's GDP by 2017/2018 to achieve Vision 2030'

5.2.3 Desired Outcomes by 2017

To achieve Vision 2030 goal of Kenya as a regional ICT hub, the ICT sector should contribute directly and indirectly to an additional 1.5% to Kenya's GDP by 2017/2018.

Artist impression of Konza Techno City

5.2.4 Objective and Strategies

OBJECTIVE 09: TO USE ICT AUTOMATED PROCESSES IN THE PRODUCT AND SERVICE DELIVERY VALUE CHAINS ACROSS VARIOUS ECONOMIC SECTORS.

Automation within the manufacturing industries and especially its value chain is likely to increase competitiveness at the local, regional and international markets.

Automation within the manufacturing industries and especially its value chain is likely to increase competitiveness at thelocal, regional and international markets.

Strategy S1: Integrate ICT in service delivery at various levels of the economic sectors.

Strategy S2: Formalize activities and gather sector specific business intelligence data mining for policy and decision-making. This will spawn new businesses (products or services) in various economic sectors. The data collected will provide information for social economic planning.

Across the various economic sectors, companies will be encouraged to spearhead the use of ICT in the value chain of their respective activities right from production to the customer. A process of monitoring and identifying the commercialization of new concepts within various economic areas should be developed and respective business recognised for their ICT adoption initiatives. In Counties with inadequate coverage of hospitals and schools, the network infrastructure will initially be terminated in strategically located public ICT centres.

5.3 DEVELOPING ICT BUSINESSES

5.3.1 Setting the Context

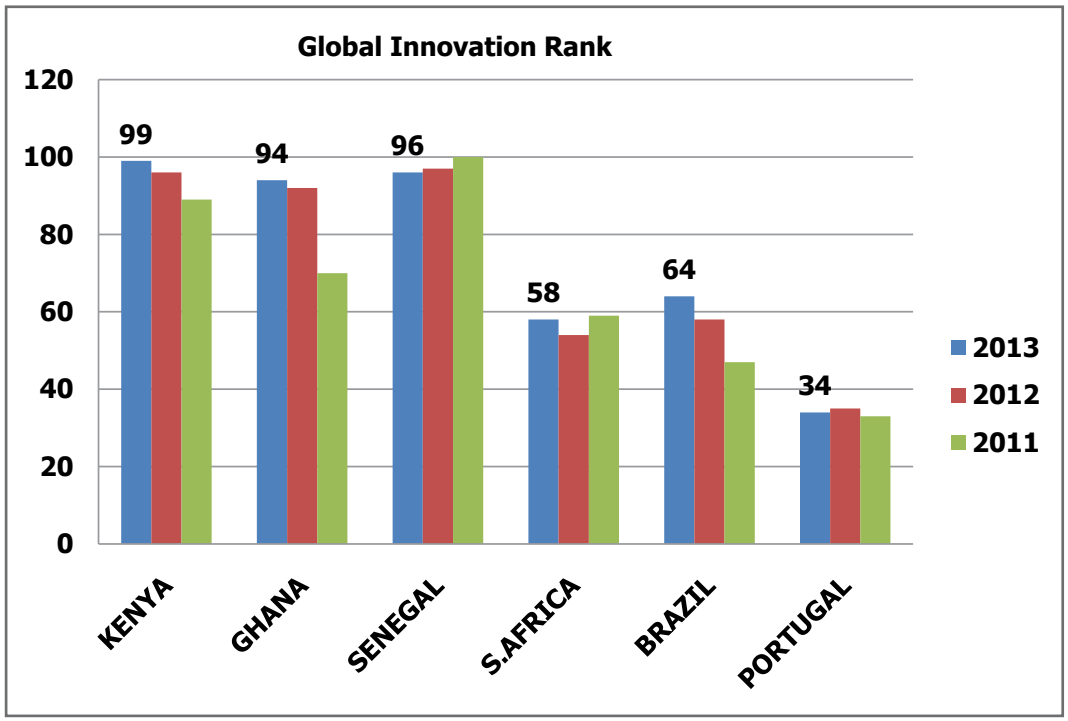
This pillar focuses on developing the information and communication industry through the creation of new businesses that produce products and services that will contribute to jobs and economic development. The pillar has been divided into three areas: technology innovation, IT enabled services (ITES) and development of the ICT sector.

a)Technology Innovation

Technology innovation aims to develop a creative and innovative ICT sector. This shall entail creation of appropriate policies and infrastructure necessary to foster creativity and innovation at all levels. The widely recognized Global Innovation Index (GII) categorizes countries and regions according to their innovative capacity. Innovations are the bedrock of entrepreneurship which translates these innovations into businesses, wealth and high standards of living for a country. This is the reason the top ten countries in the innovation index are rich with high GDPs.

Figure 14 shows the ranking of Kenya in GII, in comparison to the five countries in the various economic levels. Although Kenya has been sliding in the last three years, it is still within the LMIC.

'Innovations are the bedrock of entrepreneurship which translates these innovations into businesses, wealth and high standards of living for a country.'



Source: Global Innovation Index Report: 2013, 2012 & 2011

Figure 14: Global Innovation Rank Comparison

Figure 7 showed Kenya's capacity for innovation compared with two countries in the lower middle income, two countries in the upper middle income and one country in high income. It showed Kenya's capacity for innovation is comparable to that of both UMICs and HICs. Kenya needs to build on this capacity to develop and nurture ICT innovations.

In the recent past, Kenya has generated very many ICT innovations, and hence the relatively good ranking in capacity to innovate (Graham and Mann 2013). What however is missing is converting the new innovations into commercial products run by successful businesses. This should be one of the focus areas for the Master Plan.

b)I T Enabled Services (I TES)

Business process outsourcing (BPO) was identified as a key economic sector under the economic pillar of Vision 2030 in the first MTP. According to a recent study (Graham and Waema, 2014), although the country has been moderately successful in attracting foreign BPO firms to Kenya, the focus on international BPO work has not succeeded as originally envisioned and Kenya has not been able to build a positive and successful brand around the BPO sub-sector. There are three possible explanations why BPO has failed to realize the gains envisioned:

'although the country has been moderately successful in attracting foreign BPO firms to Kenya, the focus on international BPO work has not succeeded'

- The strategy for BPO focused on the international market before developing local clients, including Government. This lack of focus on development of a local outsourcing industry to grow the local BPOs and ITES companies and give them the capacity to deliver on larger projects was fatal to developing depth in the industry and spurring large scale companies.

- In the low-end BPO space, Kenya will never be able to compete with the economies of scale that India or the Philippines offer. It will,however, be able to occupy certain strategically useful niches like impact sourcing (ibid.).

- In the intervening period, there have been changes to the global BPO and Outsourcing industry which has rendered the traditional BPO market that Kenya had been focusing on less attractive. For instance, global outsourcing contracts are increasingly larger in scale and bundled i.e. they include various services e.g. IT support, help desk and contact centers. Also due to the competitiveness of the global outsourcing market, the deals also have smaller margins.

The lessons learned from these challenges have been used in this Master Plan for the re-engineered ITES sector to be successful. Although the low-end BPO work will continue to provide much needed jobs, the high-end IT outsourcing work will contribute to both value capture and skills development in Kenya (ibid.). In this Master Plan, more emphasis will be put on ITES to signal a move away from BPO because of some of the reasons given earlier.

c) Development of the ICT Sector

Kenya has a leadership position in terms of mobile applications and services. This leadership position is largely attributable to innovations in mobile money transfer services. However, there is an opportunity to build on this leadership role and become a leader in applications and service. In addition, there is potential for Kenya to develop local capacity for assembly and light manufacturing of ICT devices and accessories and in turn create a significant economic sector.

'Kenya has a leadership position in terms of mobile applications and services'

The development of ICT products and services has faced two key challenges: the fact that ICT is presently considered as a sub-sector and lumped with other sectors like transport or previously in Commerce and Industry, has inhibited the realization of the potential of this sector; and there is lack of legal framework for protection and enforcement of copyright and other IP laws. In order to spur the growth of ICT, there is an urgent need for proper categorization of ICT as a full-fledged economic sector with its own classification standards.

An additional challenge in developing the Kenyan ICT sector is the widespread notion that we can only focus on mobile innovations. Why is it not possible to manufacturing computer parts, developing enterprise software for the local and regional markets, etc. We need to deal with this during this planning period.

Syokimau Railway Station vision 2030 flagship project

5.3.2 Driving Forces

a)Technology I nnovation: Despite the current low innovation index for Kenya, the country has huge potential for developing innovations in the ICT sector, as was illustrated in Figure 7. Progress has been made in developing infrastructure, especially broadband and mobile telecommunications, as well as in the regulatory and business environments. The following are the key forces that will drive innovation in the ICT sector:

- Widespread adoption and use of mobile phones by the population.
- Availability of broadband that covers large parts of the country.
- Population that is composed of large numbers of educated but unemployed youth.
- Widespread availability of tertiary and higher education.
- Government commitment to research and innovation through establishment of KENIA, National Research Fund, and National Commission of Science, Technology and Innovation through the Science, Technology and Innovation Act of 2012.

b)IT Enabled Services: There are three major driving forces for the development of the ITES sector:

- Employment creation - This is the ability of IT outsourcing companies to generate jobs, especially those that can export their services and or expand into the region.

- Efficiencies from adoption and utilization of IT - The National Government has already made a commitment to Vision 2030 and as such should direct its State Departments and all Government Owned Entities (GOEs) to utilize local IT outsourcing companies to provide non-core services. This would realize efficiencies in Government while also providing the requisite leadership.

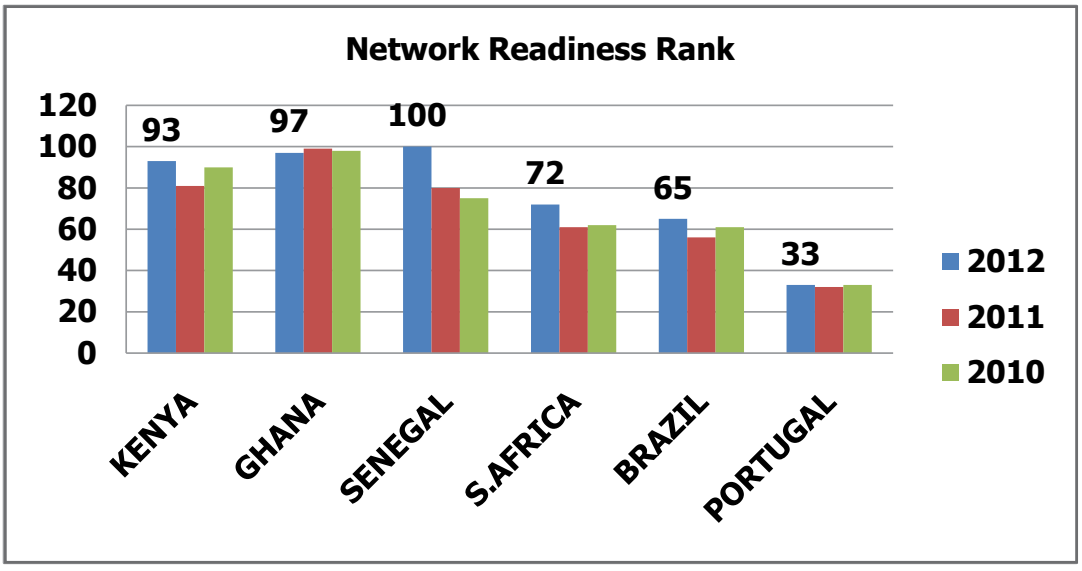
- Development and growth of local IT outsourcing businesses - The procurement and other laws (e.g. data protection) are limiting the growth of the sub-sector. Although the government has set aside 30% of all public procuremrnt spend to small and medium enterprises owned by the youth, persons with disability and women by amending Public Procurement and Disposal (Preference and Reservations) (Amendment) Regulations, this is not enough. In order to further spur the growth of the local ITES companies, further amendments in the procurement law with respect to ICT are necessary to enable local ICT companies to scale up and contribute to the growth of the ICT sector.

c)Developm ent of the I CT sector: The driving forces for developing the ICT sector in Kenya are:

- The proliferation of mobile phones in Kenya and the ease of adoption of mobile based services.
- The introduction of laptops in primary schools will create pressure for local content, the need to set up local businesses for maintenance of laptops and associated school equipment, and local assembly of these gadgets in order to sustainably roll out to all levels of education in both primary and secondary schools.
- There is a need to offer and deliver both public and private online services for a population that is primarily rural and young.

Figure 15 shows Kenya's ranking on the Networked Readiness Index (NRI) compared with two countries in the lower middle income (Ghana and Senegal), two countries in the upper middle income (South Africa and Brazil) and one country in high income (Portugal). NRI is a composite indicator composed of environment, readiness of a society to use ICT, usage by all main stakeholders and impact of ICT on economy and society. By 2012, Kenya was better than the LMICs. With the flagship projects proposed in this Master Plan, Kenya will improve on this index, largely because of the improved readiness of society to use ICT that will be realized and the expected huge impact of ICT.

'the government has set aside 30% of all public procuremrnt spend to small and medium enterprises owned by the youth, persons with disability and women'



Source: WEF: Global Information Technology report: 2012, 2011 & 2010

Figure 15: Networked Readiness Rank Comparisons

5.3.3 Desired Outcomes by 2017

The following outcomes will be expected by 2017:

a) At least 180,000 direct jobs.
b) At least 55 ICT companies established.
c) Improved global competitiveness (improve Kenya's both GII & NRI by 15 points).
d) At least 10 successfully commercialized application innovations (one of which is M-pesa type).

e) Additional 1.5% contribution to GDP by 2017/18.
f) ICT is classified as an independent sector by 2016.
g) Recognition of Kenya as a regional ICT Hub.
h) Retention in the country of at least 60% of revenue raised from ICT IPs.

5.3.4 Objectives and Strategies

The following objectives and strategies will be pursued to achieve the outcomes outlined above by 2017.

a)Technology innovation

OBJECTIVE O10: WORK WITH THE RELEVANT STATE DEPARTMENTS TO PROMOTE ICT INNOVATIONS AND THEIR COMMERCIALIZATION

Strategy S1: Establish innovation centers of excellence (CoEs) and science and technology (S&T) parks for R&D for developing ICT applications and services. There is an opportunity to build on current strengths and become a leader in ICT applications and services. By 2017, at several CoEs and S&T parks should be established that will focus on R&D in ICT applications and services. The centers and S&T parks will be enabled with capacity to provide incentives for R&D efforts in ICT applications development and innovations. They should also have capacity to handle research funds that may come from grants, gifts, endowments, etc.

'It is important that support is given for innovation hubs and clusters outside of Nairobi.'

In addition, it is envisaged that the CoEs and S&T parks will collaborate with the private sector to develop ICT innovations that are relevant to the market. They will also be linked, physically and virtually, with other innovation centres to create a physical and virtual innovation clusters. It is important that support is given for innovation hubs and clusters outside of Nairobi. There is an opportunity for one cluster to form around Konza Technocity.

Through these innovation centers and clusters, leading experts and innovators will be acknowledged, recognized and rewarded.

Strategy S2: Promote technology innovation through Government. This will be achieved through the following actions:

a) Implementation and management of public data hubs (persons, land and infrastructure, establishments, and assets) to accelerate the development of commercially viable applications by public and private sector.

b) Implementation and management of middleware, open architectures with application development engines and portals to create a conducive environment for rapid development of free and commercial services for citizens by the public and private sector.

c) ICT Authority and the Ministry of ICT meaningfully engaging and re-establishing links with the local technology community and not just the big players.

d) Facilitation of competent local companies to build and deploy proprietary technologies to complement the electronic public service delivery system.

e) Partnership with Kenyan companies to protect Kenyan technology innovations and market them to the African region and the rest of the world. It is anticipated that these technologies will be sold to at least five regional and international governments.

Strategy S3: Create programs to support commercialization of innovations. Programs to support commercialization of innovations are necessary in linking talent, technology, capital, and know-how in an effective framework to foster the growth of new businesses. To spur the birthing of innovations, various sectors of the economy such as health, education, etc. can be targeted with grants to develop applications that are specific to the sector. The idea of incubators to support new start-ups will be pursued through the creation of a national framework for business incubators. A directory of incubators in the country and their capacities will be created.

'To spur the birthing of innovations, various sectors of the economy such as health, education, etc. can be targeted with grants to develop applications that are specific to the sector'

In addition, the Government will provide commercialization support framework for innovations, e.g. incentives to local firms involved in manufacture of software and hardware. Furthermore, to showcase the innovations coming out of R&D, a national annual innovations' week will be observed with documentaries of the innovations presented with high publicity.

Strategy S4: Promote commercialization of government ICT services. This will be achieved through the following actions:

- Re-organize ICT service delivery into efficient and effective methodologies borrowed from the private sector.

- Formation of government infrastructure management SPV in partnership with private sector.

- Develop government ICT resources such as the data centre, wide area network (WAN), and ICT units in ministries into commercially-viable, managed services which are "sold" to Government departments.

- Incorporate companies to run the most effective government ICT businesses.
- Make the most successful companies independent and sell them to the public.

'Strategy S5: Promote Intellectual Property Rights (IPR) to safeguard innovations.'

It is anticipated that Managed Units to deliver ICT in 18 ministries will be developed.

Strategy S5: Promote Intellectual Property Rights (IPR) to safeguard innovations. Respect for and protection of intellectual property rights is of utmost importance for any process involved with innovations. Any organization or individual that invests in R&D do so on the basis that their innovation will have the opportunity to earn a return on investment. Without a return on innovation, the ability to continually innovate diminishes. This ability requires that IPRs be both respected and protected, a key factor in establishing a culture of innovation and achieving scale. The Kenyan IP law is presently weak and ineffective. There is a need for reviewing the IP law to allow for creating capacity and ensuring enforcement.

b)IT Enabled services (I TES)

OBJECTIVE O11: GROW THE NUMBER OF ITES COMPANIES AND THE RANGE OF SERVICES PROVIDED

Strategy S1: Promote outsourcing of government ICT operations. Candidate services for outsourcing include contact center services, records management, digitization, data storage, etc. This will be achieved through the following actions:

- Promoting policies and incentives to transform government ICT operations within Ministries and Counties from procurement of products and people to procurement of services from the private sector.

- Developing local Government contractors with the right competence and clearance level to provide secure ICT services for the Government of Kenya.

It is anticipated that there will be delivery of managed units with private sector participation to 18 Government ministries.

Strategy S2: Encourage local firms to outsource. This may include the provision tax or other incentives to promote the use of Kenyan IT outsourcing companies (excludes multinational companies with offices in Kenya). It may also include creating awareness and providing education and training to potential outsourcing customers on risk mitigation (contracts, SLAs, ownership, etc.).

Strategy S3: Develop the ITES industry to go international. Kenya is widely perceived to be a thriving technology cluster. The power of this brand should not be underestimated, and many in Kenya's BPO/ITES have used it to their advantage (Graham and Waema, 2014). One of the ways of developing the industry to go international is through the Government incorporating leading private sector ITES companies in all international delegations as well as providing business negotiation assistance.

'Strategy S2: Encourage local firms to outsource'

Strategy S4: Integrate ITES into all national policies and development of industry ITES standards to create depth in understanding of ITES to ensure growth of the industry. Government will work with the relevant industry association(s) to set standards and ethics and to establish policy to set up governance of local association to drive standards and ethics in the ITES sector.

c)Developm ent of the I CT Sector

OBJECTIVE 012: GROW AND MONITOR THE LOCAL ICT INDUSTRY

Strategy S1: Develop standards and guidelines for software and hardware manufacturing that are internationally recognised and accepted as best practises.

Strategy S2: Support Kenyan ICT companies through local procurement and export promotion frameworks. Many Kenyan ICT firms stress that they are often at a disadvantage in tendering processes. Tenders are often configured to require or encourage formal guarantees, foreign backers, or large capital resources (ibid.). Although the government has set aside 30% of all public procuremrnt spend to small and medium enterprises owned by the youth, persons with disability and women by amending Public Procurement and Disposal (Preference and Reservations) (Amendment) Regulations, this is not enough. Purposeful support to local firms will be achieved through the following actions:

- Draft and promote the passing of an "Economic Empowerment" law (cf. Zambia) that promotes involvement of local companies in all Government procurements.
- Develop and implement a growth framework that complies with the law in giving ethical and competent Kenyan companies pre- qualification and preference in ICT procurements in Ministries and Counties. This will include review of the stringent requirements that knock out local companies, e.g. three year trading history, capital requirements, bid bonds, etc.

- Reward Kenyan companies that implement excellent projects in an ethical manner with preferential classifications and opportunities to join Government delegations on marketing trips in the region and across the globe.

Strategy S3: Form effective partnerships to create an excellent growth environment for local ICT companies. This will be achieved through the following actions:

- Forming and managing an effective partnership with the National Environmental Management Agency to implement the National e-Waste Policy.

- Forming and managing an effective partnership with KenGen and KPLC to fast track the provision of sustainable energy throughout the country to provide sufficient, clean energy for growth of use of ICT.

'Strategy S2: Support Kenyan ICT companies through local procurement and export promotion frameworks'

With this strategy, we expect successful implementation of NEMA's commercial e-waste management programme and Government's digitization programme.

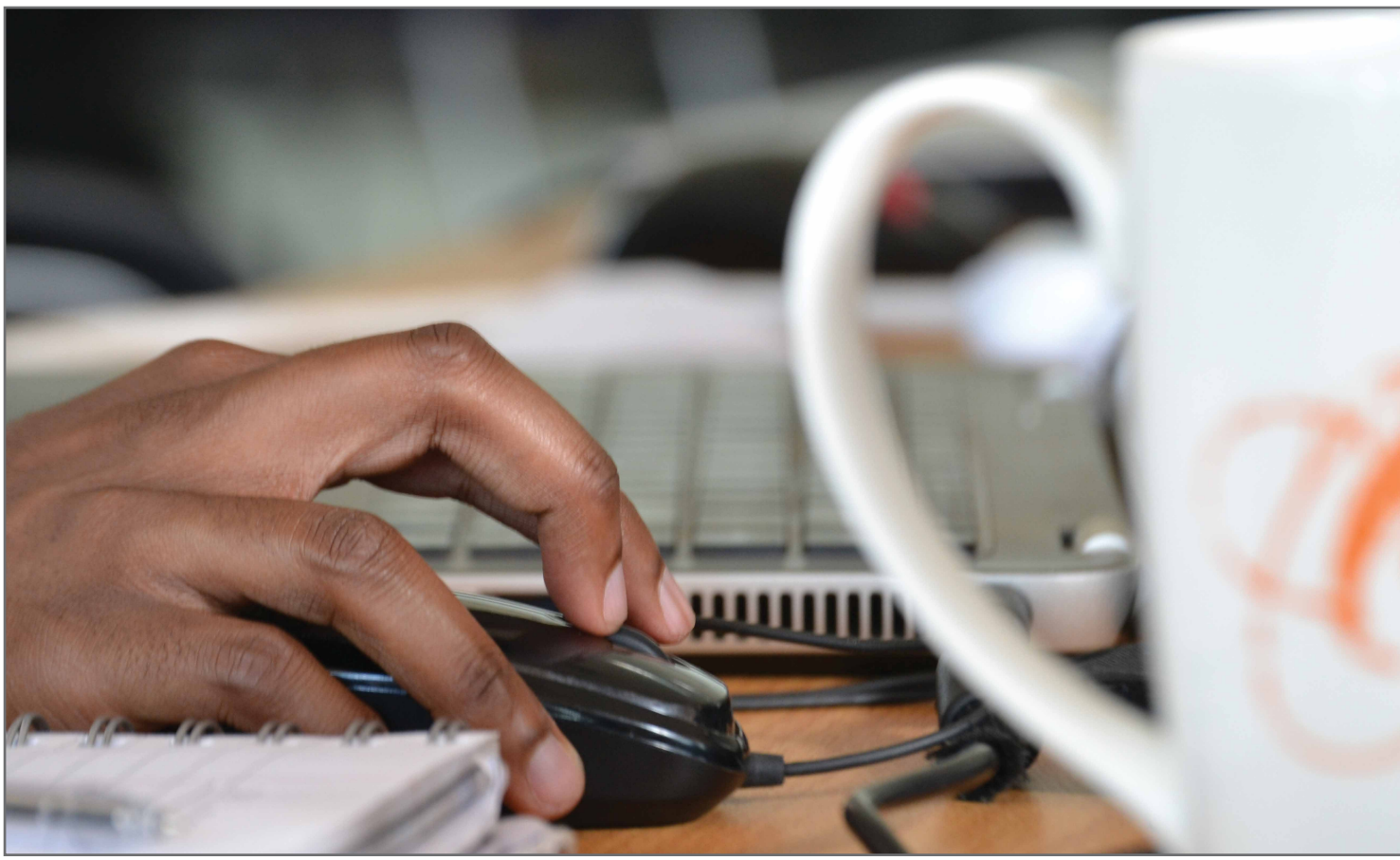
Strategy S4: Provide incentives to promote digital local content development. This can start with the Government showing commitment to encouraging consumption of local content (Buy Kenya, Build Kenya; Brand Kenya) while providing incentives producing and exporting digital content. In addition, the Government needs to create a platform for private sector to develop digital local content.

Strategy S5: Categorize ICT as a stand-alone sector with its own classification standards. The International Standard Industrial Classification (ISIC) or OECD classification standards may be customised for this new economic sector. Although KNBS has started migrating from the ICT indicators in ISIC Rev. 3.1 to those in ISIC Rev. 4, the ICT sector indicators that need to be customised are shown in Annex 3. Additional ICT indicators in health and government from Mauritius have been included.

Strategy S6: Facilitate data collection on ICT as an economic sector by relevant Government Departments and Agencies. This will enable the line State Department measure the delivery of set targets of this ICT Master Plan. In this connection, the ICT State Department will need to work with the Kenya National Bureau of Statistics and the Planning State Department to collaborate in data collection, monitoring and evaluation respectively.

06

IMPLEMENTATION



6.1 FINANCING

Achieving the vision of the National ICT Master Plan will require the mobilization of significant financial and human resources. Funding of the flagship projects in this Master Plan will come from the National and County Governments, development partners and other public or private institutions through Private Public Partnerships (PPPs) and collaborations.

In 2011, ICT spending was US$860 million. Government of Kenya spent 0.3% on IT as a percentage of overall spending. This will need to increase and be reallocated based on planned priorities. Most Government ICT spending is on hardware at 65% compared to global benchmark of 18%. IT spending on staff is significantly lower at 18% as opposed to 38% for global benchmark.

'Due to financial limitations in public and official development assistance, it is essential to develop innovative funding mechanisms to mobilize additional resources from other sources'

As shown in Table 1, Kenya spent 9.3% of its ICT spending on computer software and services in 2009, a further confirmation that a significant amount goes into hardware. South Africa spent the highest proportion of 22.4%. There is a need to benchmark this spending with global standards.

Due to financial limitations in public and official development assistance, it is essential to develop innovative funding mechanisms to mobilize additional resources from other sources as outlined below.

Sources of Funding

The following are the envisioned sources of funding for the ICT Master Plan:

1. Government: The Government shall fund the foundational pillars through a re-focused expenditure planning model. This shall be facilitated through the Government budget and allocations such as:

   a] Increase Government spending on ICT from 0.3% to 5% of National and County Government budgets from 2015/2016, as recommended in the National Broadband Strategy.

   b] Use of Universal Access Fund (which loops in 0.5% of turn-over of ICT operators and service providers) from 2015/2016 to fund broadband roll-out in under-served areas, as recommended in the National Broadband Strategy.

   c] Use of the Equalization Fund to fund ICT projects in marginalized counties from 2014/2015.

   d] Use the National Research Fund (2% GDP) or other Government Supported Venture Capital Fund to finance and commercialize ICT innovations.

   e] Provision of risk guarantees for micro and small businesses through a statutory prescribed agency.

   f] Consolidate all Ministries' ICT budgets by 2015/2016 for ICT projects only.

2. Private Sector: Development of suitable incentives and tax breaks to private sector both within and outside the ICT sector to fund the Master Plan projects. Global Venture Capital and Angel organizations will be encouraged to set up business

in the country. The incentives may include; Development of Special Purpose Vehicles/ Private Sector Consortiums and waivers on certain levies, licensing fees, tax incentives and tax breaks.

'The Government shall fund the foundational pillars through a re-focused expenditure planning model'

3.Development Partners: Kenya will leverage on our funding priorities when approaching development partners who have ICT at the top of their support priority lists to meet the costs of ICT related expenditure.

4.Capital markets: This needs to be developed to support the issuance of relevant instruments (such as ICT infrastructure bonds), which are considered to have investment grade credit rating. The National Broadband Strategy recommends KES 70 billion broadband infrastructure bond to fund broadband strategy implementation.

5.Small Business Administration Agency:Working with the commercial banking sector through existing channels to develop appropriate modalities to get potential innovations commercialized. The Small Business Administration Agency will provide Government guarantee to the commercial banks to facilitate financing of ICT innovations by 2015/2016.

ICT Budget Domains

Essentially there will be three levels at which ICT budgets will be domiciled.

a) Centralized sourcing and view of all shared services items.These should be under the ICT Authority. In return, ICT Authority will be required to provide clear SLAs to all the entities consuming the services. These include: Communications connectivity (LANs, WANs, Backbone links (fibre, wireless), etc.); Data Centres and Servers; Software Licenses (such as Oracle, Microsoft, DMS, etc.); and Computing Devices (at a later stage to leverage on economies of scale and framework contracting). The budgets for these items should be held solely at the line Ministry (MoICT).

'Development of suitable incentives and tax breaks to private sector both within and outside the ICT sector to fund the Master Plan projects'

b) For specific 'business' systems in the different Ministries, the functional aspects of the system will belong to the Ministry.ICT Authority will work with the specific Ministry to deliver the required functionality to ensure seamless integration and interoperability. Nevertheless the common items such as the Data Centre, Database platforms etc, will leverage on the shared services and will be provisioned accordingly. The budgets for the specific functional systems will remain with the Ministries who will work closely with the ICT Authority (as per the Governance stipulated in section 6.2).

c) For the common use items such as desktops, consumables, etc, these budgets will be left with the Ministries. Guidelines & standards will be used to streamline all these procurements. Use of framework contracting will be introduced to ease and streamline this component as well.

The Inter-Ministerial Committee (see section 6.2) will have a view of all the budgets and their application.

6.2 INSTITUTIONAL FRAMEWORK

The ICT State Department and the ICT Authority will work with National Government, County Governments and other departments and agencies to manage the various actions and initiatives in this ICT Master Plan. This section spells out how the structure within the ICT Authority will ensure implementation of the Master Plan and how this structure will relate with the key sectors of the economy as well as the County Governments.

Implementation of the Master Plan will require coordination of many Government departments, public and private institutions as well as the civil society.

6.2.1 Institutions Involved in ICT Projects

'In the year 2004, the Government created the Directorate of E-Government under the Office of President to coordinate all E- Government services in the Ministries as well as semi-autonomous Government agencies (SAGAs).'

Prior to the year 2004, critical e-Government services were operated by the Government IT Services (GITS), a department in the Ministry of Finance. The main services included payroll services and the integrated financial information system. In the year 2004, the Government created the Directorate of E-Government under the Office of President to coordinate all E- Government services in the Ministries as well as semi-autonomous Government agencies (SAGAs). GITS was to be under the Directorate of E- Government but it continued to work under Treasury.

In the year 2007, the Kenya ICT Board was created to market Kenya as regional ICT hub. It was also selected as the executing agency for the Kenya Transparency and Communication Infrastructure Project (KTCIP) World Bank credit of $114.4 million that was to finance ICT projects in government, universities and colleges, and some selected ICT industries. While it managed to market Kenya as a regional ICT hub and also executed several high-impact projects in government, judiciary and universities by the year 2012, the execution of e-Government projects created an overlap between the role of Directorate of E-Government and that of the Kenya ICT Board.

Consequently, the Government created the Kenya ICT Authority (ICTA) as a state corporation under the State Department of ICT through a Legal Notice No. 183 of August 2013. The Kenya ICT Authority merged GITS, Directorate of E-Government and Kenya ICT Board. ICTA was seen as the vehicle for executing and operating all information systems services and ICT infrastructure projects in the public sector.

The Connected Kenya 2017 Master Plan launched in February 2013 had identified the Kenya ICT Board as the institution that would provide leadership during implementation. This leadership role shall now be provided by ICTA. However, there will be a need to change the governance and mandate of ICTA in order to make it effective for providing leadership in ICT in the public sector.
Apart from ICTA that is envisaged to provide leadership role in this Master Plan, there are other existing institutions that shall be critical for implementation of the ICT Master Plan. These include:

a) The Communication Authority of Kenya (CAK), formerly Communications Commis sion of Kenya (CCK), the ICT sector regulator. Since CCK was created in 1999 under the Kenya Communication Act of 1998 (KCA 1998), it has overseen the phenomenal growth of the telecommunications, broadcasting, internet and mobile money transfer services in Kenya. Kenya Communication Act 1998 has now been amended to the Kenya Information and Communications (Amendment) Act, 2013 (no. 41A). CAK also operates the Universal Service Fund that will be crucial for extending critical ICT infrastructure in marginalized areas.

b) The Kenya Innovation Agency (KENIA) is a new agency that was created by the Science Technology and Innovation Act of 2013 but has not yet been operationalised. This body will manage the national innovation system, that will include innovations in ICT, and it will be under the State Department of Education, Science and Technology.

c) The Commission for Revenue Allocation (CRA), a constitutional body that determines how the Government revenue is to be allocated. It operates the Equalization Fund that could be used for building ICT infrastructure and systems in marginalized counties.

d) The National Communication Secretariat (NCS) which is under the State Department of ICT is responsible for policy development.

Information systems are widely used in other critical Government institutions such as Central Bank of Kenya, Kenya Revenue Authority, and the Judiciary that also provide e-Government services. Although the primary mandate of ICTA is the public sector, it shall be required to also ensure seamless integration with the private sector information systems.

'The National Communication Secretariat (NCS) which is under the State Department of ICT is responsible for policy development.'

6.2.2 Institutional Capacity Limitations

'ICTA is an ICT leader with oversight over all flagship ICT projects'

In addition to the challenges in capacity highlighted in Section 4.1, ICTA is perceived as a statutory body under the Ministry of ICT rather than an ICT leader with oversight over all flagship ICT projects, although the legal notice order that created ICTA gives it mandate across the public service. This perception will need to be changed rather quickly. In addition, the terms of service and organizational environment for recruiting and retaining high-end ICT professionals required to participate in procurement, implementation and operation of e-Government information systems and networks required to provide e-Government services shall need to be revised. There shall also be a need to transform the culture of ICTA to one that is result-oriented and where the remuneration is competitive.

6.2.3 Proposed Governance Structure Changes

In order to address the above limitations of ICTA as the agency that shall provide leadership, the following changes are required:

a) ICTA Chief Executive Officer shall be a secretary to an ICT Oversight Committee that shall be chaired by the President of the Republic of Kenya. This committee shall be created by the amended legal notice and shall approve all flagship projects under different state departments, monitor the status of implementation of the Master Plan and resolve any inter-ministerial conflicts and challenges.

b) The ICTA CEO shall advise the President, through the Cabinet Secretary, on all ICT matters.

c) The Chief Information Officers of the different state departments in Government shall constitute a working group under ICTA that shall be chaired by the CEO of ICTA. The working group shall scrutinize all ICT budgets and approve them before they are included in the state department.

d) A working group of County Executive for ICT shall also be chaired by the CEO of ICTA and shall have the mandate to review and approve all County ICT budgets and projects and to align them to national priority areas as defined in this Master Plan.

e) ICTA shall have the overall mandate of analyzing data on ICT education and professional development and to maintain a database of ICT professionals in Kenya. This role will be defined in the amended legal notice

'The ICTA CEO shall advise the President, through the Cabinet Secretary, on all ICT matters.'

In addition, the ICT State Department shall have the overall mandate of overseeing ICT staff development in the public and private sector. This will be achieved through a working group on ICT Professional Development under the State Department and drawn from representatives of private and public sector organizations involved in professional development of ICT staff.

All of the above changes shall be effected within the first year of the launch of this National ICT Master Plan.

6.2.4 Other Changes

ICTA has both an ICT leadership role as well as an operational role. Since the Government is large, this structure could lead to having a large and bureaucratic organization.

ICTA shall therefore be transformed to an organization that only provides the high-end ICT professional services to the state departments, County and other organizations that shall be implementing the large flagship projects. All end-user computing and ICT operational services shall be carried by independent ICT units in each of the state departments. The key high-end ICT professionals shall need to be considered under a separate scheme of service, comparable to those of leading public service enterprises, to be able to attract and retain them. This scheme needs to be developed and presented to the relevant authorities for approval as soon as possible. This includes the Salaries and Remuneration Commission (SRC).

This means that ICTA shall remain a relatively small organization with a staff complement of about 100 high-end ICT professionals and support staff. Most of the staff members shall have very detailed knowledge of ICT and many will have post-graduate degrees in business, engineering, computer science or information systems.

6.3 PROJECT MANAGEMENT

6.3.1 Introduction

Research has shown that ICT projects, especially in developing countries like Kenya, have high failure rates, either as partial failures or total failures where projects do not meet the expected results. The National ICT Master Plan identifies strategic flagship projects, that if well executed, have very high impact to the country in terms of service delivery to citizens, businesses and inter-Government agencies. The projects identified cut across various ministries and agencies in the country.

'For the Master Plan to be successful, a consolidated management approach to projects should be adopted to i nclude all aspects such as risk management, technical resource consolidation, and address critical success factors identified'

For the Master Plan to be successful, a consolidated management approach to projects should be adopted to include all aspects such as risk management, technical resource consolidation, and address critical success factors identified, e.g. change management in the affected agencies, ICT human resource capacity, attitude and soft skills, etc. The benefits of project management include:

- coordinated approach to execution of ICT projects;
- increased success rates of ICT projects implementation; and
- increased benefits realization.

Particularly, the following are recommended as key issues to guide ICT projects implementation.

- ICT leadership is critical in facilitating business process re-engineering where applicable, developing and implementing change management and other implementation interventions.

- Collaborative approach to project management as driven by the nature of ICT projects. MDA's should own the automated functions and processes.

- Adoption of a Standardized Project Methodology that facilitates clear reporting and monitoring of progress across all the stages of the project life cycle.

6.3.2 ICT Project Life Cycle

The project framework will be aligned with the best practices for project management. We recommend that the five stages of the project life cycle shown in Figure 16 be adopted for all ICT projects.

Figure 16: The ICT project life cycle

Each of these stages is outlined below.

Project concept

The purpose of the concept stage in project management is to communicate high-level information about an idea for an ICT project. At this stage, ICT projects are assessed at a high level for their potential value, their alignment with the National ICT Master Plan, and whether they overlap with other existing or proposed projects. The major output of this stage is a concept statement. Usually written by the Project Owner, this statement captures the intent of the project giving the Project Manager, Project Owner, ICTA and all other stakeholders a starting point for initiating a project.

Project initiation

Project initiation involves, among other things, definition of the objectives and scope of the project. This will take place after evaluation of the project against the selection criteria in Annex 4. The MDA project team shall refine the scope of the project and seek the necessary approvals to start the project. This approval will involve ICTA and the National Treasury, working with the owner of the project. It is to be noted that no project will be initiated unless it is either planned in or is deemed to be aligned with this ICT Master Plan and funds have been committed to it.

Project initiation involves, among other things, definition of t he objectives and scope of the project.

Project planning

The purpose of the planning stage is to define the project scope, develop the project management plan, and identify and schedule the project activities that occur within the project. In this phase, the MDA project team shall fully define, baseline, and document the extent to which the project will be deployed, and the timeline and resource requirements for the entire project. This plan should identify required human resources, ICT facilities, integration requirements, etc. and the cost of all the components.

Project execution

This stage details how the project shall be executed. It is to be noted that change management, training and capacity building will be undertaken throughout project implementation to ensure that by the time the project is commissioned, all users have been adequately trained and have the requisite skills and competencies to perform their jobs in the new ICT-driven work environment. Further, change management will ensure that an organizational culture that is supportive and enabling for ICT adoption and use has been developed.

Project closure

The purpose of this stage is to formally terminate all activities of a project, transfer the complete project to others or close a cancelled project. It includes finalizing all activities across all process groups, and transfers of the completed or cancelled project as appropriate. It also establishes the procedures to coordinate activities needed to verify and document the project deliverables, to formalize acceptance of those deliverables by the sponsor and or customer, and to document the reasons for terminating a project.

6.3.3 Institutional Framework for Project Management

In order to implement the ICT flagship projects proposed in this Master Plan, the project management governance envisaged is shown in Figure 17.

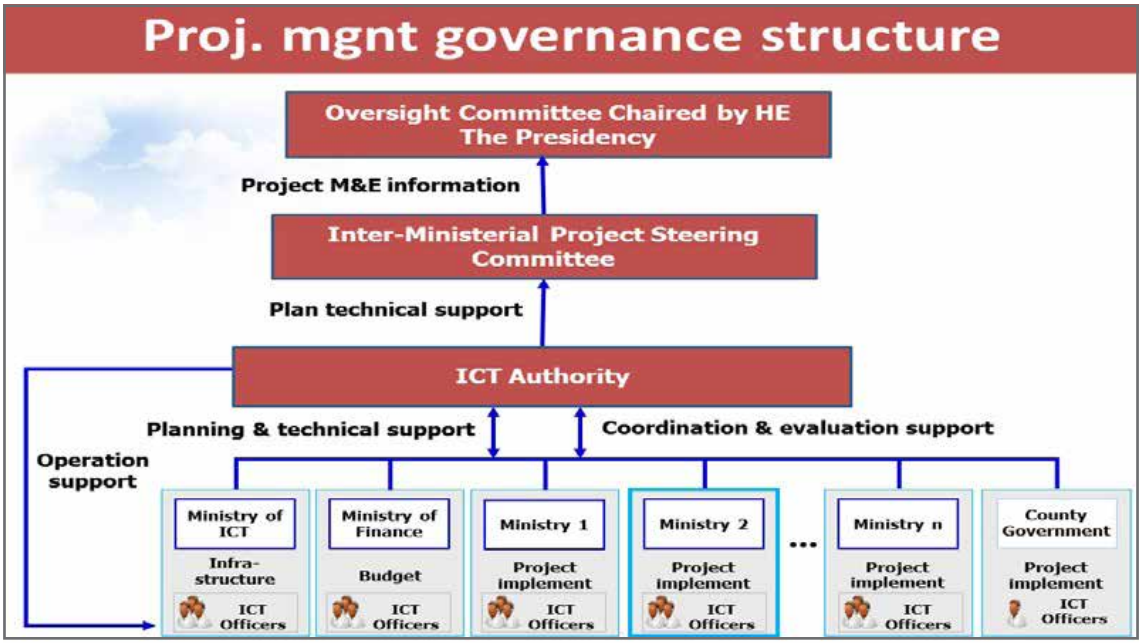


Figure 17: Project Management Structure

Source: Authors, 2014

It is to be noted that at the apex of this structure is a multi-stakeholder Steering Committee chaired by His Excellency the President. This committee has representation from key arms of Government, private sector and academia. The key arms of Government should include Ministries for the time being in charge of Energy, Infrastructure, Trade, Industrialization, Security and Education. Its role is to provide oversight of flagship ICT projects, receive status (M&E) reports from the Inter-ministerial Project Steering Committee and resolve inter-ministerial conflicts and challenges in flagship projects. This will in future be replaced by an ICT Council chaired by His Excellency the President. This is in line with global practice, especially in countries that have exploited ICT for socio-economic development.

In this structure, synergies between ICTA and respective Ministries, Agencies and Counties will provide the technical and functional knowledge base required to drive the

Table 2: Roles and Responsibilities of Key Project Management Actors

Actors	Roles and Responsibilities
Oversight Committee chaired by the President	• Provide oversight of flagship ICT projects • Receive status (M&E) reports from the Inter-ministerial Project Steering Committee • Resolve Inter-ministerial conflicts and challenges in flagship projects
Inter-ministerial Project Steering Committee	• Champion the project • Monitor and evaluate the project • Report project progress to the Oversight Committee
ICT Authority	• Provide PMO Services to overall Government • Set and enforce standards and guidelines for ICT projects • Evaluate projects against the ICT Master Plan and project selection criteria • Assist in the technical evaluation of ICT projects and provide technical support during the procurement process • Assign technical staff of implementation committees of flagship projects • Provide design, development and implementation support to flagship ICT projects • Provide technical support to the Inter-ministerial Project Steering Committee and the Project Manager (PMO office) • Provide technical training to flagship project personnel • Provide ICT literacy training to users of completed projects • Provide technical support to completed projects • Report to the Inter-ministerial Project Steering Committee • Manage contracts for project outsourced services • Manage the assigned project to completion
Ministries, Counties, Departments and Agencies (MCDA)	• Own project • Provide functional support during project execution • Sustain the project after closure • Provide user support to completed projects
Solution Providers	• Provide solutions or outsourced services under the supervision of the PMO

Table 3 summarizes the interventions of the key actors in the project life cycle.

Project cycle stage	Oversight Committee chaired by the President	Inter-ministerial Project Steering Committee	PMO	MCDA
Project conception			✔	✔
Project initiation	✔		✔	✔
Project planning			✔	✔
Procurement			✔	✔
Project execution		✔	✔	✔
M&E	✔	✔	✔	✔
Project closure		✔	✔	✔

Table 3: Roles of the Key Stakeholders in the Project Cycle

6.4.1 Background

A monitoring and evaluation framework describes the key indicators that will be used to measure progress in the implementation of the Master Plan and the institutions that will be involved in data collection and analysis.

In Kenya, two main governmental bodies are mandated to collect national ICT data, namely, the Communications Authority of Kenya (CAK) and the Kenya National Bureau of Statistics (KNBS). CAK, formerly Communications Commission of Kenya, has been collecting data in the communication sector that it regulates since it was formed in 1999. In the 2009 national census, KNBS collected data on household ICT usage and ownership. However, Kenya has not yet started collecting comprehensive national data on government, business and individual usage of data as required by the Partnership for Measuring ICT for Development. The partnership has developed internationally comparable ICT indicators that can be used to measure progress and the impact of ICT on development. Annex 3 provides ICT indicators that can be used to start collecting data on ICT as an economic sector.

'In Kenya, two main governmental bodies are mandated to collect national ICT data, namely, the Communications Authority of Kenya (CAK) and the Kenya National Bureau of Statistics (KNBS).'

Research ICT Africa has in the past collected data on household use of ICT but in a limited scale. KENET's e-readiness surveys of higher education has collected comprehensive data on a small sample of higher education institutions. The Kenya ICT Board commissioned Julisha ICT Market Survey in 2011 and 2013. The former ICT Board also had a monitoring and evaluation officer who coordinated the data collection for Julisha.

To ensure that monitoring and evaluation functions are effectively performed, the following should be institutionised:

- The Master Plan should be cascaded into the strategic plans of ICT Authority and the ICT State Department.
- There should be a yearly digital economy conference where the status of implementation of the ICT Master Plan is presented to the public and private sectors, followed by a discussion and the way forward.

6.4.2 The Institutional Capacity for Monitoring and Evaluation

The two main Government institutions that are mandated to collect ICT data for measurement and evaluation have not developed comprehensive capacity to collect ICT demand-side data. CCK commissioned national Internet Market Survey data in 2007 and no follow up to date. Kenya is therefore not tracking internationally comparable ICT indicators as defined in the partnership for measurement of ICT for development.

'there is a limited number of detailed ICT readiness studies that have been conducted for the public service or even the private sector and published.'

As constituted today, ICTA does not have the mandate to collect national data on ICT indicators. There is a limited number of detailed ICT readiness studies that have been conducted for the public service or even the private sector and published. The Directorate of E-Government commissioned an e- readiness study in 2005 but this has not been tracked on an annual basis for purposes of measuring progress.

Neither the ICT State Department nor ICTA has a strong monitoring and evaluation function. We hereby propose that ICTA establishes a fully resourced Project Management Office with strong M&E capability and work with the Inter-ministerial Project Steering Committee in flagship projects implementation, among other roles and responsibilities. The ICT State Department should also strengthen its M&E capacity and coordinate with the Planning State Department and the Kenya National Bureau of Statistics in the collection of ICT data according to the ICT sector indicators given in Annex 3. This requires a review of ICTA's as well as the State Department's organizational structure.

6.4.3 Strategies for Enhancing Monitoring and Evaluation

We recommend the following strategies for enhancing M&E data collection and analysis.

a) Enhance the capacity of KNBS to collect ICT data on a regular basis and specifically collect data that tracks the ICT indicators.

b) CAK and other governmental bodies like ICTA shall pool their resources and support KNBS in its mandate of collecting credible ICT demand-side data. The data would then be shared across all sectors.

c)The Government shall finance at least one ICT Observatory that shall analyze the data collected by KNBS for different sectors and prepare sector specific M&E reports. The Observatory could be at a University- based research center or an umbrella research organization.

d)All governmental ICT bodies, including ICTA, shall be required to build their own ICT data analysis capacity. This would ensure public institutions make decisions based on analyzed ICT data and are also able to track ICT indicators.

e)ICTA shall finance an annual ICT readiness study of important sectors of the economy as defined in the pillars. All the data collected shouldthen be available on the Open Data platform for use by all sectors of the economy.

f)The State Department for ICT shall establish a monitoring and evaluation unit that shall have the mandate of commissioning collection of ICT sector data on an annual basis.

'All governmental ICT bodies, including ICTA, shall be required to build their own ICT data analysis capacity. '

6.5 RISK MANAGEMENT

There are critical success factors which must be satisfied, and various risks managed in order to successfully implement this ICT Master Plan. The following is an outline of the risks and mitigation measures:

- Executive championship and leadership: The Government philosophy is one of progressing towards a digital Kenya. It is therefore imperative for the top leadership to be involved in the flagship projects identified in this ICT Master Plan as a means of communicating the importance of ICT as a driver, enabler and contributor to Kenya's economy. This support is necessary, especially as the ICT projects cut across various MDAs, and will transform the country. To mitigate this, it is necessary to create an executive national stakeholder oversight committee under chairmanship of The President to facilitate and monitor the implementation of the National ICT Master Plan.

- Institutionalized governance structures: The Master Plan has proposed an enabling institutional framework in sections 6.2 and 6.3. The implementation of the institutional framework will provide mechanisms to plan, implement, and monitor progress of national ICT projects. Absence of these governance structures will affect the intended outcomes of the Master Plan negatively. To mitigate this, the proposed institutional changes in sections 6.2 and 6.3 must be implemented in 2014/2015.

'Kenya must develop high end technical, management and operation capacity to sustain the outcomes envisioned in this Master Plan.'

- Stakeholder cooperation and partnership: The Master Plan has identified several stakeholders whose cooperation is of utmost importance. The stakeholders include County Governments, State Departments, Departments, State Agencies (SAGAs), private sector, development partners and the general public. The implementation of the Master Plan will transform the operational processes of key sectors, e-Government services, access to data and information, and the perspective of citizens to ICT. This calls for careful management of this transformation to ensure continuous engagement, support, cooperation, attitude and cultural change. To mitigate this, cooperation of stakeholder ministries, department, agencies and County Governments for the required data integration, business process re- engineering, and change management should be sought and managed.

- Confidence in ICTA capacity: ICTA is newly formed and needs to quickly build public confidence in ICT leadership and implementation within the first one year from the launch of this Master Plan. To build the confidence, it would be important to attract and retain competent, motivated and resourceful professional staff. In addition, sufficient financial resources to support the flagship projects should be allocated.

- Technical project management capacity: Currently, ICTA lacks capacity in project management. To mitigate this and ensure effective and efficient program coordination and management, it is necessary to develop project management capabilities under a project management office.

'In order to mitigate against the ability to attract and retain high end professionals, ICTA's categorization as a parastatal will be upgraded to the same level as that of the leading public service enterprises, like KRA and CBK'

- Technical human resource capacity: Kenya must develop high end technical, management and operation capacity to sustain the outcomes envisioned in this Master Plan. To achieve this, collaboration with the universities, industries and development partners is important. In the medium term, the ICTA must attract and retain competent, motivated, and adequately remunerated staff. In order to mitigate against the ability to attract and retain high end professionals, ICTA's categorization as a parastatal will be upgraded to the same level as that of the leading public service enterprises, like KRA and CBK.

- Availability of funding: It has been observed that most national ICT projects are unbalanced, poorly planned, and in some instances, are a duplication of efforts. In addition, most Government ICT projects are not funded enough for the duration of their useful life to keep them current and relevant. Therefore, their intended objectives are not effectively met. Often, more emphasis is given to infrastructure while other aspects of ICT are not funded, e.g. setting up data hubs that drive the e-Government systems and applications and the recurrent expenditure for operations. To mitigate this, ICTA should work closely with the MCDAs and the National Treasury and other stakeholders to ensure availability of sufficient financial resources for both capital and recurrent expenditure of flagship projects.

- Support for start-up businesses. Start-up businesses created out of ICT innovations have not been sufficiently financed. Currently, commercial banks come in much later when the business is having cash flow and risks have been reduced substantially. At start-up, a new business must therefore rely on personal/family/grants (Gov, NGOs, etc.) for financial support. 'Angels' investors may come in at this stage. In large economies like US, most of this money comes from state and federal Government in form of grants and guarantees. In order to nurture start-up businesses to growth stage, the Government must set up an innovation fund to support these businesses.

6.6 POLICY AND LEGAL FRAMEWORK

6.6.1 Setting the Context

The current policy and legal framework for the ICT Master Plan is set on the backdrop of the freedoms prescribed in Article 24 and rights prescribed in Articles of the Constitution of Kenya impacting ICT as follows:

a) Article 31—Privacy
b) Article 33 – Freedom of expression
c) Article 34 – Freedom of the media
d) Article 35 – Access to information
e) Article 40 – Intellectual property
f) Article 41—Labour relations
g) Article 43—Economic and social rights
h) Article 46 – Consumer protection

Despite the recognition of fundamental rights in the Constitution, specific Acts to protect the rights in some cases are yet to be developed.

'to ensure that the ICT Master Plan is implemented, the national ICT Policy is the most crucial one.'

6.6.2 Policy Gaps

Several policies need to be considered to ensure that the ICT Master Plan is implemented. The most crucial one is the national ICT Policy. The ICT State Department has developed a draft ICT policy to guide towards the realization of vision 2030 goals. This still needs revision to focus, among others, on key areas: fostering creativity and artistic expression; infrastructure sharing policy; industry code of practice; e-waste management; expansion of infrastructure by counties and communities; serving disadvantaged groups; network integrity, trust, security and e-commerce.

In addition, there is need harmonise policies and legislations related to energy, roads and ICT, as appropriate with provisions for categorization of ICT services as high energy users benefiting from special tariffs, and recognition of ICT infrastructure as a basic utility so that infrastructure access can receive similar protection and rights as other utilities, especially during road construction and maintenance.

6.6.3 Legal Gaps and Recommendations

In order to drive the country to be recognised as a knowledge economy and a regional ICT hub, it is important that appropriate laws be enacted. There are instances where the laws are in place but they are not enabling and others where no laws exist in facilitating execution of this Master Plan. The Government needs to urgently fast track the development of laws. Table 4 identifies the laws, the gaps and recommended actions. It shows laws that should be enacted and existing laws that should be amended.

Privacy laws to govern collection, accuracy, storage and use are needed

Areas/Laws	Legal gaps	Recommended action
Data protection	Privacy law that considers collection, accuracy, storage, use, third party disclosure, security and right of access to the information	• Fast track presentation of the Data Protection Bill to the National Assembly
Access to information	There is need to facilitate access, promote routine and systematic information disclosure and provide for the protection of persons who release information of public interest in good faith	• Fast track presentation of the Freedom of Information • Bill to the National Assembly • Develop requirements for public entities and private bodies to proactively disclose information that they hold and to provide information on request in line with the constitutional principles
Cyber security	Absence of law governing how the networks will be secured and the interaction between the various Government agencies involved	• Fast track development of cyber security law
ICT Authority Act	Change the governance and mandate of ICTA in order to make it effective for providing leadership in ICT in the public sector	• Create an ICT Authority Act to strengthen the role of ICTA
Co-development	Lack of required technical skill to implement and support the proposed projects	• Develop a law that will support economicempowerment and facilitate social development of the citizens through technical skills and knowledge transfer
Information and Communications (Amendment)	Clarification of issues of intermediary liability	• Synchronization and ease of implementation of laws
Intellectual Property Act	Does not consider software as Intellectual property since it is considered under the copyright law	• There is a need to move software intellectual property concerns from the Copyright Act to the IP Act

Table 4: Legal Gaps and Recommended Action

Public Archives and Documentation Service Act	Alignment to other new laws	• Provide an amendment
Records Disposal Act Cap 14	Alignment to other new laws	• Provide an amendment

More details of the policy, legal and regulatory frameworks and recommendations are to be found in the National Broadband Strategy. There is a need to form and manage an effective partnership with critical ICT sector regulators and policy makers such as CAK and NCS to promote the development and implementation of a conducive ICT policy and regulatory environment in Kenya.

07

FLAGSHIP PROJECTS

Electronic payments for public services

7.0 FLAGSHIP PROJECTS

Table 5 shows the flagship projects that will be implemented during the plan period. The flagship projects shown in the first column, together with the sub- projects shown in the second column will take relatively long to implement, typically three to five years. However, even as components of these long-term projects are implemented, it will be possible to implement applications dependent on these projects in relatively shorter time periods, typically six months to two years.

Program (LT, 3-5 years)		Applications (ST, 6 months - 2 years)
Flagship projects	**Sub-projects**	
A. Legal and regulatory framework		
1. Enabling legal and regulatory framework	• Enactment of an ICT Authority legislation • Enactment of a data protection legislation and setting up of a regulatory framework for data protection • Enactment of a freedom of information legislation • Strengthening cyber security legislation	• Citizens portal on available enactments, eg legal notices, Acts of Parliament, gazette notices, etc. • Update National ICT Policy document
B. Information Infrastructure and e-Government Services		
2. Persons data hub	• Persons unique identifier (NUPI) • Universal single registration system (national persons registry system) • Integrated security, intelligence and surveillance system	• Smart ID card • Drivers license system • Citizens portal providing huduma services
3. Establishments data hub	• Establishment unique identifier (e.g. CUPI) • Companies registration system • Investor registry System	• Companies and investors portal providing huduma services to businesses and investors
4. Assets data hub	• Asset unique identifier • Transport information management system (TIMS) • Assets management system • National physical addressing system	• Smart ID card for livestock • Physical address system • Citizen portal onvehicle registration tracking system
5. National spatial data infrastructure (NSDI)	• Land unique identifier (LUPI) • National land management system	• Citizen portal on land titles • Land huduma services
C. ICT infrastructure		
6. Affordable and quality broadband	• Private network roll-out by private network operators	• Hotspots in rural towns, bus

Table 5: List of Flagship Projects

infrastructure to underserved areas	• NOFBI extension • GCCN extension • Mombasa as a regional internet exchange point	stations and other public spaces • LANs in Govt buildings • Hotspots in public institutions
7. School network	• School laptop project • Integrated education management system (automates academic & administrative processes at all levels)	• Education portal • Hotspots in schools
8. Health network	• Integrated national health management system, integrating all health sub-systems	• Health portal • Hotspots in health centres
D. ICT human capital and workforce		
10. Five Centers of Excellence in ICT education & training	• Attract Global ICT brand universities to start postgraduate ICT programs in Konza Technopolis • Funding of CoEs in ICT education and training	• Enactment of KOTDA bill
11. Financing a 1-2 year intensive structured training and attachment program producing 500 high- end ICT graduates/year	None	N/A
12. Development of MOOCs-type ICT continuous education courses for training of trainers and the public		• Training of trainers portal • Public literacy program via e-learning
E. Developing ICT Businesses		
13. Scaling up ICT innovations	• A Science and Technology Park and ITES Centre in Konza Techno City and physicaly or virtually connected to other innovation hubs • Program to support commercialization of ICT innovations	• S&T Parks in selected counties
F. ICT as a Driver of Industry		
14. National electronic single window system		• Portal on cross border trade

15. National payment gateway	• Legal framework on electronic payment system (as part of project 1)	
16. National agriculture commodity exchange	None	• Agriculture portal • Electronic tea auction • Electronic animal monitoring system

Source: Authors, 2014

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http://measuring-ict.unctad.org http://www.gov.mu/portal/sites/indicators/ICTeconomicList.html http://www.egyptictindicators.gov.eg/en/Pages/default33.aspx

Annex 1: Taskforce Members

Table 6: Members of the Taskforce

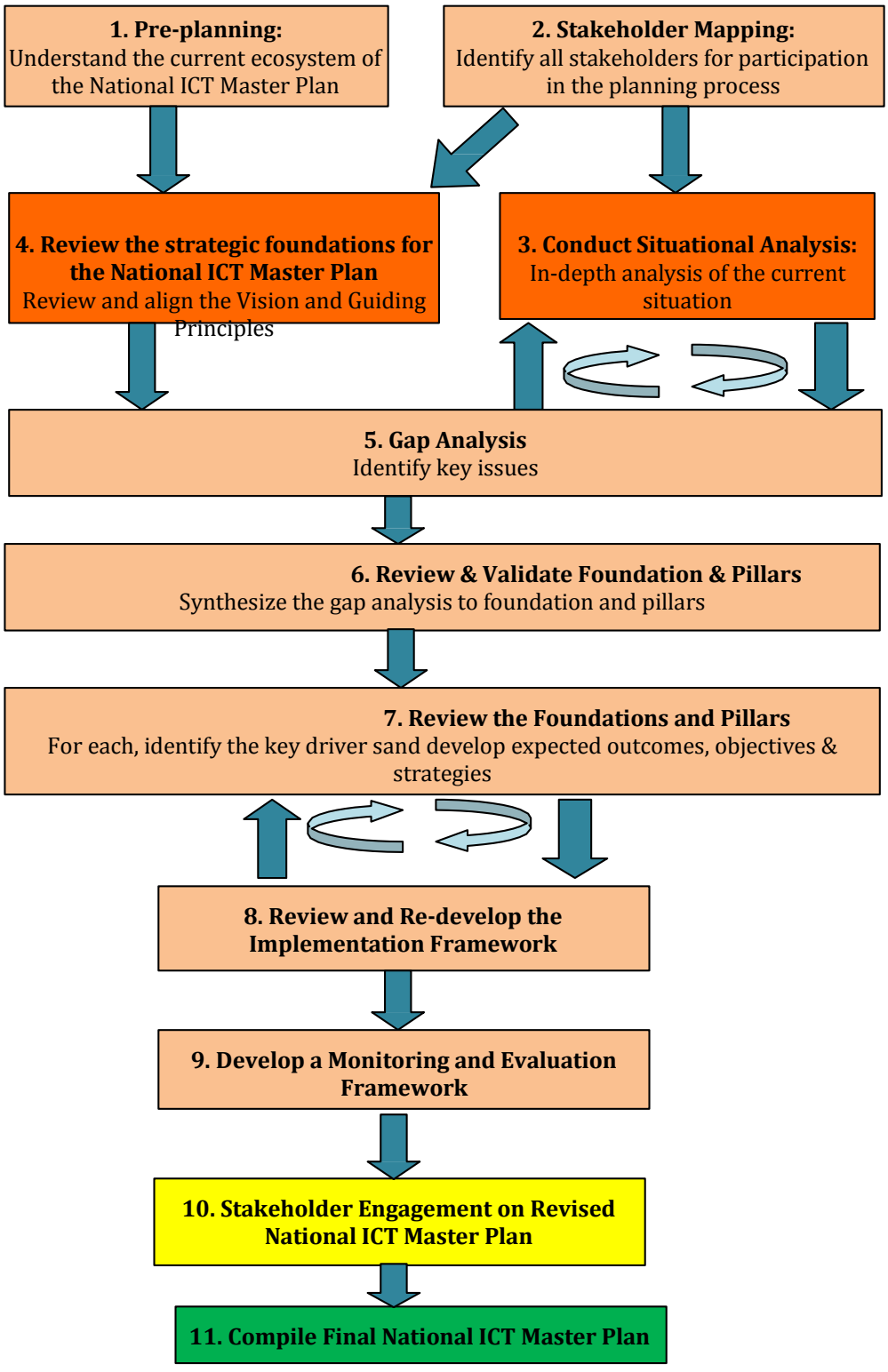
Name	Institution
Prof. Timothy Mwololo Waema	University of Nairobi, Chairman
Prof. Reuben Marwanga	Strathmore University
Dr. Agnes Wausi	University of Nairobi
Prof. Meoli Kashorda	KENET/USIU
Fiona Asonga	TESPOK
Joseph Kihanya	National Communication Secretariat, ICT State Dept
Dave Leteipan	ICT consultant/private sector
Ezekiel Saina	Government, KRA
County Representative	County Governments
Co-opted members	
Dr. Katherine Getao	ICTA
Joshua Muiruri	ICTA
John Sergon	ICTA

Assistance in report writing: Dr. Margaret Nyambura Ndung'u

Annex 2: Methodology Adopted

The taskforce reviewed the existing National ICT Master Plan to realign with the strategic direction of the country, the final product being a National ICT Master Plan for Kenya for the period 2013 to 2017. Organizational and participatory approaches to strategic planning were adopted. Organizational approach ensured that key critical success factors (CSFs) and drivers for the National ICT Master Plan are aligned with the objectives as identified through the context analysis. The participatory approach entailed taking care of the soft issues which are critical to strategic planning and management, such as attitude, creating enthusiasm and motivating all stakeholders to rally behind the implementation of the Master Plan as illustrated in Figure 18, and explained below.

Figure 18: Adopted Methodology



In Pre-Planning the main objective was for the team to have a common understanding of the planning context and in particular the current ecosystem of the National ICT Master Plan, and the factors that can influence the success of the assignment. This was in view of changes not only affecting the State Department of ICT at the National Government, but also affecting how the governance system in the country was being implemented in line with the Kenya Constitution 2010. Interviews were conducted with the country's leadership, and particularly the ICT CS, ICT PS, ICTA management and key stakeholders in the ICT sector as identified during stakeholder's mapping. Connected Kenya 2017 Master Plan and associated support documents were also reviewed to identify any important gaps.

Stakeholder Mapping included analysis of the stakeholders and ensured their participation using various forums such as workshops, online forums, public forums and consolidating their findings. These findings informed the situational analysis, and the strategic framework for the ICT Master Plan.

Situational Analysis entailed conducting a critical in-depth analysis of the current situation by appraising the total ecosystem surrounding the National ICT Master Plan, in terms of external and internal environments. The internal environment focused on the country's internal ICT resources such as the infrastructure, human resource, policies and governance structures, while the external appraisal identified conditions and opportunities that may have impact on the country's ICT appropriation capacity and capability. In addition, documents such as the national broadband strategy, relevant policy, legal and other strategic documents were reviewed.

The Vision and Guiding Principles that will drive the ICT Master Plan were reviewed and aligned with a view to capturing the aspirations of the Kenyan leadership and people with regard to the role of ICT in development.
Gap Analysis, which is an iterative process was informed by the situational analysis and vice versa. This was followed by review and validation of the other key elements of the Master Plan as shown in Figure 18, which are:

- Foundations and pillars
- Development of Key drivers, outcomes, objectives and strategies of the foundations and pillars.
- Review and re-development of the implementation framework
- Development of monitoring and evaluation Master Plan

Annex 3: ICT Indicators

Indicators on ICT infrastructure and access	
Core indicators	
A1	Fixed telephone lines per 100 inhabitants
A2	Mobile cellular telephone subscribers per 100 inhabitants
A3	Fixed Internet subscribers per 100 inhabitants
A4	Fixed broadband Internet subscribers per 100 inhabitants
A5	Mobile broadband subscribers per 100 inhabitants
A6	International Internet bandwidth per inhabitant (bits/second/ inhabitant)
A7	Percentage of population covered by a mobile cellular telephone network
A8	Fixed broadband Internet access tariffs (per month), in US$, and as a percentage of monthly *per capita* income
A9	Mobile cellular prepaid tariffs, in US$, and as a percentage of monthly *per capital income*
A10	Percentage of localities with public Internet access centres (PIACs) by number of inhabitants
Indicators on access to, and use of, ICT by households and individuals	
HH1	Proportion of households with a radio
HH2	Proportion of households with a TV
HH3	Proportion of households with telephone
	Proportion of households with fixed telephone only
	Proportion of households with mobile cellular telephone only
	Proportion of households with both fixed and mobile cellular telephone
HH4	Proportion of households with a computer
HH5	Proportion of individuals who used a computer (from any location) in the last 12 months
HH6	Proportion of households with Internet access at home
HH7	Proportion of individuals who used the Internet (from any location) in the last 12 months
HH8	Location of individual use of the Internet in the last 12 months
	Home
	Work
	Place of education

Table 7: ICT Indicators as Per ISIC Classification

	Another person's home
	Community Internet access facility
	Commercial Internet access facility
	Any place via a mobile cellular telephone
	Any place via other mobile access devices
	Any place via *other* mobile access devices
HH9	
	Internet activities undertaken by individuals in the last 12 months (from any location)
HH10	Proportion of individuals with use of a mobile cellular telephone
HH11	Proportion of households with access to the Internet by type of access (narrowband,
	broadband (fixed, mobile))
	Narrowband
	Fixed broadband
	Mobile broadband
HH12	Frequency of individual use of the Internet in the last 12 months (from any location)
	At least once a day
	At least once a week but not every day
	Less than once a week
Reference indicator	
HHR1	Proportion of households with electricity
Indicators on use of ICT by businesses	
B1	Proportion of businesses using computers
B2	Proportion of persons employed routinely using computers
B3	Proportion of businesses using the Internet
B4	Proportion of persons employed routinely using the Internet
B5	Proportion of businesses with a web presence
B6	Proportion of businesses with an intranet
B7	Proportion of businesses receiving orders over the Internet
B8	Proportion of businesses placing orders over the Internet
B9	Proportion of businesses using the Internet by type of access (narrowband, broadband (fixed, mobile))
	Narrowband
	Fixed broadband
	Mobile broadband
B10	Proportion of businesses with a local area network (LAN)
B11	Proportion of businesses with an extranet
B12	Proportion of businesses using the Internet by type of activity
	Sending or receiving e-mail
	Telephoning over the Internet/VoIP

	Posting information or instant messaging
	Getting information about goods or services
	Getting information from general Government organizations
	Interacting with general Government organizations
	Internet banking
	Accessing other financial services
	Providing customer services
	Delivering products on line
	Internal or external recruitment
	Staff training
B12	Proportion of businesses with a mobile cellular telephone
Indicators for the ICT (producing) sector	
ICT1	Proportion of total business sector workforce involved in the ICT sector (expressed as a percentage)
ICT2	ICT sector share of gross value added (expressed as a percentage of total business sector gross value added).
Indicators on trade in ICT goods	
ICT3	ICT goods imports as a percentage of total imports
ICT4	ICT goods exports as a percentage of total exports
Core indicators for measuring ICT in education	
ED1	Proportion of schools with a radio used for educational purposes (by ISCED level 1 to 3)
ED2	Proportion of schools with a TV used for educational purposes (by ISCED level 1 to 3)
ED3	Proportion of schools with a telephone communication facility (by ISCED level 1 to 3)
ED4	Student-to-computer ratio (by ISCED level 1 to 3)
ED5	Proportion of schools with Internet access, by type (by ISCED level 1 to 3)
ED6	Proportion of students who have access to the Internet at school (by ISCED level 1 to 3)
ED7	Proportion of students enrolled by gender at the tertiary level in ICT-related fields (for ISCED levels 5 and 6)
ED8	Proportion of ICT-qualified teachers in primary and secondary schools
Reference indicator	
EDR1	Proportion of schools with electricity (by ISCED level 1 to 3)

Additional indicators

Several countries in Africa have created comprehensive ICT indicators. In addition to the above indicators, we have adopted ICT indicators in Health and Government from Mauritius. These are listed below.

ICT Health Indicators

1) Percentage of public hospitals with Internet access, by type of access (narrowband, broadband)

2) Percentage of health centres with Internet access, by type of access (narrowband, broadband)

3) Percentage of health centres using computers/theInternet to collect/process/ transmit individual patient information

4) Percentage of public hospitals using computers/the Internet to collect/process/ transmit individual patient information

E-Government Indicators

1) Proportion of persons employed in National Government organisations routinely using computers at work.

2) Proportion of persons employed in National Government organisations routinely using Internet at work.

3) Proportion of National Government organisations with a Local Area Network.

4) Proportion of National Government organisations with an Intranet.

5) Proportion of National Government organisations with Internet access, by type of access (Narrowband, Fixed (wired) broadband, Wireless broadband).

6) Proportion of National Government organisations with a web presence.

7) Selected Internet based services available to citizens, by level of sophistication of service.

8) Proportion of National Government organisations offering online services.

9) Proportion of staff employed in National Government organisations routinely using an email at work.

10) Proportion of National Government organisations using open source software as an operative system.

11) Percentage of expenditure on ICT per total expenditure of National Government organisations.

12) Percentage of persons employed in National Government organisations with computer skills.

13) Percentage of ICT budget spent on institutional ICT training.

Other African countries to consider adapting ICT indicators from include Egypt.

Annex 4: Selection Criteria for Flagship Projects

Two key project evaluation indices including the importance of the project and its feasibility have been used to set the priority and consequently the selection of projects for this Master Plan. Under the importance category of the project two selection criteria are used including the degree of urgency and strategic importance. For feasibility, two criteria are used too, technical realization and institutional realization of the project. A weighted scoring model is used for the evaluation and selection of the projects to be undertaken during the Master Plan period. In the model numeric weights are applied to reflect the relative importance of each criterion and the total weighted scores determined as follows:

$$S_i = \sum_{j=1}^{n} s_{ij} w_j$$

Where

S_i = the total score of the i^{th} project

s_{ij} = the score of the i^{th} project on the j^{th} criterion

w_j = the weight or importance of the j^{th} criterion

Table 8: Project Selection Criteria

Project Indices	Selection Criterion	Criterion Description	Weight of Criterion	Score for Criterion	Weighted Score
Importance	Strategic Relevance	Consideration on the objectives and other factors to implement the project and their relevance to the Vision and Outcomes of the ICT Master Plan as well as the Government Enterprise Architecture for public service projects)	3	• H(8-10): Project has huge benefits to stakeholders • M(4-7): Project has significant benefits to stakeholders • L(1-3): Project has minimal benefits to stakeholders	
	Immediacy of Benefits Realization	Consideration of how quickly the benefits of the project will be realized	2	• H(8-10): Immediate, 1 yr • M(4-7): Short- term, 2-3 yrs • L(1-3): Long-term,	

Table 8 shows the criteria that will be used in project selection.

				>3 yrs	
Feasibility	Techno-logical Realiza-tion	Consideration on the technology to imple-ment the project is available	2	• H(8-10): Technology is readily avail-able • M(4-7): Some of the technology is available • L(1-3): Technology not available, will take time to develop	
		Consideration on the human capac-ity to roll-out the project	2	• H(8-10): All hu-man capacity exists to implement the project • M(4-7): Some human capac-ity exists to implement the project • L(1-3): No hu-man capacity exists to implement the project	
	Institu-tion- al Realiza-tion	Consideration on the requirements for policy, law and regu-lation to implement the project	1	• H(8-10): Fully possible to implement the project immedi-ately • M(4-7): Amendment of policy, law, or regulation is required • L(1-3): Enact-ment of law(s)is required	
Total			10		100

Following will be the project selection process:

a) Project feasibility is carried out.

b) A representative cross-section of stakeholders rate a project on the above criteria based on the project feasibility report.

c) The scores are added and averaged.

d) Projects scoring more than 75 points are selected.

Annex 5: Flagship Projects

Program (LT, 3-5 years)		Applications (ST, 6 months - 2 years)	Project outline	Responsibility	Time-frame
Flagship projects	**Sub-projects**				
Legal and regulatory framework					
1. Enabling legal and regulatory framework	• Enactment of an e-Government legislation • Enactment of a data protection legislation and setting up of a regulatory framework for data protection • Enactment of a freedom of information legislation • Strengthening cyber security legislation	• Citizens portal on available enactments, eg legal notices, Acts of Parliament, gazette notices, etc. • Update National ICT Policy document	• Creation of an enabling legal and regulatory framework for implementation of the flagship projects • This is not a project per se but a pre-requisite	ICT State Dept, AG's Office, CAK	2014/15
Information Infrastructure and e-Government Services					
2. Persons data hub	• Persons unique identifier (NUPI) • Universal single registration system (integrated persons registry system) • Integrated security, intelligence and surveillance system	• Smart ID card • Drivers license system • Citizens portal providing *huduma* services	• Set up an integrated persons data hub • Implementation of an integrated national persons registry system and integration with existing persons systems (e.g. IPRS) • Development of persons-related systems (Integrated security, intelligence and surveillance system;	Interior State Dept, ICTA, KRA	2013/14 – 2017/18

			and drivers license system) • Seamless integration to the tax system • Provision of *huduma* services to citizens		
3. Establishments data hub	• Establishment unique identifier (e.g. CUPI) • Companies registration system • Investor registry System	• Companies and investors portal providing *huduma* services to businesses and investors	• Set up of an establishments data hub • Automation of business/company registry to capture and maintain companies' records • Seamless integration with integrated persons database & tax system • Provision of *huduma* services to businesses & investors	AG's Office, ICTA, KRA	2013/14 – 2017/18
4. Assets data hub	• Asset unique identifier • Transport information management system (TIMS) • Assets management system • National physical addressing system	• Smart ID card for livestock • Physical address system • Citizen portal on vehicle registration tracking system	• Set up of an assets data hub • Implementation of an assets management system (AMS) to monitor and maintain assets of value for the purpose of cost effectiveness, produce greatest returns and provide the best possible return to the users • Implementation of a national physical addressing system (NPAS) to provide street addressing, numbering and coding of all properties and thereby provide clear logistical support for economic activities, e.g. delivery of goods and services to persons and businesses • Implementation of transport information management system (TIMS) • Seamless integration with integrated persons and establishments data hubs	National Treasury, ICTA, All State Departments (for AMS) NTSA, Transport State Dept, KRA, ICTA (for TIMS) ICT State Dept, ICTA (for NPAS)	2013/14 – 2017/18
5. National spatial data infrastructure (NSDI)	• Land unique identifier (LUPI) • National land management system	• Citizen portal on land titles • Land *huduma* services	• Set up a national spatial data infrastructure (NSDI) by mapping all land/property parcels using GIS • Computerization of land processes and linking with NSDI • Seamless integration with the integrated persons and establishments data hubs • Production of titles and provision of huduma services to citizens, businesses and investors	Lands State Dept, ICTA, County Govts	2013/14 – 2017/18
ICT infrastructure					
6. Affordable and quality broadband infrastructure to underserved areas	• Private network roll-out by private network operators • NOFBI extension • GCCN extension • Mombasa as a regional internet exchange point	• Hotspots in rural towns, bus stations and other public spaces • LANs in Govt buildings • Hotspots in public institutions	• Extension of ICT infrastructure to all National and County Governments' Offices by Governments • Extension of quality and affordable broadband infrastructure to underserved areas by the private sector	ICTA, CAK, Private Sector, ICT State Dept,	2013/14 – 2017/18
7. School network	• School laptop project • Integrated education management system (automates academic & administrative processes at all levels)	• Education portal • Hotspots in schools	• Implementation of the school laptop project • Creation of a schools network and its connection to the Internet through the KENET infrastructure • Automation of education processes at all levels • Provision of education data, information and statistics through an educational portal	ES&T State Dept, KENET, ICTA	2013/14 – 2017/18
8. Health network	• Integrated national health management system, integrating all health sub-	• Health portal • Hotspots in health centres	• Integration of all health management systems into an integrated national health management system	Health State Dept, ICTA, Private Sector	2013/14 – 2017/18

	systems		• Creation of a health network its connection to the Internet • Provision of public health information and services to citizens and businesses		
ICT human capital and workforce					
10. Five Centers of Excellence in ICT education & training	• Attract Global ICT brand universities to start postgraduate ICT programs in *Konza Technopolis* • Funding of CoEs in ICT education and training	• Enactment of KOTDA bill	• Establish five Centers of Excellence in five universities that teach electrical engineering, computer science and information systems to develop high end ICT talent. This shall include new teaching laboratories, employment of at least 75% doctoral level faculty in computer science, engineering and information systems. In order to retain the high-end faculty there will be a need to introduce new reward systems, attract expatriates from other countries and provide doctoral and Masters-level scholarships to bright students.	ES&T State Dept, KOTDA, Universities, ICTA	2013/14 – 2017/18
11. Financing a 1-2 year intensive structured training and attachment program producing 500 high-end graduates/year	None	N/A	• Financing a one to two year intensive structured training and attachment program for up to 500 high-end ICT staff in selected areas of ICT in developed economies with fully operational e-Government services. The program would also pay for certification for the trainees	ES&T State Dept, ICT State Dept, ICTA, Private Sector	2013/14 – 2017/18
12. Development of MOOCs-type ICT continuous education courses for training of trainers and the public	None	• Training of trainers portal • Public literacy program via e-learning	• Development of ICT electronic courses for training of trainers and the public on a massive scale. This will require construction of large data centers and providing broadband connectivity to schools, colleges and universities by 2017	ES&T State Dept, ICT State Dept, ICTA, Private Sector	2013/14 – 2017/18
Developing ICT Businesses					
13. Scaling up ICT innovations	• A Science and Technology Park and ITES Centre in *Konza Techno City* and physicaly or virtually connected to other innovation hubs • Program to support commercialization of ICT innovations	• S&T Parks in selected counties	• Establish a Science and Technology Park and ITES Centre in *Konza Techno City* and connected to other innovation hubs and clusters • Implement a program to support commercialization of ICT innovations	KOTDA, ES&T State Dept, ICT State Dept, Industrialization State Dept, ICTA	2013/14 – 2017/18
ICT as a Driver of Industry					
14. National electronic single window system	N/A	• Portal on cross border trade	• Automate the submission of regulatory documents such as custom declarations, applications for import/export permits, certificates of origin, trading invoices, etc. The electronic single window platform will facilitate cross border trade	KENTRADE, ICTA	2013/14 – 2015/16
15. National payment gateway	• Legal framework on electronic payment system (as part of project 1)	N/A	• Set up a national payment gateway • Support multiple financial institutions to carry out electronic transactions and simplify the processing of payments in Government facilitate secure online payments. This will increase the adoption of electronic services especially the internet and mobile enabled payments	ICT State Dept, National Treasury	2013/14 – 2014/15
16. National agriculture commodity	None	• Agriculture portal • Electronic tea	• Implementation of an agriculture commodity exchange to facilitate competitive and efficient trade in	Agriculture State Dept, ICTA	2013/14 – 2017/18

exchange		auction • Electronic animal monitoring system	commodities by providing reliable, timely and accurate marketing information and intelligence. It will provide a platform for transparent and competitive commodity prices through the use and application of ICTs. Farmers will be able to sell their produce directly to the customers without intermediaries and fetch better prices		

Annex 6: List of Stakeholders Consulted

#	Name	Organization/Institution/Ministry	#	Name	Organization/Institution/Ministry
1	Augustine Kanyigi	Ministry of Labor	30	Prof. Meoli Kashroda	KENET- TF Member
2	Abner Abaga	Ministry of ICT	31	Dave Leteipan	TF member
3	James Njiru	Ministry of Health	32	Dr. Agnes Wausi	UoN- TF member
4	Joseph Kuria	Commission on Revenue Allocation	33	Andrew Lewela	ICTA TF secretariat
5	Ezekiel Saina	KRA - Task force member	34	Audrey Waita	ICTA TF secretariat
6	Charles Borura	KRA	35	Hellen Kirui	ICTA TF secretariat
7	Peter Kamau	Treasury		**Private Sector and KEPSA**	
8	Matayo Odongo	Department of Special Programmes	36	E.K Saina	KRA
9	Silvester Liech	ICTA	37	Kebaso Mokogi	Orange Telcom
10	Stephen Kathuri	Ministry o Agriculture	38	Lucy Njoroge	XRX
11	Grace Malela	Industrialization	39	Godfrey W Kyama	Commonwealth
12	Peter Githuku	Industrialization	40	Stephen W Chege	Safaricom Ltd
13	Esther Nyaga	Ministry of Trade	41	Suraj Shah	Intel Corp
14	Loyford Muriithi	ICTA	42	Moise Adams Ler	Intel Corp
15	Jane Otoko	ICTA	43	Anthony G Mwangi	IBM
16	Loice Bosire	Ministry of Defence	44	Michele Castgnaro	Alcatel Lucent
17	Francis Ouma	Lands, Housing and urban dev	45	Dancan Orugi	N.C.C
18	Naphtaly Mattah	Homabay County Executive ICT	46	Peninah Muraithi	SAP
19	Julius Okwaro	Development and Planning	47	John N Ngigi	Copy Cat Ltd
20	Geoffrey Rucha	CID	48	Joseph Kwonye	NCS
21	Joseph Kihanya	NCS - Task force member	49	Daniel Obam	NCS
22	Juma Modie	Lands	50	Charles Moi Sadiki	KEYOBAY

23	Apollo Muchilwa	Ministry of Health	51	Jen Cantneii	Samasake
24	Silas Wachira	environment	52	Edwin Kinyanjui	ISA LTD
25	Clement odalla	Special Programmes	53	Kagume Cinuri	Emommentum
26	Ronald Tonui	EAC	54	Arielle Sandor	Duma works
27	Prof Marwanga	Strathmore University- TF member	55	Gitnui Anita	Emommentum
28	Eng. Victor Kyalo	ICTA-TF member	56	John Kamau	JTL
29	Dr. Catherine Getao	ICTA- TF member	57	Romuald Maina	Safaricom Ltd
58	Isaac Kaigi	IMG	89	Joseph Wairiuko	KAM
59	Eric Yamina	Safaricom Ltd	90	Caroline Makeli	KEPSA
60	AnthonyHutia	Samsung	91	Taigu Machiu	Shippers Council East Africa
61	Polo Alfred	Liquid Kenya	92	Alex Twinomugisha	Intel
62	Timothy Angatia	Liquid Kenya	93	Ibeahice Mwindu	KEPSA
63	Bethy Olweny	SAP	94	James Kamweti	Motorola
64	Victor Kyalo	ICTA	95	Awesila	Microsoft
65	Mercy Mogure	Adept Technologies	96	C Njoka	ICTA
66	Alex Masika	DDD	97	Carrgh Oudu	The Shop Print
67	George O Ojiro	COPY CAT LTD	98	Hellen Kirui	ICTA
68	T.M Waema	UON Task Force Member		**Public and Private Universities**	
69	ENG.J.M Matu	KEPSA	99	Prof. P. Ndirangu Kioni	DKUT
70	James Turothi	Callkey Networks	100	Prof. James Tuitoek	Egerton University
71	Julius M Riowgo	KEPSA	101	Prof. Stephen. Agong'	Jaramogi Oginga Odinga University
72	Andrew Lewela	ICTA	102	Dr. Waweru Mwangi	JKUAT
73	Thomas Ndegwa	KEPSA	103	Prof. Mucai Muchiri	Karatina University
74	Ferial Nathoo	AMCHAM- The American Chamber	104	Eng. Martin Nzomo	Kenyatta University
75	Wilson Mugambi	AAK	105	Prof. Francis Lelo	Laikipia University
76	Judy Nemaisa	KEPSA	106	Prof. D. k W. Makawiti	Maseno University
78	Francis W Ngokonyo	KEPSA	107	Prof. Magambo J.M	MUST
79	Angela Nganga	Microsoft	108	Dr. Edwin Ataro	Moi University
80	Khanya John	NCS	109	Prof. Walter Oyawa	Multi Media University
81	Ywme	IBM	110	Prof. M.S Rajab	Pwani University
82	N Kham	SERVTEL	111	Prof. Geoffrey Muluvi	South Eastern University
83	Fidelis Mwaka	Kenya Bankers	112	Prof. Francis Aduol	Technical University of Kenya
84	Michele Castegnaro	Alcatel Lucent	113	Dr. Nicholas Makau	University of Eldoret
85	Brettah Muthuri	Aki Center	114	Prof .W. K. Kipng'eno	University of Kabianga
86	Alon Shacham	Motorola	115	Prof . W. O. Odongo	University of Nairobi
87	James Mugi	Motorola	116	Prof. Rodney Reed	Africa Nazarene University
88	Yash Desai	AFRICA INC. - for airplane supplies	117	Ms. Asmita Gilani	Agha Khan University
118	Prof. Justus Mbae	CUEA	148	Wamalwa Mupala	Oracle
119	Prof. Peter Ngure	Daystar University	149	Mukeli Matei	Strathmore/Kweli mobile
120	Prof. Jones Kaleli	Kabarak University	150	Law Karingithi	Strathmore/Kweli mobile
121	Dr. Alice Macharia-Njuguna	KCA University	151	Anne Gatendi	Inoorero University
122	Prof. Robert Gateru	Kenya Methodist University	152	Marygoretti Munanda	ICTA
123	Dr. Joseph Sevilla	Strathmore University	153	Chalb Gichobi	Orali Subs Ltd
124	Dr. Jimmy Macharia	USIU – Africa	154	Jen Canmell	Samasource
125	Prof. Samuel Gudu	Rongo University College	155	Mercy Barasa	Adwest Communications
126	Prof Hamadi Iddi Boga	Taita Taveta University College	156	Michael Muite	Oracle
127	Mrs. Agnes Githaiga	Kagumo Teachers College	157	Mike Otieno	Seacom
128	Jeremiah Lenya	Kenya Institute of Management	158	Joshua Opondo	Migori County
129	Dr. Charles O. Onudi	Kenya Medical Training College	159	Stephen Wainaina	Oracle
130	Mr. Justus Simiyu	Bukura Agricultural College	160	Rose Maghas	Gbc
131	Mrs. Joyce Nyanjom	Kisumu Polytechnic	161	Lulu Akaki	Bake
132	David K. Some	CHE	162	Suraj Shah	Intel

133	Mr. Elijah K. Wachira	Kenya School of Government	163	Dious Emmanuel	Dhanush
134	Prof. Kinandu Muragu	KSM	164	Tom Isaac Wakisa	Inspiration Kenya
135	Dr. John N. Kimani	National Space Secretariat	165	Jacodu T	Unesco
136	Mr. Richard Atuti	Kenya National Library	166	James Kabiru	Olive Tree Media
137	Prof. Shaukat A. Abdulrazak	NCST& I	167	Josiah Mugambi	I-Hub
138	Dr. E . A Mukisira	KARI	168	Prof. E. I. Omwenga	KICTA
139	Mr. Charles Moturi	KIRDI	169	E. N. Waithara	Molh & Up
140	Dr. Elizabeth Bukusi	KEMRI	170	Nixon Masela	Jack & Mcks Consultant
	Public Forum		171	Eric Atinga	Usalama Forum
141	Timothy Angatia	Liquid Telecom	172	Ndirangu Ngunjiri	Nditronies Comm
142	Young Holowi	Oracle	173	John Njiru	N.M.G
143	Samuel Wetungu	Kakamega County Govt	174	Raputo Hawi	Usalama Forum
144	George Kariuki	ICTA	175	George Okore	Pulse Creative
145	Jackson Nginya	PWC	176	Tim Kipchirchir	Tuk
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198	Christopher Muthere	Oracle	235	Godfrey W. Kyama	Commonwealth Secretariat
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200	Fiona Asonga	Tespok	237	Murithi L. N	ICTA
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