Ministry of ICT, Innovation
and Youth Affairs

THE KENYA NATIONAL DIGITAL MASTER PLAN

2022-2032

KENYA DIGITAL BLUEPRINT

MASTERPLAN FLAGSHIP PROGRAMMES

PILLAR	FLAGSHIP PROGRAMMES	ACTORS
DIGITAL INFRASTRUCTURE	1. **Installation of 100,000km of high speed fiber optic infrastructure** to provide internet to all Schools, government institutions/offices, Metro-cities, health facilities, rural businesses, homes and public spaces	MOICT IYA, ICTA., CA,KONZA, KURA, KeNHA, KeRRA, NMS, MOH, NT,MED, CoG, Development partners and Private Sector
	2. **Establishment of 25,000 internet-hotspots** across the country to provide internet services to innovators, youth and entrepreneurs	MOICT IYA, NT,CoG, ICTA, Private Sector
	3. **Establishment of Cloud Services** for government and private sector	MOICT IYA, ICTA.,NT, KONZA,ODP Private Sector
	4. **Establishment of 1450 Village digital hubs** for citizen digital literacy training, film production and public access to government services	MOICT IYA, ICTA., MOICT IYA, ICTA.NT, KFC,KFCB, MEDIA, ODP, CoG, Private Sector
	5. **National Physical Addressing System** to accelerate e-commerce initiative	MOICT IYA, ICTA.,PCK, ODP, CA,CoG,MOI,MOL, private sector, NT
	6. **National Spatial Data Infrastructure** to provide trusted geospatial data for businesses and government	MOICT IYA, ICTA., MOL,CoG, ODP,NT, MOL, ODP,Private Sector, Development partners, NT
	7. **Regional Submarine Cable Maintenance Depot** to ensure effective maintenance support for submarine cables serving the Africa Region	MOICT IYA, ICTA.,EAC,Private sector,NT, Development Partners, MOT
	8. **Regional Smart ICT Hub**- to provide faster IP exchange and data storage for the Africa Region.	MOICT IYA, ICTA.,Private Sector, EAC, Konza, ODP
	9. **Kenya eWaste Programme** to manage e-waste electronic products in the country	MOICT IYA, ICTA., NEMA, KONZA, County Government, CoG, MCDAs, NT,Private Sector, Development Partners, ODP, KONZA
DIGITAL SERVICES, PRODUCTS AND DATA MANAGEMENT.	10. **Digital one-stop-shop for all Government** common services through automation of all government core processes and digitization of manual records, interoperability and unified communication platforms.	MOICT IYA, ICTA., KONZA, MCDAs, NT, CoG, Private Sector, Development Partners
	11. **National Public Key Infrastructure** for digital signatures	MOICT IYA, ICTA., CA, MCDAs, Private Sector, NT, ODP
DIGITAL SKILLS	12. **Digital Literacy Capacity Building for 20million citizens 10,000 ICT professionals** on high-end skills, **300,000 public servants and 350,000 teachers** to given them necessary IT proficiency to be able to deliver services effectively to the citizen to be able to utilize technology in their businesses and access to government e-services	MOICT IYA, ICTA., MCDAs, CoG, MOI,MODEV,MOED, TSC,
	13. **Smart ID card** to provide person unique identifier.	MOICT IYA, ICTA., MOI, Dept Civil Reg, Private Sector, NT
	14. **Digital Literacy Programme** to accelerate integration of technology in teaching and learning in all learning institutions	MOICT IYA, ICTA.,, MOED, TSC, KNEC,KICD, Private Sector, Development partners, NT
DIGITAL ENTERPRISES, INNOVATION AND BUSINESSES	15. **Kenya Software and Electronic Industry** – establishment of 2 software manufacturing industries and two electronic manufacturing plants with 10,000 software engineers and production of over 1.2 million electronic devices	MOICT IYA, ICTA.,MOIED,CoG, Private Sector, Development Partners
	16. **Annual International ICT Expo** to show case on existing products and services for entrepreneurs and businesses	MOICT IYA, ICTA., KENIA, KEPSA, Private Sector, MOFA
POLICY, LEGAL AND REGULATORY	17. **Harmonization/enactment of policies, legislations** to enable ease of doing ICT businesses in the country. 18. **Enactment of e-government legislation** to support resource mobilization to fund the Masterplan Programmes. 19. **Enactment of Critical Infrastructure** protection legislations to protect all critical infrastructure installations across the country	AG, MOICT IYA, ICTA, Parliament, NT

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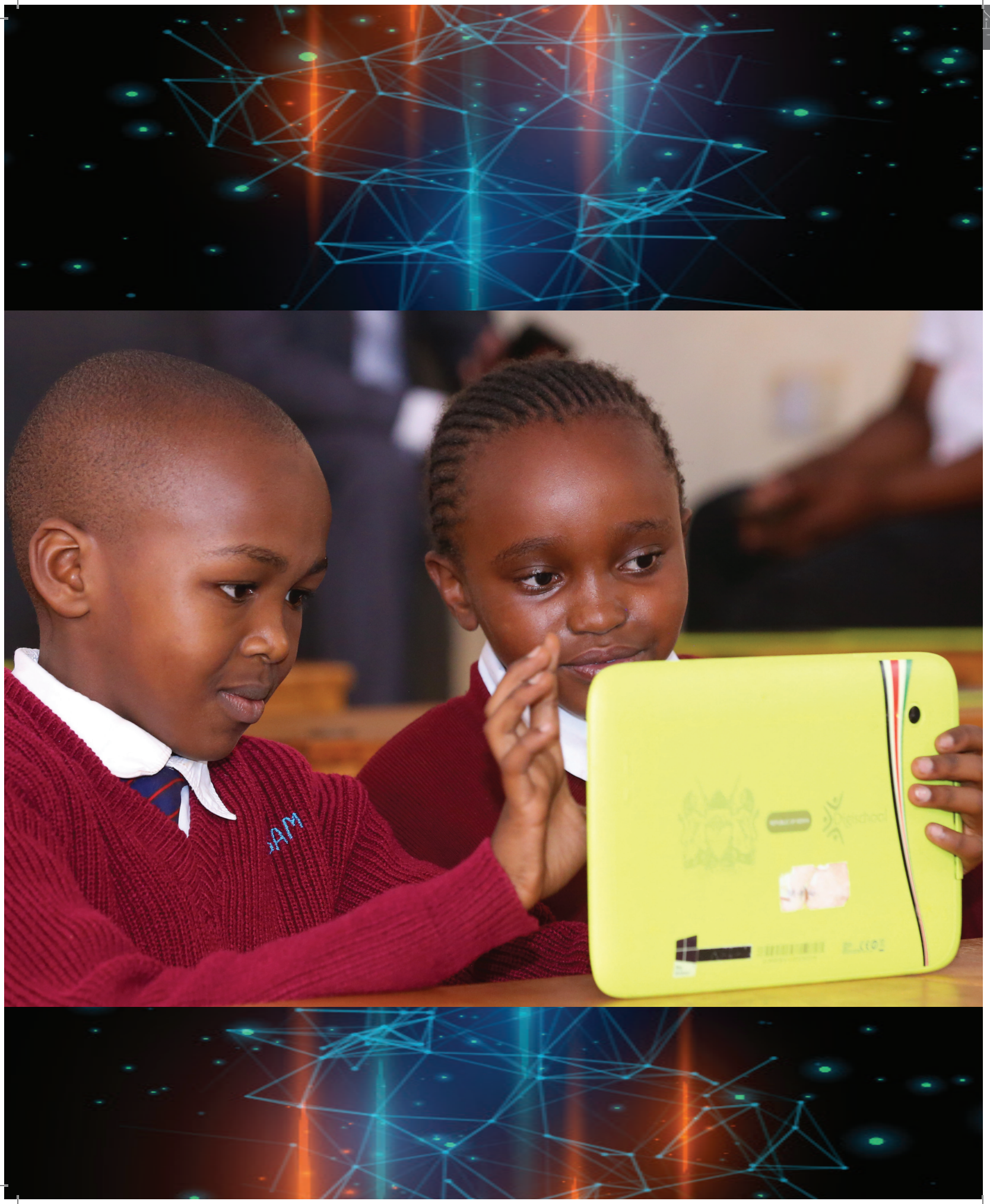

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LIST OF ACRONYMS & ABBREVIATIONS

TERM	MEANING
AI	Artificial Intelligence
CA	Communications Authority of Kenya
CCP	County Connectivity Project
CIO	Chief Information Officer
CTO	Chief Technology Officer
GCCN	Government Common Core Network
GEA	Government Enterprise Architecture
ICT	Information and Communications Technology
ICTA	ICT Authority
IoT	Internet of Things
IP	Internet Protocol
KENIA	Kenya National Innovation Agency
KEPSA	Kenya Private Sector Alliance
KICA	Kenya Information and Communication Act
KICD	Kenya Institute of Curriculum Development
KPIs	Key Performance Indicators
KYEOP	Kenya Youth Employment Opportunities Project
MCDAs	Ministries, Counties, Departments and Agencies
MOICT	Ministry of Information, Communications and Technology
MTP	Medium Term Plan
NAS	National Addressing System
NCS	National Communications Secretariat
NOFBI	National Optic Fibre Backbone Infrastructure
NOFBI 2E	NOFBI Two Extension
OECD	Organization of Economic Cooperation and Development
PCK	Postal Corporation of Kenya
TNT	The National Treasury
UCS	Unified Communication Service
VoIP	Voice over Internet Protocol
R&D	Research and Development

H. E. PRESIDENT UHURU KENYATTA, CGH

The President of the Republic of Kenya and Commander-in-Chief of the Kenya Defence Forces.

FOREWORD

Technologies and industries have risen and fallen, and the emergence of the digital arena has redefined the ways we innovate, communicate, and experience the world. And the nature of discovery itself has changed by leaps and bounds - reaching celestial heights, and microscopic complexities that were unimaginable. For this reason, I believe it is essential that we refresh and reinvigorate our technology strategy to set us on a strong course for the next 10 years. The government is entrusted with sustainable development to ensure it uses ICTs to foster economic growth and job creation towards a robust business environment. The ever-present need for ICTs have dramatically morphed into a crosscutting digital tool that my government has steadily taken full advantage of to achieve efficient service delivery to citizens. Now, sustaining the set momentum by scaling, accelerating and harnessing the deployment of digitalization, we stand to continue facilitating and enhancing the efficiency and effectiveness of administrative processes within and outside the government.

My government implemented the Kenya ICT Master Plan 2014-2017. Tremendous achievements were realised including the 8,900Km of optic fibre deployed to formerly provincial headquarters, the Counties and sub- Counties; 4,300Km of optic fiber cable along major roads to cover the then eight provincial HQs, and 2,100 Km optic fiber cable installation mainly on metropolitan area networks in all 47 county Headquarters, together with the 2500 Km Optic fiber cable installed mainly to extend the network to 290 sub County headquarters.

Together with the nationwide deployment of network to the rural parts of the country, is connection to the South Sudan under the East Africa Regional Transport,

Trade And Development Facilitation Programme (EARTTDFP) – a 730 Kms installation of optic fibre from Eldoret to Nadapal which forms part of East Africa Regional obligations. During the same period, under the Digital Literacy programme, 1,169,000 digital learning and teaching devices assembled locally at JKUAT and Moi University plants were installed in 21,638 public primary schools representing 99.6 % for both regular and special needs education.

It is encouraging to note that a total of 331,000 teachers were trained on ICT integration with an additional 218,253 teachers trained on CBC while 93,009 teachers were trained on the utilisation of ICT devices. The Presidential Digital Talent programme also trained 2,100 IT interns in specialised areas which has since had a positive impact in delivery of service to Kenyans.

In my government's quest to hasten economic growth and job creation, my government in partnership with stakeholders have jointly developed The Kenya National Digital Master Plan 2022 - 2032 that is anchored on the National ICT Policy (2020) and the Digital Economy Blueprint (2019).

On the digital infrastructure pillar projected under the Kenya National Digital Master Plan 2022 – 2032, the Government envisages to rollout 100,000 Kms of optic fibre installation to all 1,450 wards nationally, digitise Government records and automate all Government systems to maximize the benefits of interoperability under Digital Government Services, products and data management. This plan envisages the building of capacity of 20 million citizens including Special Interest Groups on digital skills, Training of 10,000 officers in Public Service in high-end specialized ICT areas, Training of 300,000 civil servants on digital skills and data protection and Training of 350,000 teachers on digital skills.

With the growing demand for the use of ICT in almost all sectors in our economy, there is a need to streamline ICT investment and initiatives to enhance success in the implementation.

The Kenyan government requires that the public and the private sectors take full advantage of opportunities provided by ICTs and the emerging trends. As a team, we have to move forward to overcome the next obstacle through the power of creativity and innovative thinking in transforming public service delivery. This digital master plan will have a ripple effect, not only on the economy, but also on improving public confidence through enhancing robust modern ICT infrastructure for service delivery.

The implementation of this ten-year digital master plan is primed to harness access to government services, businesses and investors through availability of a highly skilled critical mass of ICT workforce supporting the digital economy, a robust digital innovation ecosystem, funding of the proposed projects, and a government that is running on a fully digital platform.

In conclusion, this Digital Master Plan plays a pivotal role as an enabler towards the achievement of the Vision 2030 as well as the Big Four Agenda - the latter hinging on Food Security, Affordable Housing, Manufacturing, and Affordable Healthcare – all of which shall continue to depend on digitization to make an impact to our people. As I therefore officially launch this magnanimous digital master plan for our country, may I call upon every one of us to collaborate to transform lives.

His Excellency, Hon. Uhuru Kenyatta, CGH
The President of the Republic of Kenya and Commander-in-Chief of the Kenya Defence Forces.

HON. JOE MUCHERU, EGH

Cabinet Secretary, Ministry of Information Communication and Technology, Innovation and Youth Affairs

PREAMBLE

The development of the Global Information Society is characterized by evolving policy and regulation, ever changing technologies and unpredictable market dynamics. These conditions call for Information Communications Technologies players, Government, operators, policy makers and regulators to constantly adapt in order to ensure that they meet the challenges that the ICT revolution throws at us. There is no doubt that the most difficult part of any revolution is adapting to, and living with the changes. Successfully doing so in the ongoing global ICT revolution can mean the difference between whether organizations continue to be competitive and ultimately operational, as well as whether we achieve our developmental goals or not.

ICTs play a huge role in public service delivery. In the recent past we have seen communities embarking on what is commonly called 'service delivery protests' basically calling on the Government to accelerate delivery of basic services. To address these challenges the ministry has developed a master plan in line with The Kenya Vision 2030, The Kenya Digital Economy BluePrint, The AU Agenda 2063, The Global Sustainable Development Goals (SDGs) as well as the presidential "Big Four Agenda".

This Masterplan will guide our response to gaps such as closing the digital divide, unstructured deployment of ICTs across the Public Service and the need to enforce standards in helping the country tackle its various challenges successfully, we need to overcome the

current skills shortage within the region. We therefore need to develop better ways of ensuring that the supply of trained people matches industry demand. In particular, we must continue to ensure that the ICT industry responds to the high unemployment locally and globally. This master plan has incorporated the use of emerging technologies such as block chain, internet of things, artificial intelligence, big data and quantum computing.

This master plan is a product of an all-inclusive, participatory and consultative process. guided by the following principles; Putting ICT at the centre of the national economic agenda, improving broadband access, efficient public service delivery and maintaining an open government, Leveraging on ICT to promote Sustainable Development Goals. The plan will position Kenya to take advantage of the "Fourth and the Fifth Industrial Revolution" famously known as the industry 4.0 and 5.0 through cognizance of the new and emerging technologies in order to leverage on the current capabilities in technology and exploit the opportunities inherent in the emerging issue.

The successful implementation of this master plan will require a concerted effort and commitment from all stakeholders, national government agencies, county governments, and private sector and development partners to create the synergies to realise the planned impact. The implementation of the master plan will necessitate institutional reforms in some Semi-Autonomous Government Agencies that will result in a more vibrant sector. Finally, to implement this policy effectively, the current legal, institutional and regulatory frameworks will be reviewed and aligned to the strategic policy focus. A robust monitoring and evaluation system will be put in place to track its implementation and the reviews will be shared annually.

The Master Plan will define our efforts, in the next ten years, to create business opportunities, wealth creation, employment and the contribution of ICT to the growth of the economy through our medium to long-term road map as we strive towards the realisation of our goal in transforming lives, better for the citizens. Working together we certainly can do more. The Ministry will endeavour to create an enabling environment for stakeholder engagement, listening to feedback and making evidence-driven policy decisions. The Ministry will align the projects identified to other government of Kenya priority initiatives aimed at fast tracking the country's digital transformation as expressed in Kenya Vision 2030.

Hon. Joe Mucheru, EGH
Cabinet Secretary, Ministry of Information Communication and Technology, Innovation and Youth Affairs

EXECUTIVE SUMMARY

The Kenya National Digital Master Plan 2022-2032 is a sequential progression of the Master Plan 2014-2017, the blueprint for leveraging and deepening the contribution of ICT to accelerate economic growth. The Master Plan 2014-2017 which firmly grounded on the e-Government Strategy 2004, the first National ICT Policy of 2005 and The Master Plan 2013, adopted a conceptual model that espoused the critical elements necessary for a social-, economic- and political-wide pervasive and ubiquitous ICT for rapid and broad contribution to growth.

The Master Plan categorized the ICT elements into foundations and pillars as a conceptual model to foster understanding and structuring the strategic interventions. The foundations included; ICT human capital and workforce development, Integrated ICT infrastructure and Integrated information infrastructure.

The Master Plan had identified four pillars: E-Government services, ICT as a driver of industry and developing ICT businesses. However, the master plan was not fully implemented owing to its short timeframe, a challenge that was squarely equated to inadequate resources and delay in the implementation of the institutional reforms.

This Kenya National Digital Master Plan is a continuation of the aspirations of the Kenya Vision 2030. It dovetails the initiatives and achievements of the Kenya National ICT Master Plan 2014 – 2017, builds on the pillars of the Kenya Digital Economy Blueprint, and re-focuses the country on the transformative trajectory towards a digital economy. In the conceptual model given in chapter 3, the purpose of this Master Plan is the provision of quality, accessible, affordable, reliable, quality, and secure ICTs in government, with a positioning of Kenya as a globally competitive digital economy.

This Master Plan has four pillars that are responsible for the provision of digital services to citizens, businesses and other stakeholders:

a. **Digital Infrastructure:** For equitable access to national service through a pervasive and ubiquitous national ICT infrastructure;

b. **Digital Government Service, Product and Data Management:** For provision of e-Government information and services for improved productivity, efficiency, effectiveness and governance in all sectors. It also considers technology related products and services.

c. **Digital Skills:** For the development of a digitally skilled workforce and citizenry that is grounded on ethical practices and social cultural values to implement and operationalize this master plan; and

d. **Digital Innovation, Enterprise and Digital Business:** For enhancing the innovation value chain in order to turn innovative ideas into sustainable businesses and operating models. The pillar also aims to migrate businesses onto the digital platform.

In addition to the four pillars, the Master Plan has two types of strategic themes. The first are the foundational themes. These are the Policy, Legal and Regulatory Framework; and Research and Development. The former is to further improve the policy, legal and regulatory framework that was created in the previous Master Plan. The latter is a new theme that acknowledges the importance of being grounded on knowledge as well as the importance of the government partnering with educational and research institutions.

The second type of strategic themes crosscut the four pillars. These cross-cutting themes are Information Security and Cyber Management; and Emerging Technologies. These two themes did not feature in the previous Master Plan. As Kenya has continued in her digital trajectory, issues of safety in cyberspace have gained prominence. Emerging technologies have also gained prominence given the transformative nature of the fourth industrial revolution technologies. The Government of Kenya has to position itself to exploit these technologies to achieve accelerated development of its people.

For each pillar and theme, the plan provides a situational analysis, the intended outcomes, objectives, key performance indicators (KPIs), strategies and projects or initiatives to be implemented. These constitute the main body of the Master Plan and are to be found in chapters 4 and 5.

A variety of implementation issues are presented in chapter 6. These include the financing of the Master Plan and the institutional framework considerations to implement the plan. In addition, a detailed stakeholder mapping for the purpose of ensuring broad understanding and universal ownership of the plan is presented. Expectations of the stakeholders are critically taken into account with a view to prescribing appropriate engagement. Similarly, the obligations of the stakeholder are outlined as prerequisite communication. Finally, the chapter provides a monitoring and evaluation framework that will be adopted in measuring achievements and assessing outcomes, as well as an outline of the projects to be implemented. To ease coordination and implementation a governance framework is proposed with ICT Authority being the main implementing agency.

INTRODUCTION

INTRODUCTION

1.1 RATIONALE

The government, over time, has been developing ICT Plans and initiatives meant to guide the country towards achievement of Vision 2030. These plans are spread across a number of government activities in different forms and designs and have led to poor coordination and implementation of the initiatives. Resource mobilization for each initiative has been a challenge since most are split into small project activities which sometime may not relate to government vision. Coordination and monitoring to ensure success of each initiative has been difficult due to unclear objectives, targets and strategies.

In addition, there is a global focus on ICT investments brought about by Covid-19 challenges hence the need for the government to provide an elaborate plan to guide planning, implementation , management and investments of it in the country. Digital technologies have risen to prominence as a critical determinant of economic growth, national security, and international competitiveness. The digital economy has a profound influence on the world's trajectory and the societal well-being of ordinary citizens. It affects everything from resource allocation to income distribution and growth. This calls for an elaborate approach by the State to position ICT as one of the strategic pillars in economic growth of the country.

This National Digital Master Plan 2022 - 2032 has reviewed and consolidated ICT initiatives into a 10-year plan hence becoming a single point of reference for all government ICT Plans. The Master plan builds on the pillars of the Kenya Digital Economy Blueprint, and the achievements of the Kenya National ICT Master Plan 2014 – 2017. The previous Master Plan was implemented through programmes and projects that facilitated efficient and effective delivery of government online services. It was a 5-year plan and faced challenges due to a shorter time frame, poor coordination and inadequate resources for implementation of critical projects' activities.

The National Digital Master Plan 2022 - 2032 aims to provide a holistic and coordinated approach so as to ensure the alignment and optimization of ICTs resources with changing needs. This will enable effective and efficient implementation of government ICT initiatives, strategies and guide policy direction of the country. It attempts to reduce implementation and operation cost through an elaborate implementation plan with a coordination framework

This Plan streamlines ICT projects across government, ensures interoperability of systems by eliminating technology Silos, share and reuse Viable ICTs assets, guarantee privacy and data protection and provides Cyber Security Assurance. It has also provided an elaborate 10 year government plan which guides ICT investors in addition to providing resource mobilization strategy.

1.2 REVIEW OF THE PREVIOUS MASTER PLAN (2014-2017)

1.2.1 Implementation Status

The implementation of the National ICT Master Plan was from 2014 -2017. Although the term for this plan was up to 2017, the government continued to implement the Master Plan up to 2022 due to resource constraint and project implementation period.

Its implementation offers critical lessons as we embark on the Kenya National Digital Master Plan 2022-2032. Overall, the Master Plan had 15 categories of projects.

In establishing an enabling legal and regulatory framework, the National ICT Policy 2019 was gazetted in 2020, Gazette Notice No. 5472. The Access to Information Act No. 31 of 2016, the Computer Misuse and Cyber Crime Act 2018 and the Data Protection Act No. 24 of 2019 were also passed and came into effect. The only outstanding legislation is on the ICT Authority which is still in draft.

The previous Master Plan had three pillars (E-Government services, ICT as a Driver of Industry and; Developing ICT Businesses), three foundations (ICT human capital and workforce development, Integrated ICT infrastructure and; Integrated information infrastructure).

Under the **Information Infrastructure and e-Government Services**, the Person hub category, the Government initiated the National Integrated Identity Management System (NIIMS) as the single source of identity truth on citizens and foreigners in Kenya. The system leverages on the existing Integrated Personal Registration System (IPRS) and registration information at the National Registration Bureau. An integrated security surveillance system was also established under the National Police Service.

In addition, the Implementation of a citizen portal on land titles and linked to the e-citizen is currently on-going. In the period under review, a citizens' portal was created and 52 Huduma centres operationalised. A smart driver's license system is under implementation. However, the National Spatial Infrastructure (NSDI) is bending acquisition of resources for implementation. The government is in the process of implementing and adopting e-procurement systems and has fully Integrated within the Financial Management Systems.

An integrated National Health Management System within integrating all health sub-systems with a health portal is yet to be developed. Under ICT infrastructure development over 8900 Km of National Optic Fibre Backbone Infrastructure (NOFBI) is completed.

Hotspots in health facilities are also yet to be developed. Additionally, NOFBI has connected 28 hospitals while 91 hospitals are ready for connection (NOFBI manholes are at the hospitals). KENET, the National Research and Education Network (NREN) for Kenya, has complemented this effort and connected 10 referral hospitals that are linked to universities offering health sciences education and research programs. KENET has also connected 71 campuses of KMTCs, which are mostly based on Level 5 hospitals.

The 20 Km fibre optic Government Common Core Network (GCCN) in Nairobi was extended to cover over 50 State Agencies that are housed in private buildings within and outside Nairobi and the Government Data Centre (GDC) Private Cloud facility was upgraded with a 10 Gbps link capacity to support applications from the government organizations. Setting up Mombasa as a regional internet exchange point was completed.

Under ICT human capital and workforce development the Digital Literacy Programme (Laptop Project), 1.2 million devices (including wireless routers) were distributed to 22,891 public primary schools, and the National Education Management Information System (NEMIS) to manage information on schools and candidates has been implemented. All tertiary institutions have been connected to the internet by KENET. Hotspots in schools are yet to be implemented. The challenge of installation of hotpots in public places has been the lack of a sustainable business model. It is recommended that a policy intervention be initiated to enable private enterprise to create these hotspots.

The 5 centres of excellence in ICT and education and training were to be established and the Konza Technopolis Development Authority (KoTDA) Bill enacted. In the period under review, Konza Technopolis made significant progress with regards to its implementation progress with phase 1 horizontal infrastructure consisting of Water treatment plant, water reclamation facility, waste collection systems, landscaping and parks, electrical systems and ICT infrastructure, streetscapes and public facilities developed to 70% completion. The establishment of the command and control centre is at 40% completion. . Other key deliverables include the completion and operationalisation of Konza complex, National data Center and initial investor attraction.

The Technopolis is on course with ongoing development of the Kenya Advanced Institute of Science and Technology which will focus on postgraduate ICT and engineering courses among other STEM programmes. The university is modeled after the Korean Advanced Institute of Science and Technology. Economically, Technopolis is already engaging over 2500 direct workers in the development phase and has economically impacted over 50,000 Kenyans. KOTDA also launched its Second strategic plan that is focussed on "Accelerating the impact of Konza Technopolis and has initiated planning for phase two; comprising the rest of the 3500 with a view to open the entire city for development. Additionally, the Authority is working to implement the Buffer zone development control strategy following an MOU signoff by the three country governments neighboring the Technopolis. MOICT, Ministry of lands and the ministry of interior.

A one-year intensive structured training and attachment program producing 400 high-end graduates per year [1] has been established by the ICT Authority. The programme is on its 6th cycle having started in 2016 and has produced 1,700 graduates to date. Development of ICT continuous education has courses for training of trainers and the public is yet to begin. However, as a means of dealing with COVID-19, universities, middle level colleges and some schools have started e-learning and adopted a hybrid mode of teaching and learning.

1.2.2 Challenges and Recommendations

The implementation of the Masterplan, faced some challenges which need to be addressed..

1.2.2.1 Challenges

(i). ***Framework-*** There was a lack of implementation framework and though ICTA later took charge in monitoring and coordinating the plan it came late since it was also being established.

(ii). ***Resources-*** Inadequate resources to implement the Master Plan.

(iii). ***Coordination*** - There was inadequate coordination to align Government entities to the Master plan.

(iv). ***ICTA Establishment***- Delay in establishment and operationalization of ICT Authority. The ICT Authority was to play a critical role in coordination and implementation of the master plan and its delay in establishing the entity had a negative significant impact on the success of implementation of the master plan.

(v). Limited technical staff – The agencies tasked to implement the master plan had a limited number of technical staff.

1.2.2.2 Recommendations

(i). Resource Mobilization- A more realistic resource mobilization strategy needs to be incorporated in the Master Plan to address the issues of finances, time, systems/tools and human capital. The country needs to have a policy on resource mobilization for the master plan.

(ii). Stakeholder Engagement and Communication: A stakeholder engagement plan and an elaborate communication plan need to be incorporated in the plan for citizen 'buy-in' and support for successful implementation.

(iii). Collaboration between Government Agencies – There is a need to have a collaborative approach during the implementation of the initiatives to ensure sustainability and ownership.

SETTING THE CONTEXT

2.0 SETTING THE CONTEXT

The Kenya National Digital Master Plan has considered the importance and role of Information and Communications Technology (ICT) in economic development of the Country. It positions ICT as key enabler towards achievement of Kenya vision 2030 and acceleration of digitally enabled economy. It considers all the revolutionary aspects brought in by ICT and establishes a clear framework to enable effective utilization of each technology to benefit development. The framework classified ICT components into four pillars and foundational themes. The pillars are digital infrastructure, digital services and data management, digital skills and digital enterprises innovation and businesses. The foundations are crossing cutting issues which among them are emerging technologies, Cyber Security management, Policies and legislations as well as Research and Development. The global, Regional and National perspectives of ICTs were analyzed to give a clear view and understanding of their roles in economic development.

2.1 THE NATIONAL CONTEXT

The Kenyan government has made effective use of ICT to enhance delivery of services to citizens. Critical processes and systems such as revenue collection systems, Vehicle registration and licensing systems, registration of death and birth, education systems among others have been digitized. Under infrastructure, over 8900 km of fibre optic cable has been laid across the country to provide high speed internet connectivity services to both national and county government offices. There are a number of government services which are online. Kenya has trained and equipped a number of workforces with digital skills and has an annual youth mentorship programme for ICT professionals.

In recognition of the growth in the ICT sector as well as the rights to privacy guaranteed under article 31 of the constitution of Kenya, the Government recognized the need to have a framework in place that will regulate the processing of personal information. Subsequently, in April 2019, the executive assented to the Privacy and Data Protection policy 2019, which was followed by the enactment of the Data Protection Act 2019. In November 2020, Kenya's first Data Commissioner was appointed to spearhead the establishment and operationalization of the office of the Data Protection commissioner. In operationalizing the office, three sets of data protection regulations have been enacted. The regulations speak to the rights of the data subjects and obligations of data controllers as well as data localization requirements. Secondly, the requirement for registration and lastly as complaints and dispute resolution mechanism in relation to the processing of personal information.

Based on institutional and situational analysis, the Master Plan is in recognition of the fact that Kenya's ICTs potential has not been maximized to drive social and economic development. It is expected that the implementation of this Digital Master Plan will unlock

the high potential of the ICT sector in the country and the region. This will create a digital society and economy that is able to exploit the national, regional and global opportunities presented by the dynamic sector of information and communication technologies to advance its socio-economic growth leading to an enhanced quality of life.

The Study below conducted by UN- E-government Survey in 2020 gives a clear analysis on where the country stands as far as infrastructure, online services and human capital index.

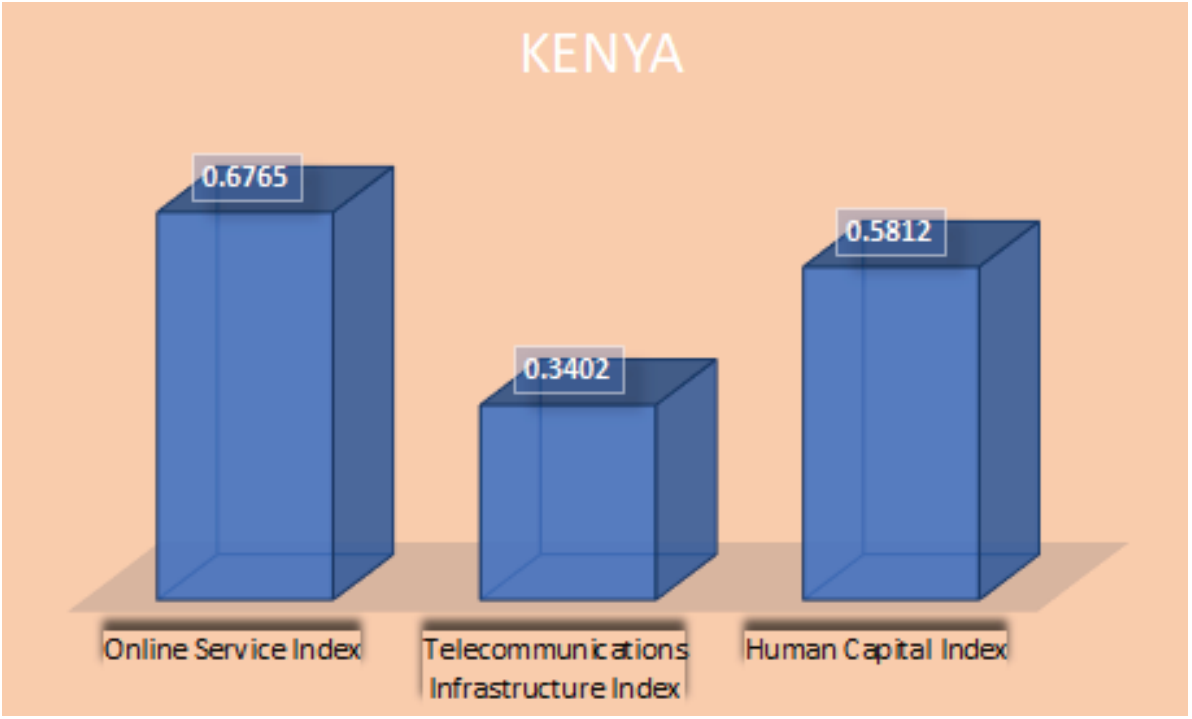


Figure 2.1: UN E-Government Survey 2020, Kenya's Score

From the local perspective, online service is rated at (67.7%), Telecommunication infrastructure (34%) and ICT human capital 0.581 (58%) UN E-Government Survey 2020 with an overall global position of 116 out of the 193 countries evaluated. This indicates that the country has done relatively well in online services but there is still low investment in telecommunication infrastructure. Kenya needs to invest more in all the three measures to ensure she becomes the regional and global leader in ICT and as a gateway for ICT research and development.

2.2 THE AFRICA CONTEXT

At the regional level, Kenya aims at improving its trade of goods and services with East Africa Community (EAC) members and Common Market for Eastern and Southern Africa (COMESA). Trading under the African Free Trade Agreement (ACFTA) started in January 2022. This calls for strategic positioning to ensure that systems and processes are put in place to promote cybersecurity and digital trust that would enhance cross border data flow management.

ICTs have a major role to play in regard to facilitating communication and engagement 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 within the community is crucial to address the digital divide, the emerging mobile and cyber security issues perpetuated through ICT and fuelled by the borderless nature of the services delivered through the technologies.

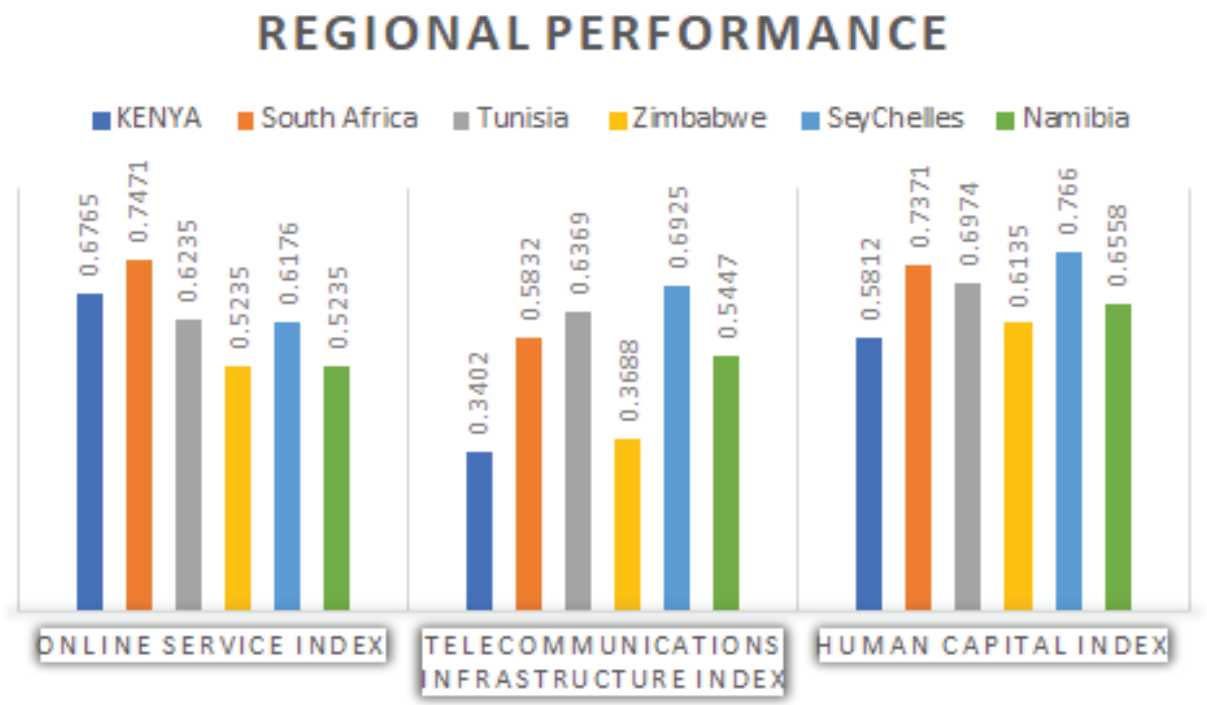


Figure 2.2: Regional e-Government performance (Source UN E-Government Survey 2020)

From a continental perspective, Kenya ranks at 116 on the UN eGovt index, ahead of Zimbabwe (at 126) but well behind Seychelles (at 76), South Africa (78), Tunisia (at 91) and Namibia (at 104). Whereas Kenya is ahead of its East African regional neighbours, the continental perspective shows that Kenya still needs to put more effort in terms of claiming its role as a continental leader in the Digital Government domain.

In recognition of Kenya's role in setting the pace for Digital transformation in Africa and championing the growth of an African-wide digital economy for all of Smart Africa Alliance members, Kenya developed the digital economy blueprint as a framework for developing digital economies, which informs this digital master plan. In addition, the strategy mirrors at the national level, The African Union Digital Transformation Strategy (2020-2030) whose vision is a "A Digitally Transformed Continent for Prosperity and Inclusivity" as well as Africa's agenda 63

With four foundation pillars, a highlight of the critical sectors to drive digital transformation classified in six broad areas and identified 5 cross cutting themes (See Figure 2.3), this Kenya National Digital Master Plan is aligned to the continental digital transformation strategy.

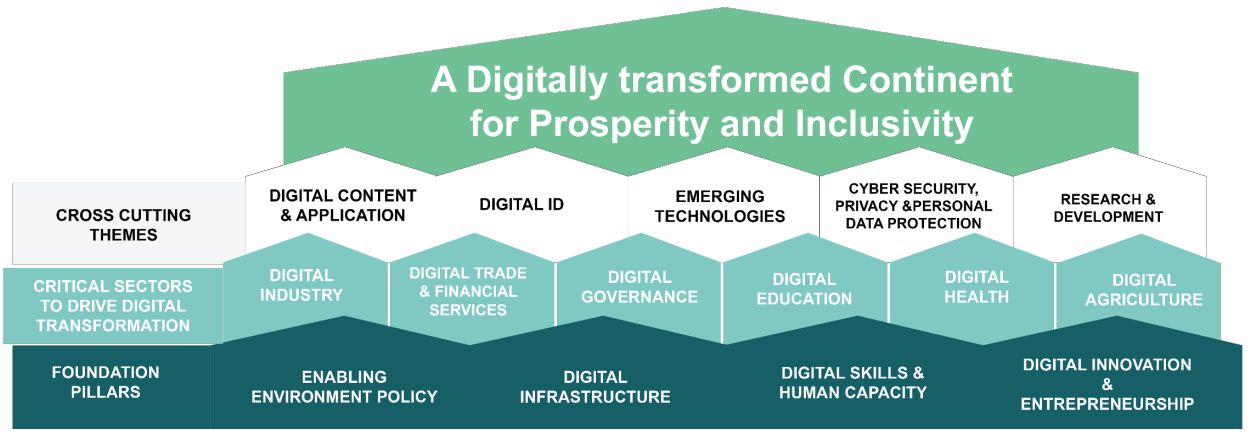


Figure 2.3: A conceptual model of the Africa digital transformation strategy

The Smart Africa Alliance has developed a blueprint for Digital Government that is based on the six foundation pillars of Smart Device, Broadband Connectivity, Security, Capacity Building, Entrepreneurship & Innovation and PPP (Public Private Partnership).

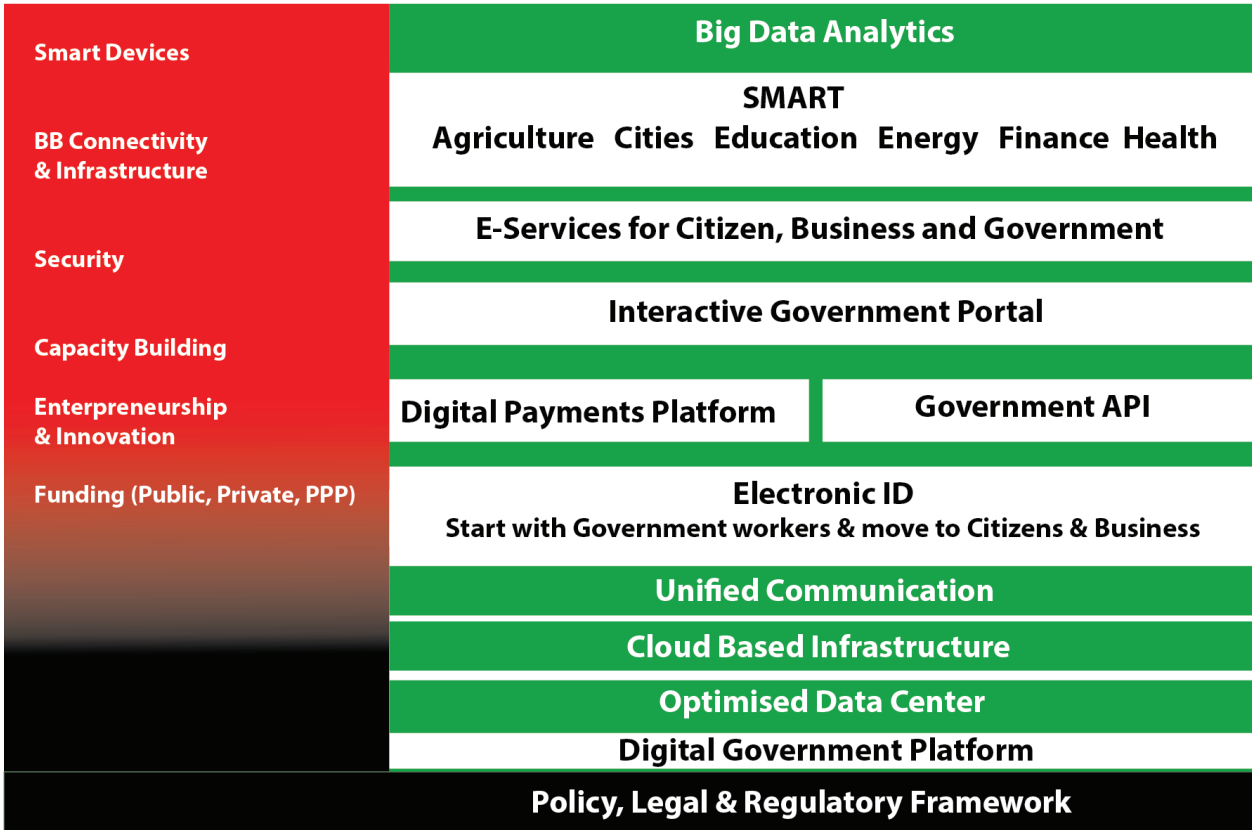


Fig 2.4: Digital Government Blueprint, from Smart Africa Alliance

The Policy, Legal and Regulatory framework is cross-cutting with the key building blocks for Digital government outlined to include Digital Government platform, Digital ID or e-ID, Digital Payment Platforms, Government APIs, Interactive Government Portal and e-Services for Citizens. These pillars and building blocks provide the prerequisite ecosystems to enable public sector services to be delivered as Smart Agriculture, Smart Cities, Smart Education, Smart Energy, Smart Finance, Smart Health amongst others. According to the Smart Africa Alliance, the long-term outcomes of digital government include Job Creation & Economic Growth, Sustainable Development, Cashless Economy, Citizen Participation, Transparency, Trust and Accountability.

This National Digital Master Plan is informed by these Continental as well as the UN Global Digital Government models. The current integration of infrastructure across African countries through Lamu port, Southern Sudan and Ethiopia transport corridor (LAPSSET) and East Africa Regional Trade and Development facilitation are among the initiatives currently under implementation by the Kenya Government.

2.3 THE GLOBAL CONTEXT

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) and the World Summit on the information society (WSIS). 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 (ICANN) headquartered in the United States which is responsible for the coordination of the global Internet's systems of unique identifiers and ensuring it's stable and secure operation. In addition, Kenya has been actively participating in the two UN processes, Group of Government Experts (GGE) discussions from 2004 and the UN Open Ended Working Group (OEWG) created in 2019 where deliberations related to the developments in the field of information and telecommunications in the context of international security have been going on. The deliberations have acknowledged that the benefits of digital technologies are not evenly distributed and that narrowing digital divides, including through universal, inclusive and non-discriminatory access to ICTs and connectivity, remains an urgent priority for the international community. Eleven (11) non-binding norms and confidence building measures (that includes transparency, cooperative and stability measures) have been suggested for countries to align with to promote International Security.

Globally and according to the UN eGovernment Annual Survey (2020), 66% of Member States provided online transactional services in 2020. Prevalence rates are highest in the very high and high OSI groups (93% and 81%, respectively), covering the full spectrum of the 20 services assessed in 2020. In the middle and low OSI groups, the respective prevalence rates are 53 and 13%. It is important to note that progress in online services delivery is being made even in countries with low OSI levels, where the average number of online services offered rose from 1 in 2018 to around 3 in 2020.

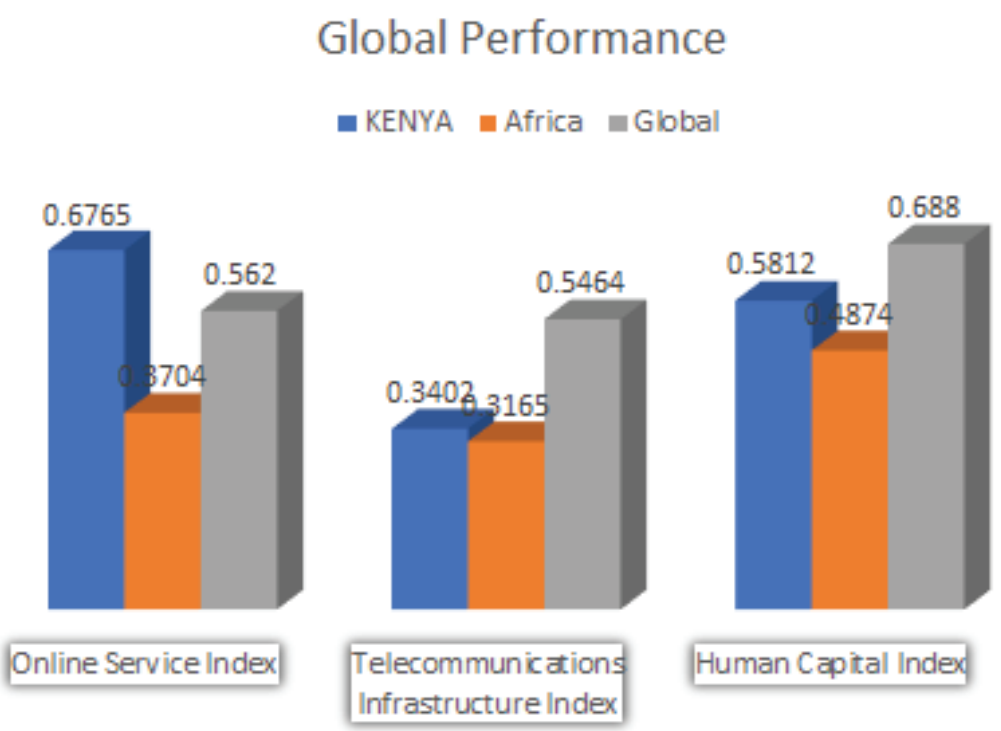


Figure 2.5: Global performance index on Online Service, Telecommunication and ICT Human capital

Figure 2.5 shows that Kenya's global performance index with respect to the online service is at 0. 677 (67.7%) which ranks Kenya above the average performance for the whole of Africa and the world. However, Kenya's performance on Telecommunication infrastructure is still low at 0.34 (34%) compared to the average scores for Africa and the rest of the world which are at 31% and 54% respectively. This presents opportunities for expansion on telecommunication infrastructure.

The ICT human capital index for Kenya is at 0.58.(58%) compared to the average scores for Africa at 48% and 68% Global performance ratings. This implies that there is a need for Kenyan Government to invest in training ICT human capital as this will ensure that Kenya takes on a competitive edge as she aims to become the gateway for ICT research and development.

CONCEPTUAL MODEL

3. CONCEPTUAL MODEL

The conceptual model for this Master Plan is represented in Figure 3.1.

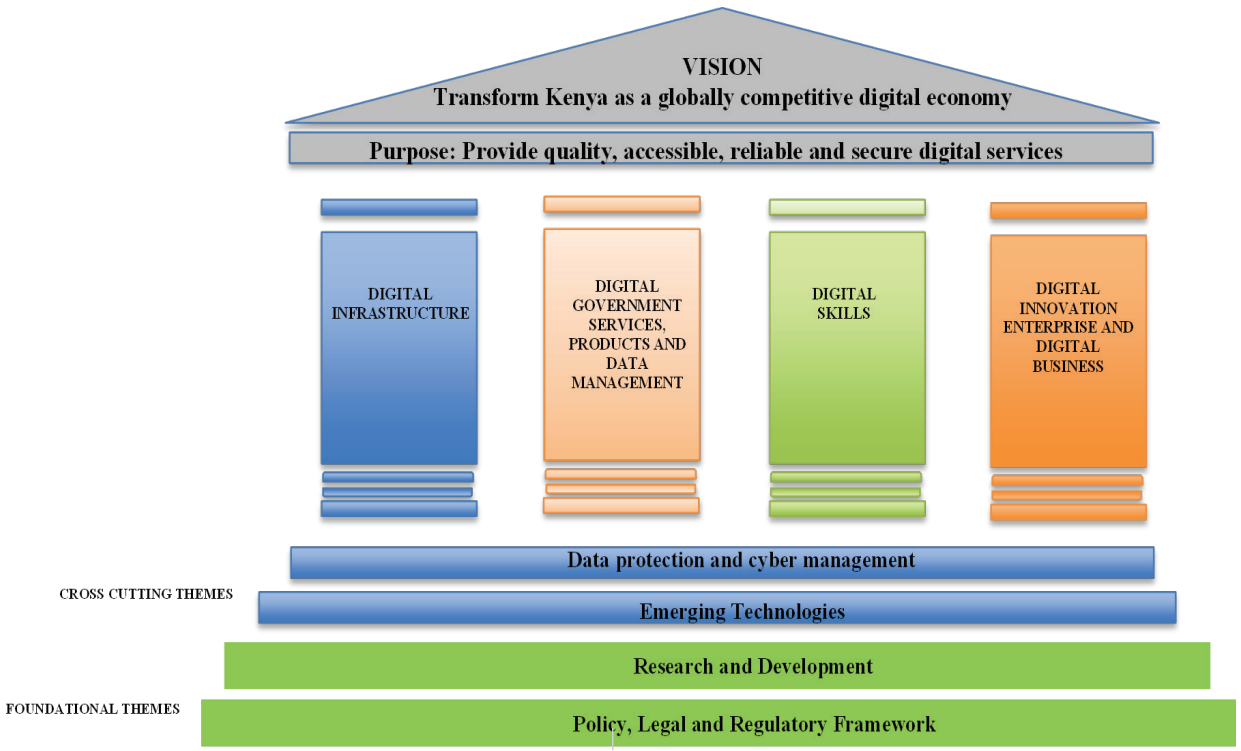


Figure 3.1: Conceptual model of the Digital Master Plan

This conceptual model has a total of eight strategic themes. Four of these are referred to as pillars and are Digital Infrastructure; Digital Products, Services and Data Management; Digital Skills; and Digital Innovation, Enterprise and Digital Business. In addition, there are two strategic themes that cut across all the pillars; Data Protection and Cyber Management, and Emerging Technologies. Finally, there are two foundational themes; Legal, Policy and Regulatory Framework, and Research and Development. These themes are summarized below, and their detailed plans can be found in chapters 4 and 5.

3.1 PURPOSE

The purpose of this Master Plan is to provide a coordinated approach in the planning, designing, deployment and management of government ICT initiatives to have successful implementation. It will address the gaps that have been identified, relating to poor planning and uncoordinated approach in the implementation of government ICT initiatives. It is also to provide an engagement framework with ICT investors and guide them on investment opportunities within the country.

3.2 OBJECTIVE

The broad objective is to build a robust, secure, affordable, accessible and reliable digital ecosystem which benefits the public and private sector, and improve quality of life.

3.3 PILLARS

The primary objectives of this Kenya National Digital Master Plan 2022 - 2032 are represented through its four pillars. These objectives, among others, are: -

- To utilize ICT to enhance government service delivery to the citizen. This will be achieved through automation of all government services, digital literacy training of citizens, broadband connectivity, Metro-Cities infrastructure, Cloud infrastructure, adoption of smart technologies, 'government paperless office strategy' and online platforms for 'common services'.
- To deploy ICT infrastructure to all underserved and unserved areas of the country so as to spur economic growth, promote job creation, enhance innovation and creativity. This will be achieved through connectivity of schools, rural areas/businesses, homes, provision of hotspots in public spaces, capacity building and provision of village digital hubs and studios for filming.

  To provide adequate digital skilled human capital through capacity building of public servants, citizens and ICT professionals.

- To promote development of ICT industries through full establishment of Konza technopolis, establishment of electronic manufacturing plants and software industries as well as expansion of film and media industries.
- Promote government-private sector engagement and involvement in ICT development of the country through development of policies, forums/structures which enable active participation and involvement of the private sector during design, deployment and management of ICT initiatives.
- To position Kenya as a regional ICT hub through establishment of submarine maintenance depot and establishment of regional smart hub for IP exchange.
- To promote e-commerce and business enterprises through implementation of national physical addressing system, enactment and adoption of building codes legislations, adoption of integrated infrastructure plan, adoption of smart technologies i.e IoT, block chain and cryptocurrency.
- To provide robust, secure ICT environment

through development and implementation national cyber security plan, full implementation of data protection legislations

- To identify and enact policies, legislation to ease growth of the ICT sector. Clear resource mobilization plan through partnerships with private sector, donor community, development partners and e-government legislation.

Pillars are one of the ways of delivering the above objectives. 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 ICTs; and creating ICTs businesses that help to create a thriving ICT sector. Four pillars were derived from the situational analysis as follows.

Digital Infrastructure: ICTs connectivity to all the unserved and underserved corners of the country is a key prerequisite for transformation towards the realization of the Vision 2030 and the medium-term plans (MTPs).

Digital Government Services, Products & Data Management: 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 provisioning and management of e-Government information and services is key to improving productivity, efficiency, effectiveness and governance in all sectors. Achieving a fully digitized ecosystem will result in processing of large volumes of data, this means that proper data handling and management will have to be adopted to ensure that users are protected accordingly.

Digital Skills: This pillar focuses on the development of a digitally skilled workforce that is grounded on ethical practices and social culture values to implement and operationalize this master plan. It also focuses on the development of digital capacity among the citizenry for them to effectively consume digital services, whether from government or other sources. Training adequate human capital to be able to serve ICT in the country as well as the region is a priority.

Digital Innovation, Enterprise and Digital Business: Government operational challenges in terms of delivering efficient digital services to the public presents a great opportunity to collaborate with academia and industry in terms of finding sustainable solutions. Specifically, the government can provide an environment to pilot and incubate some of the proposed solutions to maturity. This pillar focuses on enhancing the innovation value chain in order to turn innovative ideas into sustainable businesses and operating models. The pillar also aims to migrate businesses onto the digital platform.

3.3 FOUNDATIONAL AND CROSS-CUTTING THEMES

3.3.1 Data Protection and Cyber Security Management

As the government digitizes its operations, it automatically increases its attack surface from the perspective of both insider and external actors in the digital space.

Additionally, successful information and cyber related attacks creates trust-deficits and subsequently reduces uptake of digital services by the citizens and businesses. Information security is therefore a critical cross-cutting theme in terms of securing digital assets while increasing citizens and businesses confidence and adoption of digital services. There is a need for speedy implementation of data protection legislation.

3.3.2 Emerging Technologies

Automation of government services is a great step towards increasing efficiency, effectiveness and transparency in the public sector. However, new and emerging technologies can be both disruptive or game-changing depending on how prepared the public sector is in terms of scanning the environment, anticipating

and leveraging on these new technologies. Emerging technology is therefore an important cross-cutting theme that can revolutionize public sector services. The country's strategy on Artificial Intelligence [AI] and adoption of smart technologies is very necessary going forward.

3.3.3 Policy, Legal & Regulatory Framework

Many of the useful and established automated processes in the private sector would find implementation barriers in terms of lack of clear policy, legal or regulatory frameworks to empower the public servants to adopt and implement automation. The ongoing digitization of the land records is a good example where there was a need to amend the policy and legal frameworks to give legal effect to digital processes that would otherwise be declared null and void - given the then analogue-based land laws. This foundational theme identifies the policy, legal and regulatory gaps that need to be resolved to ensure and guarantee a successful implementation journey for digital services in the public sector.

3.3.4 Research & Development

The Master Plan will endeavor to accelerate national and regional ICT initiatives that support research and research-based education, in order to build the necessary human capital needed and increase the capacity of institutions to provide valuable training and research opportunities. This foundational theme seeks to forge a robust partnership with research institutions to integrate research in e-Government service development and delivery. This could easily be achieved through collaborating with our local universities and other learning institutions offering ICT courses. Bilateral agreement can be sought to address any gap in this area; centres where locals can be exposed to high technology designs and discoveries and be part of the interface with investors' technical headquarters.

3.4 GUIDING PRINCIPLES

The successful implementation of the Master Plan will also be guided by the principles of partnerships, equity and non-discrimination, technology neutrality, environmental protection and conservation and good governance as outlined below:

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

(b). Equity and non-discrimination: Equitable and non-discriminatory availability of and access to ICTs.

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

(d). Environmental Protection and conservation The implementation of the Digital Master Plan will adhere to environmental agreements in which Kenya is a signatory.

(e). Good governance: The implementation of this master plan to adhere to the highest standards of good governance, sound policies and ethical behaviour.

PILLARS

4. PILLARS

4.1 DIGITAL INFRASTRUCTURE

Kenya currently boasts of being one of the most connected countries on the Eastern Coast of Africa. There are six submarine cables and 8900 Km of Backbone, Metro and last mile connectivity that cut across the country as well as various Private sector connectivity. However, Kenya still faces a number of challenges in developing and providing connectivity infrastructure which will be discussed in the following sections;

(a). Digital connectivity
(b). Digital Data centre and cloud Infrastructure

4.1.1 Situation Analysis

4.1.1.1 Digital Connectivity

Kenya currently boasts of being one of the most connected countries on the Eastern Coast of Africa. There are six submarine cables namely TEAMS (5.2TB), EASSY (27.4TB), SEACOM (12TB), DARE (36TB), PEACE (192TB) and LION2 (12.33TB) that offers connectivity to the rest of the world via redundant routing as shown in Figure 4.1.

The Government network is connected to the international broadband highway through TEAMS which the government has a 20% shareholding (1.04TB). The government has utilised its capacity in Teams by activating internet capacity of 10 Gbps to serve the government. The challenges are as below

1. Poor maintenance of submarine cables for the region due lack of regional maintenance depot
2. Only one landing station that could pose a risk of the country being out of connectivity in case of major disaster.
3. In adequate number of experts to support the infrastructure
4. Lack of ICT Infrastructure development plan.
5. Damage and destruction of ICT infrastructure due to road constructions and other private sectors initiatives.
6. Inadequate broadband coverage and high cost of connectivity as compared with other states within the region.
7. Lack of ICT standards to guide implementation of territorial ICT connectivity.

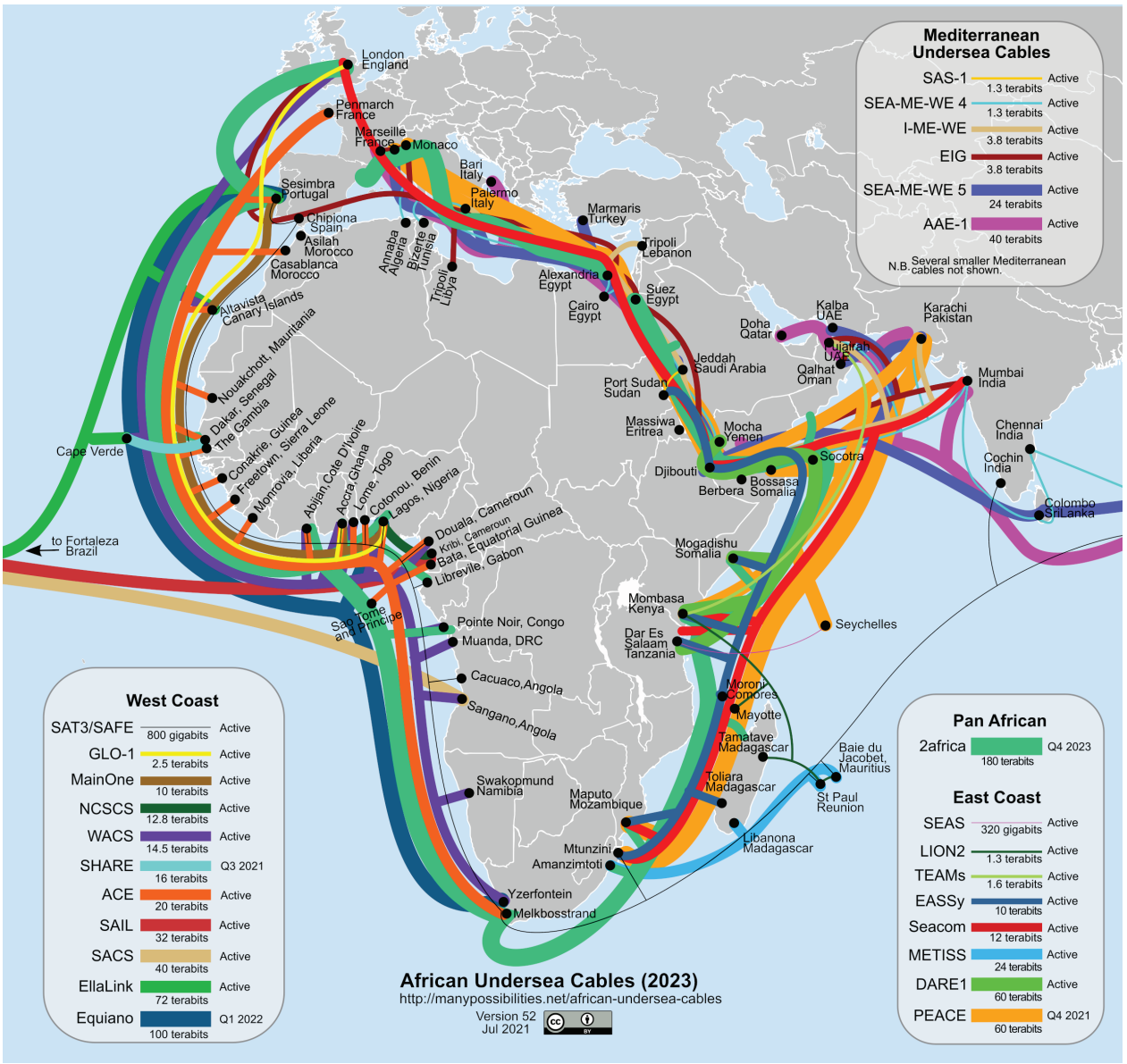


Figure 4.1: Africa Undersea Cables

On National Connectivity, the government in the last ten (10) years has built approximately 9000km of terrestrial fibre that has reached the sub-county level mainly connecting key government institutions and offices to offer government service through National Optic Fibre Backbone Infrastructure Project (NOFBI).

National Optic Fibre Backbone Infrastructure (NOFBI) has been implemented in three Phases; NOFBI phase I was implemented in 2008 and covered 4300Km of terrestrial fibre. NOFBI Phase 1 was largely a linear network and needed to be improved to make it more reliable and available; hence in 2010 the Government

embarked on NOFBI Phase 2 in order to provide a more reliable, stable and efficient basic national backbone network and also offer protection/redundancy leveraging on the NOFBI Phase I implementation

The NOFBI Phase 2 project started from September 2014 and its scope included 2,100 KM fibre links and IP equipment to all the 47-county headquarters, building of metropolitan area networks in all 47-county headquarters, and creating a redundancy to the national backbone.

In 2017, the government embarked on NOFBI 2E network with a scope of 2,500 KM fibre links and IP equipment majorly covering sub-counties and creating sub-rings to further increase redundancy as shown in Figure 4.2. Kenya has since achieved a more reliable, stable and efficient national backbone network that is being used by the Government at the National and County levels.

On Last Mile connectivity the government has built a total of 534km of last mile connectivity mainly connecting 1650 key public institutions and offices to offer service delivery through programmes such as Government Common Core Network (GCCN), NOFBI, CCP).

The Government Common Core Network was implemented within Nairobi meant to serve as a shared and secure inter-operable Government-wide ICT architecture and improve inter-ministerial sharing of databases and exchange of information.

At the county level, through Nation Optic Fibre Backbone Infrastructure (NOFBI) and County Connectivity Project the government has implemented 510 km of last mile connectivity in the county headquarters as part of the county metros and last mile connections. The main aim of last mile connectivity is to interconnect all counties with VoIP (county and inter-county communication; voice services) through internet connection (promoting online services using telephones, emails and video conferencing) and access to critical government applications like the IFMIS.

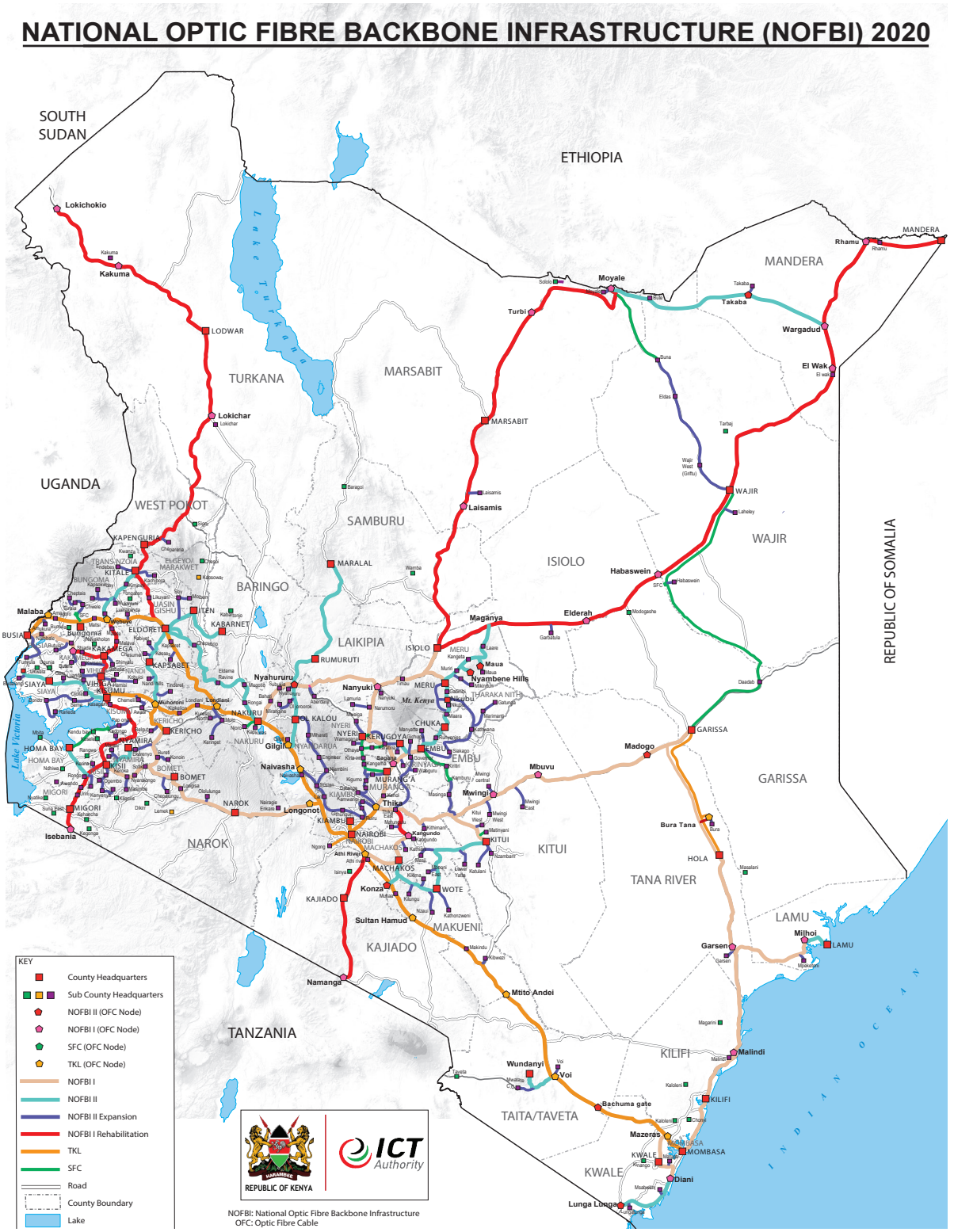


Figure 4.2: Current National Backbone

There has been tremendous growth in the ICT sector particularly in the mobile sector, which by Sept 2021 had 64.8 million subscribers of which 44.8 million mobile internet data subscriptions were reported by the operators (Communication Authority, Quarterly Report of July-Sept 2021). At the same time, Mobile Broadband subscribers were estimated at 26.9 million, which is an indication that Kenyans are ready to embrace information and communication technology as long as it enhances their perceived quality of life.

However, Kenya still faces a number of challenges in developing and providing National connectivity infrastructure among them:

1. Limited coverage of backbone infrastructure in the rural areas.
2. Inadequate bandwidth capacity. The capacity of the network is not able to serve all the government needs as well as the private sector.
3. Damaged/old infrastructure. The government network has also faced challenges of some of its sections being destroyed and therefore not usable despite being an old network
4. Limited Intra-County Connectivity utilization. While there is good utilization of the installed capacity at the main County locations, there is need to extend the connectivity across the sub-county and all other government offices as well as general populations

The growth of connectivity by 2030 will be enormous and bandwidth requirements will be in Terabytes due to big data consolidation and analytics. A single Households could need 2 Gbps of broadband speed by 2030. A new report from the Fibre Broadband Association predicts that a four-person household will require 2,141 Mbps speeds in the next decade.

This masterplan will also ensure that the structural designs incorporate ICT infrastructural requirements for any building erected or development of land to comply with ICT building code.

4.1.1.2 Data Centres

Data Centre and cloud services are critical ICT infrastructure that ensures E-Government services continuity by protecting critical applications and data against loss that could arise from natural disasters, acts of terrorism, sabotage, and technical faults among others.

The Government in 2008 developed a Tier-2 Government Data Centre (GDC) infrastructure to ensure the security of Government data, applications and hosting of government critical data. The GDC houses the power, storage, and applications of the most critical and sensitive data and information necessary to support government services. Through this centralization, government data is easy to access and is protected from natural or man-made disasters that may occur at the primary service sites/Government offices. GDC is connected to the Government Common Core Network (GCCN) with high-speed connection links for faster access.

Additionally, the Government has established the National Data Centre at Konza Technopolis, a cloud based, tier 3 data Center that is set to play a key role in the digital government agenda. The National Data Center is connected to all major optic cables and strategically positioned as the first Data Center from the Landing station in Mombasa.

The National Data Centre is already hosting services for some government agencies and will play a key role in the Technopolis is setting up an offsite DR site and has established linkages with most service providers to power both public and private corporation's Data center needs.

Kenya still faces a number of challenges in developing and providing Digital infrastructure among them being the following:

(a). Limited coverage of national fibre infrastructure and limited internet penetration, especially in the rural areas.
(b). Over utilization/capacity constraints. The capacity of the network is not able to serve all the government needs as well as the private sector.
(c). Frequent fibre cuts and destruction of telecommunication frustrate
(d). Lack of last mile infrastructure connectivity to all government institutions
(e). Limited Internet access in homes, schools, social centres and villages
(f). Limited sharing of communication

infrastructure by infrastructure operators
(g). Inadequate and high-cost power infrastructure
(h). Limited uptake of connectivity by SMEs
(i). Lack of smart data centre to host Local and international Internet Exchange and Content Delivery Networks (CDN)
(j). Lack of functional Recovery Data Centre and low adoption of cloud technologies
(k). Low uptake of Data Centre/Shared Services by County Governments
(l). Increased Cybercrime cases

4.1.1.3: Universal Access to ICT Services.

4.1.1.3.1 Cellular Mobile Network Infrastructure and Services Project

The Government through the USF, under Communication Authority of Kenya, commenced to rollout communications infrastructure and services in unserved and underserved areas in the country to ensure universal access to ICT services by all in Kenya. The Cellular Mobile Network Infrastructure and Services Project, which commenced in the FY 2017/18 targets to rollout mobile network infrastructure and services in unserved and underserved areas. Phase I of the project targeted 78 sub-locations, which are expected to be completed in the FY 2021/22. Phase II of the project, which commenced in the FY 2021/22 targets to rollout mobile network infrastructure and services (3/4G) in 101 sub-locations in 17 Counties. Subsequent Phases of the project targets 278 sub-locations in 25 Counties.

4.1.1.3.2 National Public Kenya Infrastructure (NPKI)

Implement National Public Key Infrastructure (NPKI) to authorize and authenticate information systems in the country. The Root Certificate Authority (RCA) and Government Certification Authority (GCA), which will facilitate the use of digital certificates, will be set up.

4.1.1.3.3 National physical addressing system

National physical addressing system project will provide street addressing, numbering and coding of all properties and thereby provide clear logistical support for economic activities, e.g. deliveries. It will spur e-commerce initiative as well as boast economy growth of the country. The lack of physical addressing system hinders speedy development of e-ecommerce industry. The country has developed policy but yet to be implemented. This masterplan advocate for acceleration of its implementation.

4.1.1.3.4 National Building Codes Standards

The main purpose of building codes areto protect public health, safety and general welfare as they relate to the construction and occupancy of buildings and structures. The building codes assist in deployment of ICT infrastructure as it avoids duplication of cabling in the buildings hence reducing the cost of installations and ease access to the building structures. This master plan calls for speeded review of building code standards to incorporate ICT services and related structures .

4.1.1.3.5 Kenya National Spatial Data Infrastructure (KNSDI]

The National Spatial Data Infrastructure (NSDI) is defined as "the technology, policies, criteria, standards, and employees necessary to promote geospatial data sharing throughout the National, County, Sub- County, Ward and village level, and the private sector (including nonprofit organizations and institutions of higher education)".The NSDI "shall ensure that geospatial data from multiple sources (including the National, County, Sub- County, Ward and village level, the private sector, and institutions of higher education) is available and easily integrated to enhance the understanding of the physical and cultural world. A key element of the NSDI is thegeoplatformswhich provides access to trusted geospatial data from various levels of government and a range of web-based geospatial services. SDIs have enormous potential, such as the development of new information markets, pecuniary benefits, economic and sustainable development, better planning and decision making, and better quality of data and information

In spite of these numerous benefits, the concept of SDI is still lagging behind in Kenya. The Kenya National Spatial Data Infrastructure (KNSDI) is a national initiative that strives to provide better access to spatial data, thus eliminating wastage and data duplication. Its mission is to promote the production and sharing of spatial data for sustainable development, thus facilitating access to and use of the data in decision making. Some of the challenges faced by Kenya with

regard to its SDI aspirations include outdated and scarce datasets, inadequate funding, and lack of a formalised policys. Access to information is still a challenge, signifying technical and institutional barriers. Data is often seen as a commodity or source of power (Williams et al., 2014), implying that the KNSDI stakeholders have not realised that data become more valuable if shared widely. This masterplan calls for development of KNSDI Policy and implementation of the initiatives.

4.1.1.3.6 Sustainable power supply for ICT installations

ICT installations are considered critical and their functionality depends entirely on reliable power sources. There is a need to establish green energy plants for sustainable electricity supply to ICT systems to ensure reliable and accessible services as well as service continuity.

4.1.2 Outcomes, Objectives, Strategies and Key Projects

The overall outcome for this pillar is high availability of high-speed and reliable broadband connectivity at the Ward level in all the 47 counties. The intermediate outcomes are:

Outcome 1: Increased and enhanced coverage of connectivity access in the unserved and underserved areas as well as disadvantaged groups.

Outcome 2: Availability of secure, high quality and affordable digital infrastructure

Outcome 3: Availability of Policies, standard and guidelines for Digital infrastructure.

Table 4.1 shows the objectives, strategies and key projects to deliver the above outcomes.

Table 4.1: Objectives, strategies and key projects for the Digital Infrastructure pillar

Outcomes	Objectives	Strategies	Key Projects
Outcome 1: Increased and enhanced broadband connectivity across the country.	(a). To connect underserved and unserved population (b). To reduce on digital divide (c). To build sustainable capacity to support infrastructure (d). To enhance business continuity services. (e). To enhance equity and fairness through reaching all disadvantage groups	■ Develop and implement a digital integrated infrastructure plan which incorporates all designs, deployment and management for all networks. ■ Develop digital infrastructure standards and guidelines. ■ Develop, implement connectivity management framework, shared infrastructure policies, guidelines, standards and structures ■ Develop a training plan for all ICT experts required to support ICT infrastructure. ■ Develop and implement business continuity strategy. ■ Develop broadband plans for disadvantaged groups ■ Develop and implement plans for village digital hubs ■ Development of technical support centres across the country	■ Construct 100,000 kms of national fibre optic connectivity network. (52,000Km for Government Networks – Schools & learning institutions, health institutions, Metro cities, Government offices, counties and wards- and 48,000Km for private networks- homes, businesses, public spaces and rural centres). ■ Rehabilitation of 2500KM of damaged/old fibre network. ■ Installation of 25,000 Hotspots in business centres, rural areas and other public spaces. ■ Rollout latest technology for mobile network infrastructure across the country. ■ Establishment of village digital hubs and studios ■ Regional integration Connectivity network [inter-states] ■ Regional Smart Digital Hub

Outcomes	Objectives	Strategies	Key Projects
			■ Enhance Shared infrastructure development ■ ICT Infrastructure for disadvantage groups ■ Development of Government and private Cloud services. ■ Establishment of regional submarine maintenance depot ■ Establishment of additional landing site for submarine cables
Outcome 2: Availability of secure, high quality and affordable digital infrastructure	(a). To enhance the availability of ICT services	■ Develop a business continuity plan including a comprehensive power management plan. ■ Develop personnel to provide adequate technical support. ■ Develop and implement cyber security plan ■ Promote infrastructure integration through establishment of critical infrastructure policy.	■ Establishment of Network Operation Centres (NOC) in all the 47 counties ■ Establishment of a repository portal for all critical infrastructure for the country. ■ Establishment of cyber security management system ■ Upgrade key connectivity equipment to a minimum of 100Gb/s ■ Reengineer 2 satellites hubs ■ Establish green energy power plant
	(b). Provide affordable digital Infrastructure.	■ Develop appropriate policies to support affordable digital infrastructure.	■ Portal for all government common services. ■ Policies/ regulations for affordable digital infrastructure. ■ E-Health Systems programme.
Efficient, effective, affordable and secure data centre and Smart City services.	(a). Provide a Centralized Government and private data services for Efficient, effective and secure data centre and Smart City services.	■ Develop policies and standards to support utilization of the data centre and Smart City facilities. ■ Develop and implement a marketing plan of the data centre and Smart City facilities. ■ Develop the operational framework of the data centre and Smart City facilities.	■ Establishment and operationalization of Konza National Data Centre and Smart City Facilities. ■ Establishment of Kenya Electronic refurbishment & E- waste plan - KOTDA. ■ Metro-city smart programme

4.1.3 KPIs

The key performance indicators are:

(a). 100% availability of broadband connectivity across the country.
(b). 99% reliability of broadband connectivity.
(c). 100% connectivity of all schools and other educational institutions.
(d). 60% reduced cost of internet connectivity.
(e). 90 % internet accessibility and utilization by the public.
(f). 50% increase in SMEs.
(g). 50% of 12.5 Million homes are connected to the internet.
(h). No of the MCDAs onboarded to Konza National Data Centre.
(i). No. of Public Health using E-Health Systems.

(j). No. of Hotspots installed and working.
(k). No. of cloud services adopted.
(l). No. of job opportunities created.

Detailed KPIs are shown in Annex4.

4.2 DIGITAL GOVERNMENT SERVICES, PRODUCTS AND DATA MANAGEMENT

4.2.1 Situation Analysis

Digital Government Services, Products and Data Management involves the definition and implementation of policies, practices and initiatives and procedures that facilitate the effective and efficient use of digital services and data in government as well as developed products. E-government is "the use of ICT and its application for the provision of information and public services to the people''. It streamlines and integrates workflows and processes, to effectively manage data and information, enhance public service delivery, as well as expand communication channels for engagement and empowerment of people. The opportunities offered by the digital development of recent years, whether through online services, big data, social media, mobile apps, or cloud computing, are expanding the way we look at e-government.

The e-Government Services focus on the facilitation of efficient and effective Government services, enhancement of data access and protection of public data & information, offering of consistent, integrated, e-government citizen-centric services; and provision of reliable, secure and affordable connectivity across the country.

Kenya has seen increased traffic on its e-Government services, with half of the adult population accessing at least one e-service. The services available so far address concrete customer needs, with eight of ten users surveyed stating to be "very satisfied with their quality." Other sources of information point to a relatively good value perception on the part of the public.

Nevertheless, a number of challenges remain. The key ones revolve around:

- Security & protection of government data and information.
- Standardization of government systems and procedures
- Integration of government application systems & databases.
- Sustainable management of e-government portals and websites, particularly in the context of limited financial and human resources for portal creation and maintenance;
- Integration and streamlining of systems across National and County governments; and
- Low levels of awareness by the public on the e-government services available.

Kenya should not relent in its efforts to place itself at the very top of the global league on international standards to ensure the long-term sustainability of the various services on offer. Public-Private sector partnerships should be explored in depth.

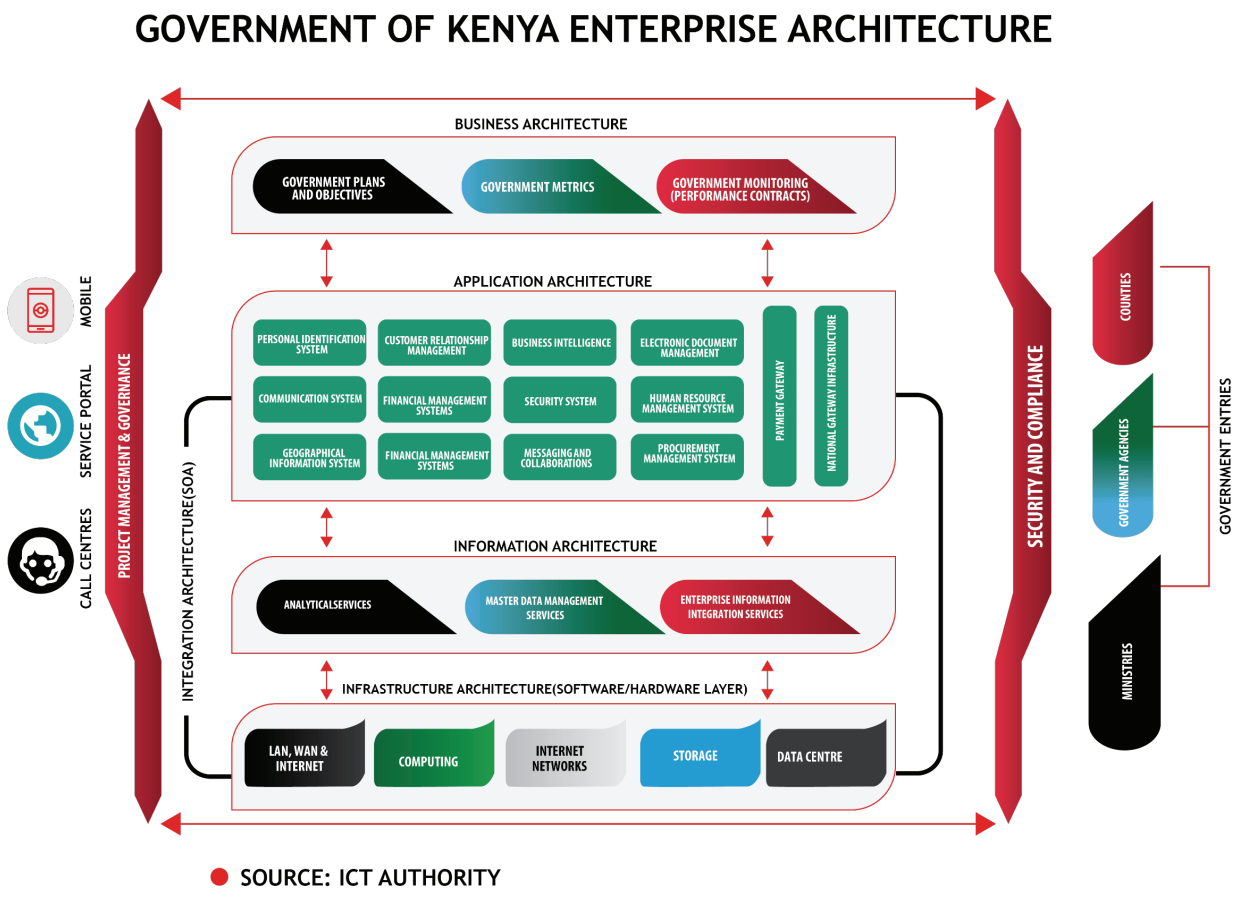
In addition, an awareness-raising campaign may be necessary in order to ensure that citizens make full use of the opportunities already available. Social media provides a relatively cost-effective way of reaching out to those who are already digitally active and, hence, may display a higher relative propensity to use e-Government services. Word-of-mouth is also deemed as a powerful tool, although it is contingent on continued quality in e-service delivery, particularly as demands on the various systems grow with increased customer usage

Through innovation and e-government, public administrations have been more efficient, provide better services and respond to demands for transparency and accountability. E-government has stimulated economic growth and promoted social inclusion, particularly of disadvantaged and vulnerable groups. ICTs have also proven to be effective platforms to facilitate knowledge sharing, skills development, transfer of innovative e-government solutions and capacity building for sustainable development. E-government has generated important benefits in the form of new employment, better health, better

education and shorter transaction time by bringing services closer to the people.

The Government of Kenya through the ICT Authority has come up with the Government enterprise architecture (see Figure 4.3), and ICT standards which serves as a guide on how e-government services are to be implemented to ensure interoperability and leverage on usability and economies of scale. (https://icta.go.ke/standards/gea-ict-standards/)

Figure 4.3: Government Enterprise Architecture



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. These systems provide electronic services to citizens and businesses through Government portals such as the Kenya government e-Citizen gateway to government services. The e-Citizen (https://www.e-Citizen.go.ke/) is a Kenya Government to Citizen (G2C) portal that provides services including business name search and registration, notice of marriage, registration of marriage, driving licenses, land searches and clearances, passport and visa applications. The key projects that have been implemented include:

Establishment of Data Hubs: All land/property parcels are mapped using GIS (NSDI). The Spatial Data center building is 95% complete and National Digital mapping data is produced. Titling Management System has been developed (survey, adjudication and registration

of new titles) EDMS-Automation of Land Registration Transaction is fully completed.

Company Registry: The Registry has greatly improved in handling reservations of Company names, payments and searches. The reservation is now instant, Payment is by M-Pesa for registration which now takes one day. The service is also accessed at the Huduma Centres and a law has been enacted to allow for online submission (uploading) of relevant documents.

Personal Data Hubs: The National Population Registration System (IPRS) is already established, with about 19.3 million records of Kenya citizens (18 years and above), Passport holders (350,000), and Registered Refugees records (223,723), and Registered Alien's records (111,768). Recently the country embarked on the unified identification called, Huduma number which is going to lay the foundation of systems integration.

E-passport: The East Africa Heads of states launched the regional e-Passport during the 17th EAC Heads of States Summit held on 2nd March 2016 in Arusha, Tanzania. The e-Passport shall be embedded with a contactless electronic chip. The e-Passport upon implementation will have the following benefit: Secure identification of the traveller; Provide protection against identity theft; Eliminate passport data skimming; Provide regional identity of EAC member states citizens. Currently, persons are able to launch and get a Kenyan visa online.

Huduma Centres: Huduma Kenya is a program by the Government of Kenya that aims to transform public service delivery by providing citizens access to public services and information from One Stop Shop citizen service centers called Huduma Centres and through integrated technology platforms. The project is being implemented by the State Department of ICT, ICTA and State Department of Planning and Devolution. Huduma centers are created with the aim of transforming public service delivery. The aim is to establish Huduma centers in all 47 counties.

As of December 2021, Huduma centers have been established in 31 counties with 45 services being offered at the centers serving about 30,000 citizens a day and 12 billion shillings being collected through Posta Pay (payment system for Posta organisation). There is a need to further enhance services by having more online services.

Assets Data Hubs: The goal was to develop and implement the Transport Information Management System (TIMS) which will confine PSV vehicles to their areas of jurisdiction as per their Transport Licencing Board licenses. This will ensure that the driving habits and behavior of drivers are streamlined. It enables sharing of inspection information between inspection units and the police.

Open Data Hubs: The Kenya Open Data Portal makes Public Government datasets accessible for free to the public in easy reusable formats, supporting the Government's drive to proactively inform citizens and be accountable. The goal of open data.go.ke is to make core government developmental, demographic, and statistical and expenditure data available in a useful digital format for researchers, policymakers, ICT developers and the general public.

4.2.2 Outcomes, Objectives, Strategies and Key Projects

The overall outcome for this pillar is increased availability of e-government services to citizens, private sector businesses and other stakeholders. The intermediate outcomes are

Outcome 1: Effective and efficient delivery of e-Government services by the National Government.

Outcome 2: Effective and efficient delivery of e-Government services by County Government.

Outcome 3: Increased ICT Products and Services

Table 4.2: Outcomes, objectives, strategies and key projects for the Digital Government Services, Products and Data Management.

Outcomes	Objectives	Strategies	Key Projects/programmes
Outcome 1: Effective and efficient delivery of e-Government services.	a)To enhance service delivery to the Public through ICT.	■ Develop a digital service plan. ■ Develop plan for Automation of all government critical services. ■ Strategy to ensure all government common services are on online platforms. ■ Government paperless office strategy ■ Develop Government digitization strategy ■ Realign and evolve data center practices in line with the data protection act. ■ Develop strategy to enhance security intelligence and surveillance of the country. ■ Develop and implement a unique identifier. ■ Develop and implement a National Physical addressing System. ■ Review Building Code for ICT services. ■ Development of National Spatial Data Infrastructure policy and implementation of initiative.	■ Government Digitization Programme [of 5 billion government records]. ■ MDA's Automation Programme. ■ Government interoperability and integration programme. ■ Government Automation Programme for all Critical Services. ■ Government unified communication System. ■ Government online portal System. ■ Government and Private sector Cloud services ■ National Data Center. ■ Government security intelligence and surveillance system. ■ Smart ID card. ■ National Physical Addressing system. ■ National Building Code ■ Hotspots in public installation in rural areas and other public spaces. ■ National Spatial Data Infrastructure programme.
	b) Enhanced Government systems integration, interoperability and availability.	■ Strategy to review the existing Government Systems. ■ Develop a central repository plan of all existing automated Government systems. ■ Develop business continuity and disaster recovery plans for the country.	■ Integration and interoperability Framework and standards for Shared Government Platform (SGP). ■ Government Interoperability platforms. ■ Government business continuity Infrastructure.
Outcome 2: Effective and efficient delivery of e-Government services by County Governments.	To enhance county service delivery to the public.	■ Develop county automation strategy. ■ Formulation of county e-waste policy.	■ County Digitization programme [of 25 billion government records (500 Million per county records). ■ County Automation Programme. ■ County E-waste guidelines. ■ County capacity building programme.
Outcome 3: Development of ICT Products and Services	To enhance development of ICT products and services.	■ Develop ICT Product development strategy ■ Develop policies and legislations for IP protection for ICT products and services.	■ Programme for ICT Product development.

4.2.3 KPIs

The overall KPIs: By 2030 there shall be:

(i). 99.99% availability of e-government services.

(ii). 80% of Government records are Digitized.

(iii). 80% of government critical services are automated.

(iv). No. of automated government services.

(v). No. of Portal for government online services.

(vi). No. of ICT Products and Services.

(vii). This pillar focuses on citizens' capacity building, youth productivity and employment, and the public sector workforce.

4.3 DIGITAL SKILLS

4.3.1 Situation Analysis

Background

The development of quality ICT human resources is a prerequisite to the development of a viable ICT sector. It ensures that ICT development, implementation and exploitation are integral and sustainable components of development.

Kenya has low and intermediate digital skilled experts with few professionals possessing advanced digital skills. High-end ICT skills are essential to facilitate a vibrant digital economy, design and support complex digital Systems as well as spur innovation. Digital skills constitute the foundation for accessing, adopting, adapting and benefiting from emerging technologies.

This shortage of digitally skilled workforce does not also apply to Kenya but to Africa as a region. It, therefore, means that a state with an excess of such skills has the advantage of supplying the region with the required human capital. While the Government and the private sector have been investing heavily in the ICT infrastructure, there has comparatively been little investment in the human resources required to design, develop and operate this digital infrastructure and the associated digital services.

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 Kenya Vision 2030. The local universities and tertiary colleges continue to develop ICT human capital and a workforce that is neither guided by a human resource development policy nor well aligned to the industry needs, especially at the high end.

To leverage the opportunities from industry 4.0, the country requires to invest in developing a critical mass of IT experts with advanced skills to adapt to the future of things for instance the growing digital opportunities in Data protection, Coding, Mobile App Development, Internet of Things, Robotics, Cyber Security, Artificial Intelligence and big data among others. This will help bridge the ICT skills gap, especially among the youth to access digital jobs. The attempts to increase the number of trained professionals in digital skills by the government is to meet the required competencies for the digital economy; retrain the public sector workforce to ensure they advance their digital skills and competencies; and bridge the digital skills gap in the citizenry. The plan is for the country to export, in the future, this skilled workforce to serve the region.

Digital inclusion

According to the 2019 Kenya Population and Housing Census (KPHC) Report, Kenya has a total population of 47.6 million Kenyans up from 38.6 million in 2010. This increase has led to a new set of challenges for the government, especially in the areas of job creation for the youth, who currently make up 71.5% of the population. The Report approximates that 2.6 million Kenyans are actively searching for jobs, representing an 18.2 percent rise in the number of unemployed over the last 10 years. In this regard, data from Kenya National Bureau of Statistics indicates that the country manages

to inject only about 800,000 new jobs each year against an unemployed population of 7 million Kenyans.

Youth, women, minorities, the elderly, rural communities and persons with disability (PWDs) are disproportionately affected by the digital transformation of the economy despite the fact that they constitute a sizable proportion of the population. Some of the challenges that perpetuate digital exclusion amongst these marginalized groups include, but are not limited to: cost of access, skills, lack of content, poor connectivity, information gaps and limited mobility, limited ownership and control of assets, as well as safety and security concerns. Strengthening Community roles will be crucial to implementing these Digital skills. The successful integration of ICT into the digital economy will require a coordinated and comprehensive approach of participation and collaboration.

Focus skill areas

Basic Skills: Foundational skills will enable the populace to function and perform basic digital tasks at a minimum level in society by interacting with others digitally and accessing digital services. At a lower level of basic education, learners are introduced to basic IT skills through the use of computing devices during classrooms lessons.

Intermediate Skills: These enable meaningful use of digital technologies with a wide range of digital tasks needed to participate as engaged citizens and productive workers. They include the ability to critically evaluate technology or create content and effectively job-ready skills needed to perform work-related functions. It exposes the individual to minimal innovative ways of working. At the Upper level of basic education, learners are introduced to intermediate IT knowledge through the use of advanced computing devices which enable more advanced interaction with their lessons.

Advanced Skills: These are needed by specialists in ICT professions such as computer programming and network management and include emerging technologies such as AI, big data, coding, cyber security, IoT, and mobile app development. This level exposes individuals to higher innovative work performance and entrepreneurship skills. At a higher level of education, learners are exposed to high-end technologies which enable them to be innovative and entrepreneurs.

Importance of digital skills

The impact of digital skills is an increased number of responsible and productive ICT professionals, increased innovation and digital entrepreneurship, utilization of ICT in business models, and increased ICT production. Digital skills also increase re-employment models such as working from home and virtual offices, availing of digital jobs, and expansion of the job market for a digitally skilled workforce.

Current initiatives

Various initiatives by the Government to improve these skills include but are not limited to the Digital Literacy Programme [DLP] at the basic education level and a review of the entire education Curriculum. This enables competency-based education which allows early mentoring of learners in their areas of competencies. Youths are currently actively engaged in digital skills development through PDTP Graduate Internship; online jobs through the Ajira Digital initiative; and incubating innovative ideas through the Whitebox initiative.

The Government has built a capacity of 92,000 youths under the Ajira initiative and currently over 1.2 million working on digital and digitally-enabled jobs, 2100 Presidential Digital talent graduates Trainees, over 15000 Civil servants trained. Through DLP, the government has distributed over 1.1 million learners' devices to over 22,000 public primary schools and these benefited over 3 million learners at basic primary for grades 1-3. There are over 228,000 teachers trained on the utilization of technology in learning and over 47000 teacher's devices distributed in primary schools.

Over 24,000 primary schools have been connected with electricity to enable the use of technology in schools. Additionally, Konza Technopolis launched the Konza Innovation Ecosystem Initiative which seeks to enable Kenyans undertaking innovation in different parts of the country to find the support needed to scale. The program has advanced several initiatives impacting

over 5000 youth in skills development, innovation incubation and acceleration from all 47 counties since 2018 in partnership with other actors in the country.

However, there exists much more room for growth in the ICT sector if the country is going to realize an all-inclusive ecosystem that supports the integration of the youth in the digital economy.

The DLP initiative is meant to equip the citizens with digital skills starting from the basic education level in preparation for the 21st-century digital economy where a digitally skilled workforce will be required.

Observable gaps

Some of the challenges experienced in human capital development by the country include the following: -

(a). Non-alignment to the industry needs by the universities/colleges
(b). Lack/Poor Manpower Planning for digital skills.
(c). Inadequate funding and infrastructure to enable effective digital skills development. This applies to the entire ICT investment for the country.
(d). The dynamic nature of the ICT industry requires continuous training, a lack of an ICT Academy/professional body to coordinate skills development & coordination among the stakeholders.
(e). Low level of ICT Literacy among citizens, businesses and employees.
(f). Inadequate relevant content and deployment mode for e-learning systems.
(g). Poor accessibility to digital learning by citizens from rural areas especially from ASAL regions where broadband connectivity is still a challenge.
(h). Lack of awareness and importance of digital skills among the citizen.

Key drivers

Factors that continue to drive the demand for high-end ICT professionals include:

(a). Increased demand from the national and county governments that aim to provide e-Government services and automate their internal processes.
(b). Increased demand for skilled ICT workforce 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 the 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 includes mobile operators, data companies, broadcasting companies, financial institutions, manufacturing enterprises, agricultural enterprises, and tourism among others.
(e). The government demand to respond to emerging challenges caused by technological changes which regularly disrupt its plans.
(f). The need for the government to develop a competent workforce, with digital competency, to effectively run the 21st Century digital economy.
(g). Government plan to use ICT to spur economic growth.

4.3.2 Outcomes, Objectives, Strategies and Key Projects

The overall outcomes to be achieved in this pillar:

Outcome 1: Digitally enabled society.

Outcome 2: Adequate and competent ICT professionals.
Outcome 3: Adequate and competent public sector ICT workforce.

The objectives, strategies and key projects to deliver the above outcomes are shown in Table 4.3.

Table 4.3: Outcomes, objectives, strategies and key projects for the Digital Skills pillar

Outcomes/ Impact	Objectives	Strategies	Key Projects
Outcome 1: Digitally enabled Kenya Society.	(a). To increase by 50% digital literacy of citizens from the current level. (b). To train an adequate workforce to manage ICT services nationally and regionally. (c). To enhance Digital skills inclusion for Special Interest Groups: Senior citizens, and Women in SMEs, PWD & Youth Groups & other disadvantaged Communities. (d). To increase Digitally Enabled job opportunities for youth. (e). To create awareness on data protection framework (f). To integrate technology from early learning.	(a). Develop and implement a strategy for capacity building for citizens. (b). Develop and implement a digital training program for each category of learners. (c). Partnership and engagement with Government and non Governmental organizations on capacity building. (d). Utilization of technology in teaching and learning.	(a). Survey for citizen digital literacy. (b). Citizen digital literacy training program for 20 Million citizens. (c). Establishment of training facilities for citizen digital literacy. (d). Training program for Special Interest Groups on digital skill]. (e). Establishment of an open online training portal with features including Multilingual e-learning facilities. (f). Establishment of A centralized web-based ICT skills inventory database system to track skills information on demand and supply for ICT Professionals and citizens. (g). Expansion of the AJIRA, PDTP and CIHs programs to assure sustainable job opportunities. (h). Digital Literacy Programme. (The School Laptop project). (i). Cloud infrastructure for digital content for all learners. (j). Capacity building for 500,000 teachers and education officers.
Outcome 2: Adequate and competent ICT professionals.	(a). To develop a critical mass of local and regional high-end ICT professionals. (b). To generate 2% of GDP through the export of skilled ICT workforce. (c). To promote the ethical conduct of ICT professionals through the establishment of governance.	(a). Develop a strategy for the development of ICT skilled workforce for the country and region. (b). Develop and regulate ICT professionals for the country. (c). Develop and deploy training programs targeting different cadres.	(a). Establishment of 10 Regional ICT & Innovation Centres of Excellence. (b). Konza Technopolis acceleration program (c). Establishment of 1450 Community Digital centers. (d). Establishment of a professional body for ICT professionals.

Outcomes/ Impact	Objectives	Strategies	Key Projects
Outcome 3: Adequate and competent public sector ICT workforce.	(a). To develop an adequate and competent ICT workforce. (b). To enhance governance and professionalism of the ICT workforce in Government.	(a). Develop and deploy programs targeted for ICT staff working for the government. (b). Develop a database and register all ICT officers for the public sector. (c). Develop a career guide for ICT staff in public service.	(a). Capacity-building Programme for public service ICT staff (target -10,000 officers in Public Service in High-End Specialized ICT areas.) (b). Capacity building of 20,000 ICT professionals for the sector. (c). Digital literacy Capacity building for 300,000 civil servants. (d). Establish a Smart Academy for ICT professionals. (e). Training of 250,000 county staff on digital skills. (f). Sensitization 200 top leaders on digital transformation.

4.3.3 KPIs

The overall KPIs: By 2032 there shall be:

(a). 20 million citizens each accessing and using at least 5 e-Government services.
(b). 20 million citizens trained.
(c). 10,000 local high-end ICT professionals trained by 2030
(d). 300,000 trained civil servants trained on digital services by 2030 = what is the percentage in 10 years we should be at approx. 85% of all civil servants going up leveraging digital training opportunities (virtual programs and physical sessions).
(e). 500,000 teachers trained on digital services by 2030.
(f). 2,000,000 short- and long-term employment opportunities for youths in ICT (Digitisation, Refurbishment, and Innovation) realized.
(g). 250,000 county staff trained on digital skills.
(h). Establishment of 1450 ICT Training Centres in every ward.
(i). Village digital hubs established.

Intermediate and more detailed KPIs are shown in **Annex 4.**

4.4 DIGITAL INNOVATION, ENTREPRENEURSHIP AND DIGITAL BUSINESS

4.4.1 Situation Analysis

Around the world governments and private organizations provide support to innovators and institutions that promote innovation that promotes job creation and Digital economy competencies. Different countries have put in place measures that support and promote innovation and start-ups. Some of these practices include

4.4.1.1 Public policies to support innovation

Government regulations and standards serve as important incentives or barriers for innovation.

Innovation policies can play a crucial role in improving the conditions for innovation, identifying and addressing bottlenecks that impair the ability of countries to innovate and improve productivity. Innovation policies also have the potential to enlarge market size, increase the degree of competition in the product market, increase the productivity of research and development and improve the capability of firms to benefit from it. Government policies should be designed to minimize the negative effects without limiting potentially positive spill-overs.

Governments need better policies to allow the public

to benefit from the innovations that occur in their academic institutions and other sectors.

In the United States of America, a number of laws have been written over the past decade not only to allow but also to promote technology transfer to the private sector. The laws allow and encourage federal laboratories to enter into cooperative R&D with private companies, license technology directly to them and provide private firms with direct access to the personnel, services and equipment of federal laboratories to pursue joint efforts in technology development. This has led to the success of innovation in the US Military as well as NASA.

4.4.1.2 Research and development support

Government spending can provide direct financial support for research and development (R&D) in colleges and universities, non-profit research entities, private firms as well as at government-run laboratories. Government spending on research and development produces technology that would be broadly available for firms to use.

Governments can also facilitate innovation by collaborating on advanced R&D and product development, usually at the pre-competitive stage but increasingly at the competitive stage as well. Governments are also needed to invest at the foundational stage of some innovative industries particularly because of the cost required or the risks involved.

For instance, the US government's investment in agricultural research helped transform U.S. agriculture from a natural-resource-based industry to a science-based industry. The Federal Government has funded agricultural research at State universities for more than a century. These funds are increasingly in the form of project support instead of the traditional institutional (formula) grant. Public investment in agricultural research has resulted in large economic benefits of at least 35 percent annual rate of return and improvement of the US commercial agricultural sector.

4.4.1.3 Government Innovations Centres and Hubs

Many governments have built conduits to enable citizens and businesses to provide ideas and solutions. There are 124 registered government innovation centers around the world. In Kenya, the national government has partnered with the county government to establish over 187 innovation hubs in the country.

In Dubai, The Mohammed Bin Rashid Centre for Government Innovation provides a world-class, multifunctional space for creating, testing and spurring innovations locally, regionally and internationally. The Centre was established to stimulate and enrich the culture of innovation within the government sector through the development of an integrated innovation framework.

The center seeks to provide a rich database of local innovative experiences available to individuals and entities, to help establish a culture of innovation in the UAE community. This has helped develop the government operations and enhance the UAE's competitiveness, making the UAE one of the most innovative governments around the world.

4.4.1.4 Public procurement of innovations

A government's key role in fostering innovation is being the lead customer. The government should acquire the required systems, products or services after following a prescribed procurement procedure that provides fair competition.

As very large and concentrated markets, governments have major opportunities as well as a major role to play in the promotion of innovations. Countries pursue procurement of innovation to meet needs and demands for new products, goods or services, as well as to solve problems.

Almost 80% of OECD countries support procurement for local innovation, and 50%have developed an action plan for procurement for innovation; either as part of broader innovation or procurement strategies or as stand-alone initiatives.

In Germany, for instance, procurement for innovation is part of the overall innovation strategy of the Federal

government. The "High-tech-Strategy Germany" encompasses all research, technology and innovation measures of the German government. Innovative procurement is the most important measure under the framework of demand-oriented policy instruments. The overall strategic goal is to encourage public procurers to buy more innovative and sustainable products.

A competence Centre for innovative procurement (KOINNO) was established to:

(a). Give advice to procurement offices.
(b). Build a database for innovative products, services, procedures and other solutions which could be used by procurers as well as information to areas where innovative solutions are required.
(c). Give awards for the procurement of an innovative good/solution and for an innovative procurement process.

Build-in Canada Innovation Program (BCIP) is another example that assists Innovators to bridge the pre-commercialization gap by helping them move their innovations from the lab to the marketplace through testing in operational environments across government. The BCIP awards contract to entrepreneurs with pre-commercial innovations through an open, transparent, competitive and fair procurement process for their testing within the Canadian federal government.

4.4.1.5 Kenya innovation landscape

Over the years, Kenya has made its mark in the world through innovations, from financial services solutions like M-Pesa, to digital lending solutions. Its efforts in innovation were recognized when it was ranked 77th in the world in the Global Innovation Index (GII) of 2019. This placed Kenya 2nd in sub-Saharan Africa behind South Africa.

Nairobi, which also ranks among the top 100 globally, pipped Cape Town for the first position, while Kampala, Cairo and Johannesburg came in at third, fourth and fifth places respectively. This is because Nairobi offers a good balance between the number of research institutions, available innovation funding and innovative activities, as well as the ease of doing business.

4.4.1.6 Innovation events

Kenya has over the years been a host to various African and Global tech and innovation summits and conferences. These have expanded the Kenyan market and provided innovators a platform to showcase their products. As a result, a number of Kenyan start-ups have received funding from foreign investors as well as opportunities to showcase solutions on the Global market. Examples of such events include;

- Africa BFSI Innovation Summit
- Afro Asia FinTech festival
- Afro tech summit
- International Development Innovation Alliance (IDIA)
- The Sustainable Blue Economy Conference

4.4.1.7 Innovation hubs

Many innovation spaces, incubation centers, accelerators, and maker labs have been started in Kenya since the launch of iHub in 2010. Tech hubs have also sprouted up in other regions besides Nairobi. The country boasts of over 35 independently run innovation hubs out of Nairobi including ; Mombasa (Swahili pot), Kisumu (LakeHub), Eldoret (Dlab Hub), Voi (Sote Hub), Machakos (Ubunifu), and Nyeri (Mt. Kenya Hub and DeHUB). Th emergence of the hubs has led to the emergency of associations that allow these hubs to collectively seek growth opportunities and to advocate for growth in the sector such as the Association of countrywide hubs, ASSEK, etc.

Some of these hubs work independently, while others operate within the framework of academic institutions. But all of them support entrepreneurs working at the intersection of the technological, creative, and cultural sectors.

In 2016, Kenya had 27 innovation hubs. Today the country boasts of over 60 innovation hubs and accelerators and another over 187 constituency

innovation hubs (CIHs) established in various counties across the country. Other than the CIHs, counties have developed innovations programs to foster innovation within the counties. Examples include;

- Laikipia Innovation & Entrepreneurship Fair - An initiative toward nurturing and upscaling innovations in the county.
- Makueni Innovation Challenge - A program that aims to catalyze the growth of start-ups, so as to amplify and consolidate the gains of the country's digital innovative ecosystem.

Hubs have also come together to form an association of hubs. Their main objective is to promote activities and programs of the member hubs and to support their vision of testing and building impactful sustainable businesses in rural and second-tier towns of Kenya. Presently there is a membership of 26 member hubs spread across 17 Kenyan counties and growing. The association has facilitated cohesion, co-creation, sharing of ideas and challenges, innovation symposiums and programs to boost the innovation ecosystem.

Konza Technopolis, a government's vision 2030 strategic project towards actualizing Kenya's knowledge economy has begun engaging the Innovation Ecosystem via the Konza Innovation Ecosystem Initiative. The authority aims to Convene, Connect and Catalyze a conducive environment for technology start-ups and SMEs to thrive and scale in partnership with other actors in the Innovation Ecosystem, By adopting the Quadruple helix partnership approach, Konza Technopolis aims to also accelerate the development and commercialization of innovations from Kenyans. This infrastructure is envisioned to provide a bridge between research institutions, innovators and industry.

4.4.1.8 Start-up funding

Every year, Africa's start-up ecosystems compete on who will attract the most investments. In 2020, research by Start-up list Africa showed Kenya start-ups on the top of the 5 most popular investment destinations in Africa (see Figure 4.4).

Table 4.4: Report by Start-ups Funding

COUNTRY	START-UPs FUNDING (Million $)
Kenya	266
Nigeria	237
South Africa	198
Egypt	125
Ghana	90

The African Tech Start-ups Funding Report, reported that 2020 was a record-breaking year for African tech start-ups, with 397 companies securing US$701.5 million worth of investment.

In Kenya, many start-ups now have access to Finance through the increasing number of accelerator programs available in the country. Entrepreneurs have access to grants, angel investors, pre-seed, debt, and equity investment.

Raising capital and funding mechanisms in Kenya have also improved, supported by an increase in crowdfunding initiatives, websites and apps.

Government initiatives for supporting innovators have increased with more money allocated to youth fund programs to support start-ups e.g., Youth Fund and KYEOP.

These achievements have been attributed to the government's role in economic progress and support of innovations.

The Government has achieved the following in the promotion of innovation and entrepreneurship:

1. 1,546 innovators registered under the Whitebox program with 281 innovations incubated.
2. 1,800 innovators and entrepreneurs trained on entrepreneurship.
3. Over 180 constituency innovation hubs were established.
4. Development of policies to promote innovation. These include
   - National Innovation framework.
   - National ICT Policy of 2019.

- The Start-Up Bill-2020.
- The 10 Year Science and Technology Parks Master Plan.

Some of the challenges experienced in innovation and entrepreneurship include the following: -

(a). Lack of a framework for scaling of innovations.
(b). Lack of coordination among the stakeholders in the innovation ecosystem.
(c). High training costs for incubation/acceleration support.
(d). Low skills development of innovators on product development, go-to-market strategies, and intellectual property.
(e). Lack of resources to support innovation capacity building and ecosystem support.

4.4.2 Outcomes, Objectives, Strategies and Key Projects

The ultimate outcome is increased local e-government solutions that can be exported to other countries and increased commercially viable digital businesses. The intermediate outcomes are

Outcome 1: Enhanced government innovation value chain that turns ideas into sustainable businesses.

Outcome 2: A globally attractive innovation ecosystem that provides adequate support to start-ups.

Outcome 3: Increase in Government revenue through the provision of ICT services and products.

The objectives, strategies and key projects to deliver the above outcomes are shown in Table 4.4.

Table 4.4: Objectives, strategies and key projects for the Digital Innovation, Entrepreneurship and Digital Business pillar

Outcomes	Objectives	Strategies	Key Projects
Outcome 1: Enhanced government innovation value chain that turns ideas into sustainable businesses.	(a). Create and promote a digital innovation and entrepreneurship culture in government.	■ Enhance strategic partnership and collaborations to train on key strategic competencies to stimulate innovative thinking and improve performance for the growth of the digital economy. ■ Collaborate with local and international research institutions, innovation hubs and organizations to develop innovative ICT solutions which will address the needs for the Kenyan government and public. ■ Formation of a special purpose vehicle for government ICT innovations commercialization. ■ Promote the establishment of e-market places	■ **Establish 10 Regional ICT & Innovation Centre of Excellence –** to upskill innovators in the areas of entrepreneurship, intellectual property, product development, market entry and emerging technologies, promote innovation investment in the county. ■ National Agriculture commodity exchange. ■ Village innovation hubs. ■ Accelerate development of the Konza Technopolis and the Konza Innovation Ecosystem Initiative program. ■ Establish and operationalise the startup Fund for innovators. ■ Kenya White Box Project
	(b). Accelerate commercialization of government innovations for deployment in local, regional and global markets.	■ Establish strategic partnership & collaboration between private sector and government to commercialize and scale innovations created in government. ■ Collaboration between national and local government in development of innovation support infrastructure to provide innovators with support services required.	■ Annual International Innovation Expo to showcase and sensitize on viable Kenyan innovations.

Outcomes	Objectives	Strategies	Key Projects
Outcome 2: A globally attractive ecosystem that provides adequate support to start-ups.	(a). A supportive legal, regulatory and policy environment for Start-up's development in Kenya.	■ Improve legal frameworks that support and promote investments in innovation and enterprise development. ■ Develop an e-commerce strategy. ■ Establishment of start-up development, support and advisory services. ■ Development of a program to improve government procurement of innovation. ■ Development of preferential business growth measures, acceleration hubs and sandboxes.	■ Development of supportive innovation and entrepreneurship policies, legal and regulatory environment. ■ Establish integrated constituency-based digital marketplaces in 290 Constituencies. ■ Annual International Innovation and ICT Expo to showcase and sensitize on viable Kenyan innovations.
Outcome 3: Increase in Government revenue through provision of ICT services and products.	To increase the quality and number of ICT services and products by Kenya firms.	■ Establish a framework for software testing and certification. ■ Develop software strategy for government use and export. ■ Develop strategy for manufacturing & assembling strategy. ■ Identify personnel and institutions for software development. ■ Develop software commercialization strategy. ■ Develop standards and guidelines for software development and deployment. ■ Review/Develop guidelines and standards to protect technopreneurs, innovators and customers products.	■ Establishment of a testing and certification scheme for software, hardware, and ICT professionals. ■ Establish a robust software industry. ■ Establishment of two software industries with 1000 trained software engineers. ■ Establishment of two manufacturing plants.

4.4.3 KPIs

The ultimate KPIs are the number of local e-government solutions that are successfully commercialized and the number of Kenyan businesses online. The detailed KPIs are given in Annex 1.4

(a). No. of constituency-based digital marketplaces in 290 Constituencies.
(b). Establish 10 Regional ICT & Innovation Centre of Excellence
(c). Establishment of a testing and certification scheme for software, hardware, and ICT professionals.
(d). Accelerate the Konza Innovation Ecosystem Initiative
(e). Establishment of two manufacturing plants for electronic products
(f). Establishment for two software industries
(g). 1000 trained software engineers
(h). 100 enterprise software developed
(i). 250 software developed

FOUNDATIONAL AND CROSS-CUTTING THEMES

5. FOUNDATIONAL AND CROSS-CUTTING THEMES

5.1 POLICY, LEGAL AND REGULATORY FRAMEWORK

5.1.1 Situation Analysis

Policy Framework

Key policies to be considered in the implementation of this Digital Master Plan are among others the Vision 2030 (and associated MTP), the national ICT Policy; and the Digital Economy Blueprint (2019). The overarching guiding document is the Kenya Constitutional (2010) with the bill of rights spelled out in articles 34,35 and 36.

The national ICT policy of 2019 was published in a special issue of the Kenya Government Gazette (MoIC, 2019). The vision of this Policy is "Kenya as a globally competitive knowledge-based economy", and its stated mission is "To facilitate universal access to ICT infrastructure and services all over the country."

The mission for the Digital Economy Blueprint (2019) is "A digitally empowered citizenry, living in a digitally enabled society" while the mission is "A nation where every citizen, enterprise and organization has digital access and the capability to participate and thrive in the digital economy".

These National Policy documents are guided by the need for the national development of infrastructure, human resources, innovation and enterprises, in an environment where stakeholder participation and engagement are prioritized. For this to happen, a progressive enabling policy, legal and regulatory framework is a prerequisite. This National Digital Master Plan, 2022 – 2030 aims at supporting the fulfillment of the Visions and Missions of the highlighted documents and to complement other existing strategies such as the current MTP III under implementation and the National Broadband Strategy 2018-2023 which aims at extending the broadband to ward level.

Other strategic documents in the ministry include the Ministry of ICT, Innovation and Youth Affairs Strategic Plan (2018-2023) and ICT Authority Strategic Plan (2020-2025), The Kenya Digital Economy Blueprint Strategic plan.

At the regional level, the African Union Agenda 2063 and the Digital Transformation Strategy (2020-2030) whose vision is "An Integrated and inclusive digital society and economy in Africa that improves the quality of life of Africa's citizens, strengthens the existing economic sector, enable its diversification and development, and ensure continental ownership with Africa as a producer and not only a consumer in the global economy" provides the regional focus and direction for the sector.

Legal Framework

The ICT sector is guided by the following Acts:

(a). Kenya Information and Communications Act, 1998 (as amended in 2013 and 2015) (KICA)
(b). Competition Act, 2010 (with the 2012 and 2014 amendments)
(c). Science, Technology and Innovation Act of 2013
(d). Computer Misuse and Cyber Crimes Act of 2018
(e). Data Protection Act of 2019

As at the end of 2022, there is no single point of reference for the sectoral policy or a single license and compliance framework. The latter leads to multiple licensing authorities issuing licenses to the ICT operators including Communication Authority (CA), Kenya National Highway Authority (KENHA), County Governments, National Communication Secretariat (NCS), Kenya Railways, KCAA, KPLC, and the National Environment Management Authority (NEMA).

There is a need to review existing ICT sector laws that includethe KICA, Legal Notice 183 of 2013 and Computer Misuse and Cybercrimes Act, to create a progressive ICT regulatory environment with updated laws to cater for developments and changes in the sector.

Regulatory Framework

The ICT sector regulation is under the umbrella of the Communication Authority as well as the newly commissioned Office of the Data Commissioner. Some of the pending concerns that need to be addressed include

(a). There are issues of **reciprocal data-sharing agreements** between countries that are yet to be resolved. There is a provision for the data being processed, but no enforcement mechanism to ensure that data meant to remain local remains local. The Data Commissioner is expected to give approvals for personal data that is of strategic national importance before it can be used outside Kenya.
(b). On data protection, the bulk data has been going to specific multinationals and they are mining all the data. The Data Protection Act (2019) takes care of this. Currently, there are 3 regulations in draft form to be finalized and gazetted. All actors (global and domestic) in the data economy (e.g., FB, FinTech, Public Sector e.g., Huduma Namba, etc.) are regulated by the Data Commissioner with a comprehensive Act that is modeled along the EU Data Privacy Act known as the General Data Protection Regulations (GDPR).
(c). Open Government Data Project - To progress the project, we intend to come up with an Open Data Framework that has clear guidelines for data sharing, specifying what to share, and how to share, among others. This is both in relation to the data owned/hosted by the government as well as by the private sector that includes KNBS, Safaricom, etc.
(d). Resource Mobilization Framework. To enable the successful implementation of identified flagship programs in the digital masterplan, there is a need for the enactment of e-government legislation which will be read together with the budget annually, to enable funding of the programs.

Over and above that, the government considers public-private partnership framework where applicable to fund the programs as well as donor funding and support from development partners.

Two key questions for consideration are:

(a). What can be done to ensure there is a policy for sharing infrastructure? There is a need for the law. Can the ICTA bill impose operators to share infrastructure? Government has many data centers hosting different data sets. Can the infrastructure be shared while addressing the competitive edge that the operators need to guide? How? What is the value of inputting

the data into the local data centers? Is the awareness there? Stakeholder engagement is still missing. What is the role of the Government in marketing the data centers like Konza considering the competition from the private sector? There is a need for policies, guidelines, and regulations to enable infrastructure sharing.

(b). ICT protection infrastructure. There is the Critical Infrastructure bill that covers many areas. Then there is the Computer Misuse and Cyber Crimes Act of 2018. Can the two be harmonized?

(c). What are the best approaches for resource mobilization to fund the masterplan?

5.1.2 Outcomes, Objectives, Strategies and Key Projects

The key outcome is a harmonized and enabling ICT policy, legal and regulatory framework. A multi-sectoral team could review the current licensing framework to come up with a single license and compliance framework. The objective of this review would be to:

(a). Eliminate the multiple licenses.
(b). To provide a legal framework to enable resource mobilization for masterplan.
(c). Set clear mandates for each Institution in the sector.
(d). Harmonize existing policies, regulations, strategies and working papers.
(e). Develop policies and strategies for infrastructure sharing.
(f). Harmonize charges payable by the service provider to National and County governments.
(g). Set targets for monitoring and evaluation of the master plan.

The critical Policies and Acts which need to be developed and implemented includes:

(a). Mandatory infrastructure registration and mapping policy.
(b). Building Code Policy.
(c). Laws relating to Management of Critical Infrastructure. - Critical Infrastructure Protection Act (Bill still pending).
(d). ICT Authority Act.
(e). Development and implementation of the National Spatial Data Infrastructure System.
(f). Development and enactment of e-government legislations.
(g). Konza Technopolis Act.
(h). The Electronic Transaction Act (e-Transaction Act).

The outcome is as specified below;

Outcome 1: Harmonised and enabling ICT policy, legal and regulatory framework.

Outcome 2: Enactment of e-government legislation to fund the masterplan initiatives and completion of pending laws for ICTA and Konza Technopolis.

The objectives, strategies and key projects to deliver the above outcome are shown in Table 6.1.

Table 5.1: Objectives, strategies and key projects for the Policy, Legal and Regulatory framework.

Outcomes	Objectives	Strategies	Key Projects
Enabling ICT policy, legal and regulatory framework.	(a). Review policy and laws that relate to ICT and establish gaps. (b). Revise existing laws and create new ones to address gaps. (c). Legislations to enable resource mobilization to fund master plan flagship programmes.	■ Review/create acts and legislation for implementing agencies. ■ Move software intellectual property issue from the Copyright Act to the IP Act ■ Amend the public procurement law to allow the government to competitively procure innovative solutions from the local market. ■ Develop an open data policy. ■ Enhance strategic data and knowledge management guidelines. ■ Harness existing public and private data sets for social-economic development. ■ Develop policy and legislations for resource mobilization for masterplan programmes. ■ Policy and law for the National physical addressing system. ■ Policy and law for National Spatial Data Infrastructure. ■ Review policy and legislation for building code.	■ Review the IP law to include software and other ICT products as an intellectual property. ■ Enact policy to finance ICT and Innovation initiatives. ■ Enactment of ICTA Law. ■ Legislation to introduce levy tax on ICT products and services to fund the master plan. ■ Enactment of KOTDA law. ■ Policy to consolidate government ICT budget into one vote to enhance management of the fund of the masterplan. ■ Develop Policy and guidelines for integrated infrastructure development. ■ Implement the open data policy. ■ Enactment of E-government legislation. ■ Policy and legislation for National Physical Addressing Systems. ■ Policy and Legislations for Critical Infrastructure Protection Law. ■ Policy and Legislation for Building Codes. ■ Policy and Legislation for National Spatial Data Infrastructure.

5.1.3 KPIs

The overall KPI is enhanced conduciveness of the ICT sector. Detailed indicators are provided in Annex 2.

■ No. of ICT policies, laws and regulations formulated, enacted or reviewed.

5.2 RESEARCH AND DEVELOPMENT

5.2.1 Situation Analysis

Digital incorporation is critical for the social-economic development of a growing economy. ICT-enabled public sector management is currently a key area of interest for research and innovation efforts among progressive nations. This push is driven by the need for an innovative public administration paradigm emphasizing open data, open service and open processes; which essentially may lead to increased collaboration, participation and transparency in the delivery of services to the public. Across the world and particularly in Africa, there is empirical evidence that increased adoption of ICT is associated with improved public sector management.

Much empirical and theoretical work emphasizes that research and development (R&D) is an important contributor to economic growth. R&D spending is likely to lead to growth through its positive effect on R&D and total factor productivity (TFP). The improvements in technology through industrial innovation have been the driving force behind the rising standards of living in the developed world over the long run. Research targets at enhancing innovation will allow businesses to gain a competitive advantage, support sectors to transform, and achieve their digitalization potential. To achieve this, the National Digital Master plan will focus on a framework for creating various facilities and programs to enhance and support the R&D capability in the public sector to enable the government to build new and innovative solutions.

There is no R&D in the government development and use of ICTs. At the same time, the government does not consume R&D outputs from universities and research institutions. In reality, the government is a consumer of ICTs, largely focusing on the procurement of technology from the private sector, most originating from Western countries. This Master Plan proposes a shift towards the government embracing R&D to locally produce and use technology. This will require increased collaboration with academia and industry.

The preparation of this National Master plan shall address the challenges technology poses for user privacy, the potential of emerging technologies and unintended consequences of technology in general through the application of Research and Innovation in promoting digital economy. Consequently, Research and Development (R&D), which is a creative and systematic work that aims to increase the stock of knowledge and devise new applications for available knowledge, will help accelerate digital inclusion. Therefore, applied research, which is an original investigation undertaken in order to acquire new knowledge, will be pursued by Kenyan Government.

5.2.2 Outcomes, Objectives, Strategies and Key Projects

The challenges outlined in the situation analysis would be addressed with the stated objectives and to achieve the following outcomes;

Outcome 1: Streamlined approach on ICT R&D in government

The objectives, strategies and key projects to deliver the above outcome are shown in Table 5.2.

Table 5.2: Objectives, strategies and key projects for Research and Development

Outcomes	Objectives	Strategies	Key Projects
Outcome 1: Streamlined approach to ICT R&D in government.	(a). A streamlined approach to ICT R&D in government.	■ Create a framework for ICT R&D in government ■ Support ICT R&D in government. ■ Develop National ICT knowledge management framework. ■ Collaborate locally with academia and industry in solving government digital challenges through R&D.	■ Develop a framework for government ICT R&D. ■ Establish ICT research hub. ■ Develop ICT research fund. ■ Develop partnership framework for ICT research.

5.2.3 KPIs

The main KPI to track the realization of the outcomes is the number of government digital R&D solutions.

Detailed indicators are provided in Annex 2.

(a). No. of ICT research & Development conducted.
(b). No. of ICT innovations adopted.

5.3 DATA PROTECTION AND CYBER MANAGEMENT

Information Security refer to the process of ensuring the Confidentiality, Integrity and Availability (CIA) of the Government's information assets. The CIA model of ICT security ensures that information assets, both tangible and intangible, are safeguarded against unauthorized access, use, dissemination, modification and disclosure.

5.3.1 Situation Analysis

As the government envisages delivering the objectives of the National Digital Master Plan through various digital interventions, more emphasis should be given to data protection and cyber management to ensure that current and emerging threats are being addressed. This shall be done through digitizing, automating and securing government services for effective and efficient delivery to the citizenry.

In addressing information security challenges, the government has enacted the following critical legal frameworks and policies:

(a). Computer misuse and cybercrimes act 2018.
(b). Data Protection Act 2019.

Besides these, the Government has been able to put in place the following interventions governing the management of our cyberspace:

- The current review and Implementation of the (V2) National Cybersecurity Strategy.
- Operationalization of National Public Key Infrastructure.
- Development of an Information Security Standard as a baseline reference point for MCDAs.
- Formulation of the National Information Security Policy.

However, the development and implementation of a government-wide information security program have been faced with a number of challenges including

- Lack of security integration in government projects at inception.
- Lack of proper security controls across the infrastructure results in service disruptions and outages.
- Successful cyber-attacks result from a lack of security management systems to manage security vulnerabilities on critical infrastructure.
- Lack of real-time monitoring to identify vulnerabilities and threats.
- Lack of clear critical systems User Identity Management.
- Low and/or lack of skilled personnel in Cyber security.
- Software and systems are designed and manufactured from a variety of sources give rise to the possibility of compromised supply chains.
- Large attack surface in the government, stemming from the increased complexity of systems and digital connectivity use models.

Social and technology trends, such as teleworking, and mobile devices, lead to an increased number of insecure devices accessing government networks and blurring the perimeters of systems.

5.3.2 Outcomes, Objectives, Strategies and Key Projects

The Government endeavors to transform Kenya into a globally competitive digital economy through building a resilient and secure infrastructure that facilitates the achievement of digital services and data management through the development of digital skills, business, and innovation and digital enterprises. This requires a comprehensive plan on information security and cyber management. The overall outcome envisaged at the end of the planned period is increased security of government digital resources. The intermediate outcomes are:

Outcome 1: Enhanced data protection and cybersecurity legislative framework.

Outcome 2: Enhanced Governance and cybersecurity management in MCDAs.

Outcome 3: Enhanced capacity on information security and cyber management in government.

The objectives, strategies and key projects to deliver the above outcomes are shown in Table 5.3.

Table 5.3: Objectives, strategies and key projects for Data Protection and Cyber Management

Outcomes	Objectives	Strategies	Key Projects
Outcome 1: Enhanced information security and cybersecurity legislative framework.	■ Enhance the country's cyber policy to address current and emerging threats. ■ Enhance the capacity and capability of information security enforcement.	■ Review the legal, policy gaps, and regulations on ICT systems and infrastructure.	■ Formulation of legislation to protect ICT Infrastructure. ■ Review cybersecurity legal and policy framework.
Outcome 2: Enhanced Governance and cybersecurity management in MCDAs.	■ Improve MCDA's Information Security & Cybersecurity Management and Business Operation (Government, CNII and Business). ■ Provide and ensure a resilient and secure Digital Infrastructure and Services Platform to facilitate the achievement of a digitally enabled economy. ■ Strengthen and Build Capability to effectively deter, detect, and respond to Incident Management and counter the threat from cyber activities targeted to government systems.	■ Conduct Information Security/ cyber security maturity assessments in all MCDAs – (Critical Services). ■ Developing and operationalizing National Security Incident Response Framework. ■ Adapt and Implement "Zero Trust" Strategy across all government digital platforms. ■ Establishing and operationalizing the Government CIRT. ■ Develop plan for disposal of government ICT systems and equipment.	■ National cyber-protection system. ■ Establishment of Cyber Security Operation Centre (Gov-Soc).
Outcome 3: Enhanced capacity on information security and cyber management in government.	■ Enhance the National Cyber Security Capacity and Capability Building. ■ Raise the general level of cybersecurity Awareness in Kenya for individual users, communities, enterprises, and organizations. ■ Increase public and investor confidence in the government delivering secure digital services.	■ Establish a cyber-security resource center. ■ Roll out a robust cybersecurity capacity building program ■ Conduct Government wide Cyber security drills. ■ Incorporate cyber security training in early learning curriculum through institute of curriculum development. ■ Conduct a cyber security awareness monitoring.	■ Establish and operationalize a cyber-security center of excellence (Cyber Excellence Centre). ■ Training for key officers from MDAs on data protection and Cyber Security best practices.

5.3.3 KPIs

The overall KPIs are the percentage of successful threats to security and period of downtime due to security breaches. The intermediate and detailed KPIs are presented in Annex 2.

(a). Critical Information Infrastructure (CII) Bill.
(b). 300 MCDAs that have adopted the National Cybersecurity Maturity Model.
(c). cyber-security centre of excellence (Cyber Excellence Centre).

(d). 300 Security Incident Response Plans for MCDAs.
(e). Capacity building for Cyber security professionals/ Point persons in MDAs.
(f). 300 MCDAs trained on data protection.

5.4 EMERGING TECHNOLOGIES

5.4.1 Situation Analysis

The ubiquitous coverage of AI in the mainstream news in recent years has sparked considerable skepticism among non-AI scientists about what AI can and cannot achieve, as well as the implications of increasingly sophisticated AI. The general populace is concerned that artificial intelligence (AI) will eliminate their jobs or, worse, take over the entire globe. Given the success of deep learning in some industrial applications, some believe that AI must now be solved, or at the very least advanced to the point where the industry can address all remaining challenges. Given the rapid expansion of the AI business, there has been some debate about the government's active involvement in AI initiatives either as a regulator or promotion of research and development of AI.

Emerging technologies introduce a paradigm shift through the expansion and use of intelligent technologies. These are mainly represented by AI, IoT, Big Data, and Distributed Ledgers, amongst others (see Figure 5.1 for examples of emerging technologies). A dynamic ecosystem of government needs to be established, which creates and captures the added value represented through the 4th Industrial Revolution.

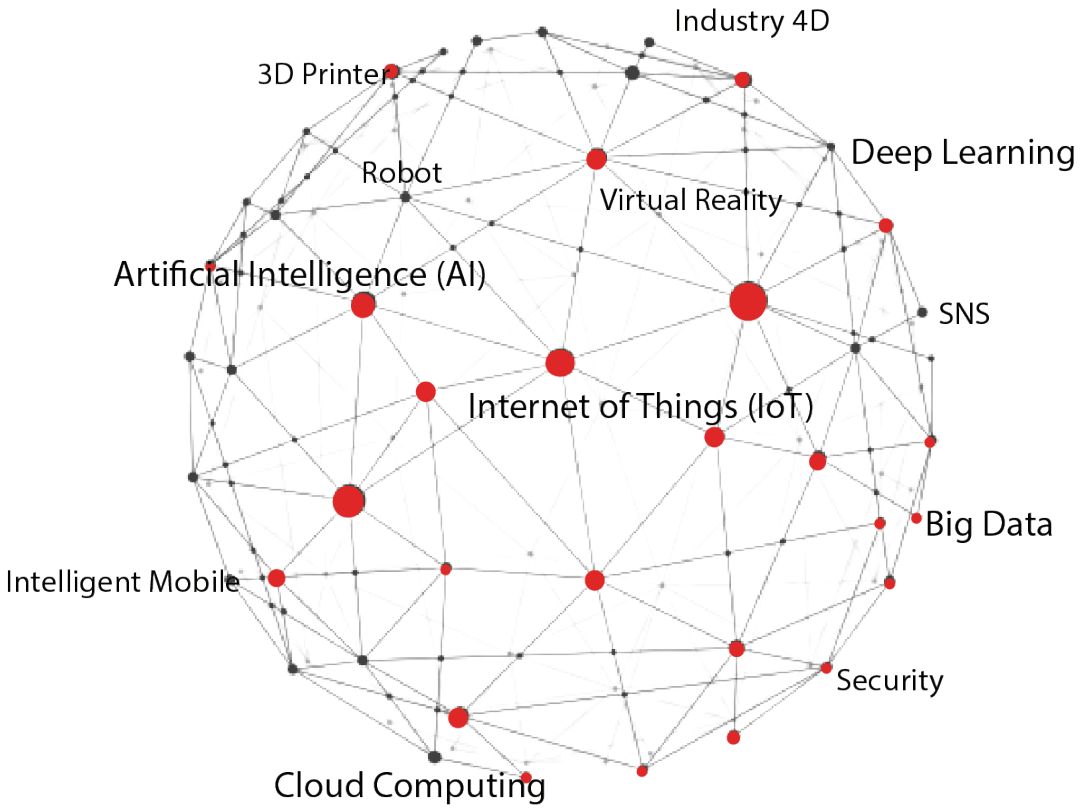


Figure 5.1: Some Emerging Technologies

International AI Approaches by governments

AI or artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems. These processes include learning, reasoning and self-correction. Some of the applications of AI includeexpert systems, speech recognition and machine vision. Globally, most economies have taken active steps to take advantage of the benefits that come with AI.

AI has been applied by both governments and private organizations in the following areas; Health care, surveillance, banking and finance, education, service delivery etc.

The Kenya AI Masterplan

Kenya has been a trendsetter when it comes to adoption of both mature and emerging technologies as evidenced by the growth in FINTECHS and Mobile money largely driven by the private sector. The AI technologies and capabilities will be the in thing in the next 5-10 years and Kenya cannot afford to be left behind or to be the late laggards. Kenya can support Research and Development of this technology and encourage harnessing of the AI capabilities to solve local problems while exporting the same capabilities to other countries either through skill AI human capital or through AI products and services.

The Strategic plan supporting the AI Masterplan

To create this plan, the government will convene an interagency AI task force comprised of National Government agencies, County Governments, higher education and private sector organization stakeholders to create a National AI Research and Development Strategic Plan. The primary goal of the National AI R&D strategic plan is to develop a high-level framework for identifying scientific and technological needs in AI over the next 5 to 10 years, as well as recommendations for establishing and maintaining the National AI Research Resource, including technical capabilities, governance, administration, assessment, and requirements for security, privacy, and civil rights.

The following key areas will be addressed by the National AI Strategic Plan:

1. The long-term transformative effects of AI on the Kenyan economy and service delivery.
2. The National and County Governments' Roles in AI Investments.
3. Determine long-term investments in AI research. Prioritize investments in the next generation of artificial intelligence.
4. Create effective methods for collaborating on human Artificial Intelligence. To create effective interactions between humans and AI systems, more research is required.
5. Recognize and address the ethical, legal, and societal implications of artificial intelligence. To understand the ethical, legal, and social implications of AI, as well as to develop methods for designing AI systems that align with ethical, legal, and societal goals, more research is required.
6. Ensure the safety and security of AI systems. Before AI systems are widely used, assurance that the systems will operate safely and securely in a controlled, well-defined, and well-understood manner is required. More research is needed to address the challenge of developing AI systems that are reliable, dependable, and trustworthy.
7. Create shared public datasets and environments for AI training and testing. The depth, quality, and accuracy of training datasets and resources have a significant impact on AI performance. Researchers must create high-quality datasets and environments, as well as provide responsible access to high-quality datasets, testing, and training resources.
8. Use standards and benchmarks to assess and compare AI technology. Standards, benchmarks, test-beds, and community interaction are all important for AI progress. More study is needed to develop a wide range of evaluating tools.
9. Gain a better understanding of the human capital (workforce) requirements for AI R&D in Kenya. AI advances will necessitate a large community of AI researchers. To ensure that

adequate AI professionals are available to handle the priority R&D areas identified in this Plan, a better understanding of existing and future R&D workforce demands in AI is required.

Countries such as India, China, and the United States, all created special teams to address emerging technologies such as Artificial Intelligence. Kenya has made great strides in the discourse of emerging technologies being amongst the first countries globally to set up a taskforce in 2018 that investigated the emerging technologies of Artificial Intelligence and Block chain (distributed ledgers). The 11-person taskforce prepared and launched a report following their terms of references requiring them to make recommendations of how the government can use Artificial Intelligence and Distributed Ledgers technologies to promote and enhance government services. A summary of these recommendations appears in the infographic shown as Figure 5.2.

Figure 5.2: Summary of interventions as proposed by the AI & Blockchain Taskforce

Emerging technologies often pause a unique challenge to governments as they may often require deployment structures that do not already exist in government. They also have an inherent risk of support and maintenance as they may often involve novel technologies that do not already have established supply chains and support structures to guarantee their deployment.

Nevertheless, if deployed successfully, emerging technologies promise a great opportunity in adding efficiency, creating immense savings and even creating totally new industries that can give great benefit to a government and an economy that embraces them. It is in light of this that this National Digital Master Plan proposes to make Kenya an icon of emerging technology applications in Africa by localizing and creating new industries around these emerging technologies.

5.4.2 Objectives, Strategies and Desired Outcome

The overall outcome of this theme is enhanced value creation from the adoption, localization, and utilization of emerging technologies by the government. The intermediate outcomes are:

(a). Outcome 1: Kenya as a leader in emerging technology adoption, localization, and utilization for development.

(b). Outcome 2: New solutions and industries are created with the adoption, localization, and utilization of emerging technologies.

The objectives, strategies and key projects to deliver the above outcomes are shown in Table 5.4.

Table 5.4: Objectives, strategies and key projects for Emerging Technologies

Outcomes	Objectives	Strategies	Key Projects
Outcome 1: Kenya as a leader in emerging technology adoption, localization, and utilization for development	(a). Create an enabling environment for the absorption and implementation of emerging technologies.	■ Develop and expand e-Government services using emerging technologies ■ Develop strategy for adoption of smart technologies	■ Incorporate AI-Driven in deployment of government services. ■ Deployment of IoT, blockchain systems and infrastructure for the tracking of assets, transactions and legal documents. ■ Creation of a digital assets framework to support government registries as the basis for distributed ledgers to support access to credit and financial facilities ■ Develop a framework for big data sharing for the public. ■ Establish a government framework for adoption and utilization of smart technologies (AI, IoT, Blockchain, crypto currency) ■ Enactment of laws for smart technologies.
		■ Drive government services through collaborative mechanisms	■ Provision of secure APIs to home-grown Kenyan independent software developers and vendors to create business productivity applications for emerging technologies. ■ Establishment of an R & D fund dedicated to emerging technologies, ICT research. ■ Establish automated 24hr On-Demand Government services.
	(b). Lead in emerging technology discourses and discussions globally	■ Promote R&D and centers of excellence within academic institutions	■ Develop curriculums and deliver courses around emerging technologies within academic institutions and ICT centers of Excellence. ■ Increased international partnerships with leading R&D actors in the emerging technology space
		■ Develop digital talent on emerging technologies.	■ Establish formal discourses, working groups and courses on emerging technologies ■ Host an Annual global conference on emerging technology applications.

Outcomes	Objectives	Strategies	Key Projects
Outcome 2: New solutions and industries created with the adoption, localization, and utilization of emerging technologies	(a). Localize, co-create, partner, and build upon emerging tech producers	■ Creating new e-Government ecosystem that co-exists with industry and academia	■ Develop a government, academia and private sector Emerging technologies sandbox.
	(b). Harness the knowledge and export emerging technology products	■ Promote regional and continental e-Govt cooperation	■ Develop technology exchange partnerships and royalty programs with partner governments
		■ Globalizing our best e-Government knowledge base and practices (eCitizen, Huduma Centres)	■ Commercialize the best in class e-Government systems.

5.4.3 KPIs

The overall KPI of this theme is the amount of value the government creates with the adoption, localization, and utilization of emerging technologies. Intermediate and lower-level KPIs are provided in Annex 2.

- ✓ 4 AI, IoT, Big data and blockchain projects implemented.
- ✓ 5 Automated On-Demand 24hr Government services.
- ✓ 4 curriculums on emerging technologies in academic institutions
- ✓ 10 Institutions delivering the emerging technology courses.

IMPLEMENTATION

6. IMPLEMENTATION

6.1 RESOURCE MOBILIZATION

6.1.1 Introduction

A critical imperative for the successful and effective implementation of this MasterPlan is that the required financial resources will be available. The ministry will explore diversified strategies for resource mobilization and prudent financial management; funding of the projects in this Master Plan will come from the National Government, development partners and other public or private institutions through Private-Public Partnerships (PPPs) and collaborations.

Main Objectives

- To give us a guide on how we intend to partner and collaborate on how to harvest enough resources that will support the National Digital Master Plan
- To source for Master Plan funding to cater for implementation of all the components of the Master Plan, including to ensure sustainability and to develop and implement a framework for resource mobilization.

Specific Objectives

- Liaise with stakeholders in the acquisition of resources
- Prioritize Master Plan activities for budgeting

6.1.2 Resource Requirements

The resource requirement per theme for the period 2022-2032 is shown in Table 6.1 (in Ksh Millions).

Table 6.1: Resource requirements

Theme	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1. Digital Infrastructure	46,800	46,800	41,050	41,050	36,800	36,800	36,800	36,800	19,300	19,300	
2. Digital Government Services, Products and Data Management.	3,202	3,242	3,241	3,035	3,035	3,035	3,035	3,035	3,035	3,035	
3. Digital Skills	500	3,491	3,491	3,490	3,489	3,489	3,489	3,489	3,488	3,488	
4. Digital Innovation, Enterprise & Digital Business	265	265	365	365	340	340	340	340	340	340	

5.	Legal, Policy & Regulatory Framework	6.836									
6.	Research & Development	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	2,180	
7.	Data Protection & Cyber Management	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
8.	Emerging Technologies	587	1,420	1,768	1,767	1,825	1,825	1,544.5	1,544.5	1,259.5	1,259.5	
Total		**55,541**	**59,398**	**54,095**	**53,887**	**49,669**	**49,669**	**49,389**	**49,389**	**31,603**	**31,603**	

The total financial resource requirement to fund this Master Plan for the period is Ksh. 484.241 billion, about 0.5 trillion.

6.1.3 Sources of Funds

The Master Plan will require substantial resources to implement over the period of ten years. There are several sources of possible funding available for consideration:

(a). Resources generated from commercialization of the infrastructure already in place. There are currently 7,300 Kms of fibre under commercialization under NOFBI I, NOFBI II and IIE. 1600 Km of NOFBI requires rehabilitation.

(b). Allocation from the National Treasury. The ministry will continue to lobby for additional funding from the National Government through the Exchequer and other sources. Participation in Sector Working Groups will be important for the bidding of the required financial resources.

(c). Support from Development Partners. Strategies to attract technical and financial support from development partners will be executed.

(d). The Ministry will also diversify the resource base through identification of development partners/donor policy priorities areas.

(e). Public Private Partnerships. The diversification of resources will also be achieved through Public-Private Partnership (PPP). Development of suitable incentives and tax breaks to the private sector to fund the Master Plan projects will be explored.

(f). Universal fund. This will be useful in the funding of broadband roll-out in unserved and under-served areas, in order to increase service coverage and access.

(g). ICT Government Policy Funding Proposal: Government policy to allocate 5% of the national budget to fund the master plan. This is per international best practices.

(h). ICT Fund Proposal: Introduce a levy on ICT services to form an ICT Fund for the master plan.

6.1.3.1 Resource Management and Efficiency

To ensure utilization and prudent management of the available resources, the ministry will employ the following interventions.

(i). Financial Management Systems: The policies and procedures manuals for Supply Chain Management and Audit will be reviewed as necessary and adopted to ensure financial management is harmonized and efficient. The planning, budgeting and financial management systems will be strengthened to optimize management of financial resources and enhance budget absorption capacity. All resources shall be managed through the Ministry Financial Management System which will, among other aspects, ensure automation and synchronization of work plans with budgets and procurement plans. Key activities, projects and programmes will be identified and fast-tracked for implementation to provide impetus for the medium term and long-term milestones. Implementation of capital projects will be guided by the Projects Committee with reference to the infrastructure manual for annual budget allocations.

(ii). Financial Reporting: Production of accurate and informative annual financial statements in accordance with International Public Sector Accounting Standards will be key to achieve excellence in Financial Reporting. The ministry will endeavour to resolve 100 percent of audit findings within 12 months of audit publication. Annually, it will issue clear year-end closing instructions with specific deliverables and deadlines. It will develop corrective action plans and assist spending units with the support necessary to continually strengthen their activities with regard to financial monitoring and reporting.

(iii). Fully-Fledged Accounting Units: Qualified accountants will be deployed to ensure that each station can run a fully-fledged accounting unit. It is expected that each station will also be served by a procurement officer to meet their procurement needs. This independence will help to overcome the challenges such as delays in cash bails and deposit refunds and any other bottlenecks experienced in the accounting processes.

(iv). Prioritisation and Sequencing: To ensure efficiency and value-for-money, the activities will be logically sequenced and prioritized through annual work plans as well as procurement plans for implementation.

(v). Innovation: The ministry will continuously seek to promote new ideas, services or systems that add value or improve quality of services. This will include exploiting modern technology, invention and innovation by employing out-of-the-box thinking to generate new value and bring about significant changes in society.

(vi). Fast Tracking Policies: Development of key policies, manuals, strategies and guidelines identified in this plan and subsequent approvals from the ICTA will be given priority during the Plan period. These will provide a framework for effective management of key administrative processes while ensuring inclusivity and certainty of impacts.

6.1.4 Challenges

The following are key challenges with respect to resource mobilization.

(a). Over reliance on Government funding in support of the Master Plan which is not sufficient

(b). Funding for implementation of all components of Master Plan is not consolidated but distributed across several players involved

(c). Lack of awareness of the scope of the Master Plan

6.1.5 Strategies

The main strategies to address the above challenges are:

(a). Enhanced Collaboration with the Parent Ministries under Master Plan and the National Treasury. This is to ensure adequate resources are allocated to the Plan. This can be done through active participation in Sector Working groups.

(b). Demonstration of the successes of implementation of Master Plan to attract more funding. This is to create awareness to the general public, attract private investors and show viability of the Master Plan. This can also be done through having Donor conferences that showcase the benefits of implementation of the Master Plan.

(c). Employ Human Resources with a deep understanding of technology to be able to support and sustain the Plan.

(d). Research on the best and affordable technologies to be used in the implementation of the Plan. Reach out to universities to find out how we can harness research and development

(e). Enhance political goodwill by having a Master Plan champion at the top level of the Government. Also engaging local leaders to show the success of the Plan at the local level.

(f). Using ICT to lower the cost of managing government services to showcase the benefit of funding investment in ICT.

6.2 INSTITUTIONAL FRAMEWORK

The ICT State Department and the ICT Authority will work with the National Government, County Governments and other departments and agencies to manage the various actions and initiatives in this Kenya National Digital Master Plan. This section spells out how the structure within the ICT Authority will ensure implementation of the Digital 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 Proposed Governance Structure Changes

ICTA as the implementing agency that shall provide leadership, the following changes are required:

(a). This Digital Master plan shall be implemented by the Ministry of ICT, innovation and youth affairs through the ICT Authority. The ICT Authority shall coordinate implementation of master plan activities and shall chair Technical Implementation Committee comprising technical officers from key implementing agencies. The Principal Secretary incharge of department of ICT and Innovation shall chair inter-ministerial Committee composed of principal secretaries of agencies implementing the Master Plan, whilst the Cabinet Secretary in-charge of Ministry of ICT, Innovation and Youth Affairs shall chair the Oversight Committee composed of Cabinet secretaries from ministries implementing the projects.
The ICT Authority shall provide a secretariat and project management office for the flagship programmes.

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

(c). The Chief Executive Officers of the different state departments in Government shall constitute a technical working group chaired by CEO ICT Authority

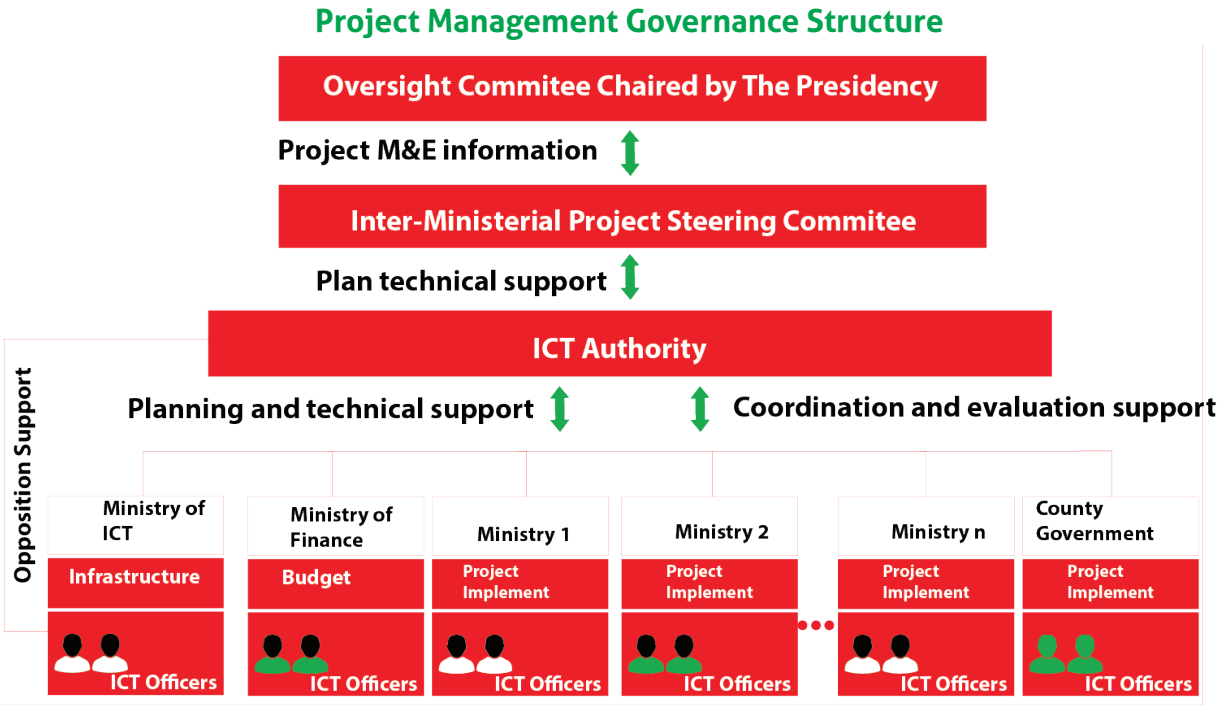
(d). A working group of County Executive for ICT shall be chaired by the CEO ICT Authority and shall have the mandate to review and approve all County ICT budgets and projects and to align them to national priority areas as defined in this Master Plan.

(e). ICTA shall have the overall mandate of analysing data on ICT education and professional development and to maintain a database of ICT professionals in Kenya.

(f). ICT Authority shall be the main coordinating and implementing agency for the master plan.

6.2.2 Institutional Framework for Kenya National Digital Master Plan Governance

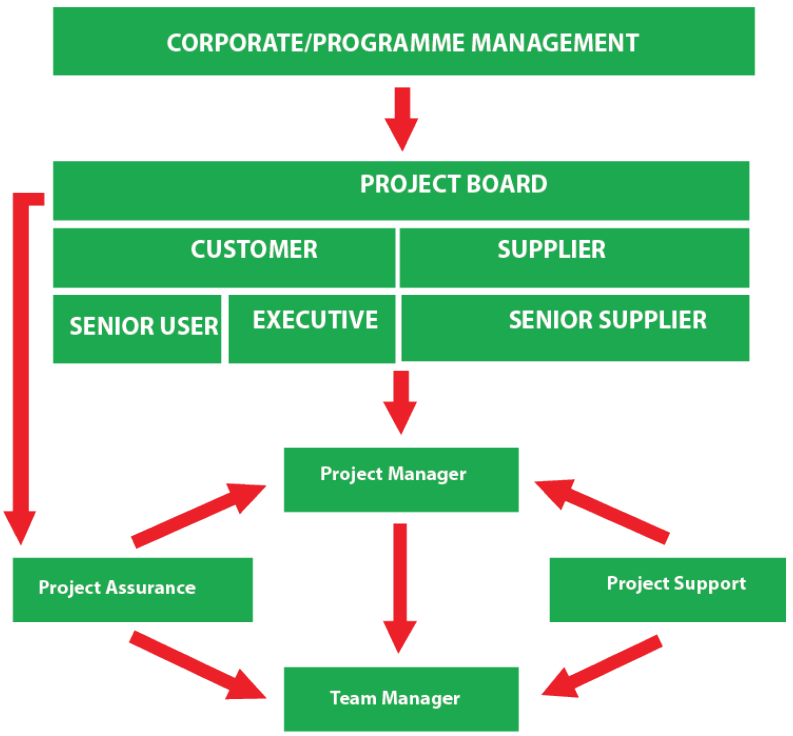
In order to implement the ICT flagship projects proposed in this Master Plan, the project management governance envisaged is shown in **Figure 17.**

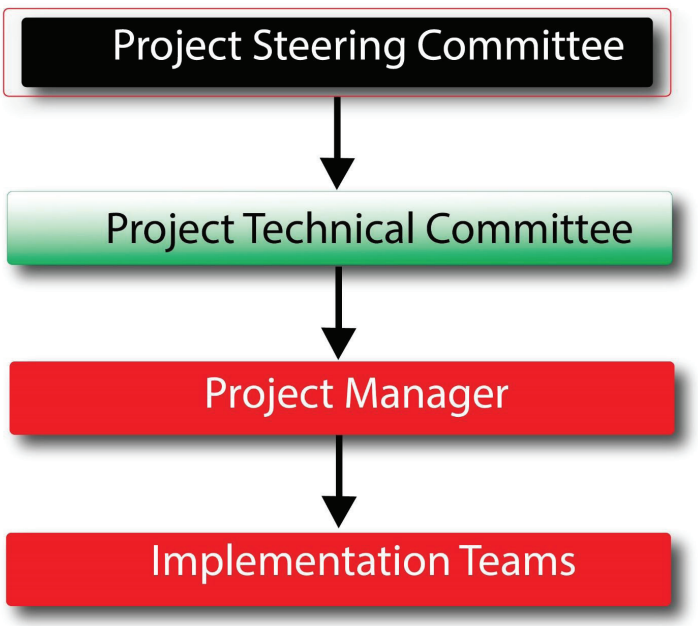


It is to be noted that at the apex of this structure is a multi-stakeholder steering committee chaired by the President. The team has representation from key arms of the Government. The key Government arms should include ministries in charge of energy, infrastructure, trade, industrialisation, security 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.

In this structure, synergies between ICTA and respective ministries, agencies and counties will provide the technical and functional knowledge base required to drive the ICT Authority successfully. Table 2 shows the roles and responsibilities

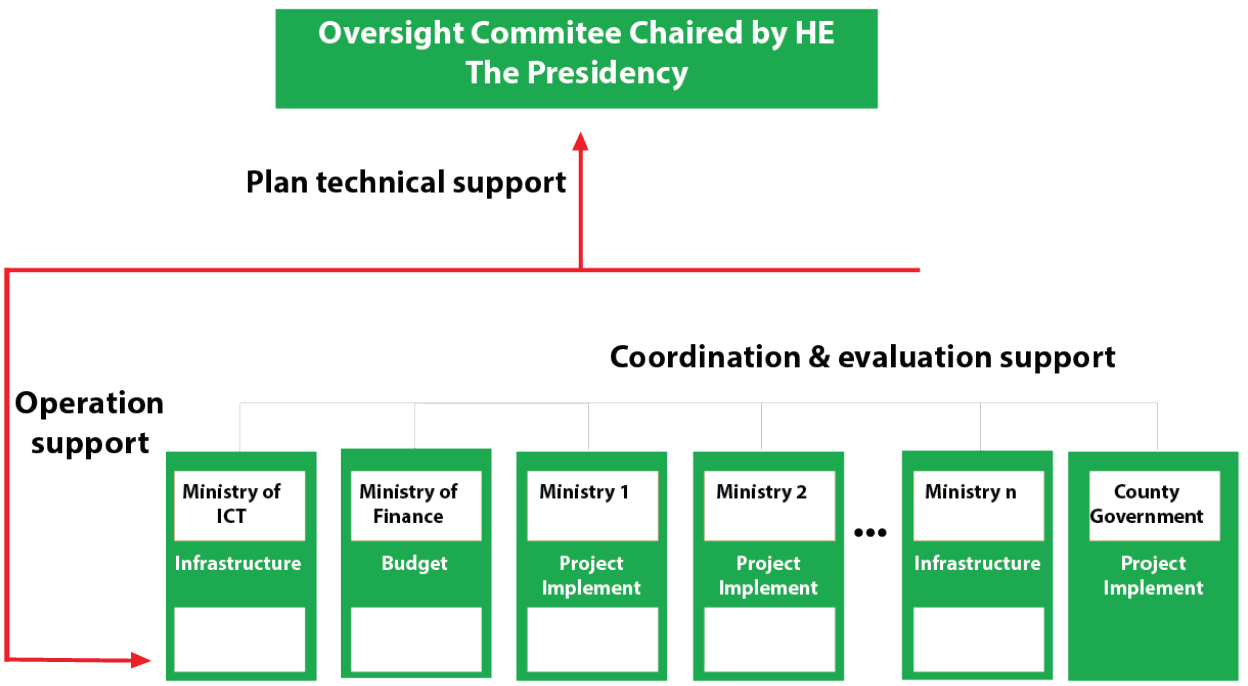
Project Governance





PROJECT MANAGEMENT GOVERNANCE AS PER THE DIGITAL MASTER PLAN 2022 - 2032

PROJECT MANAGEMENT GOVERNANCE STRUCTURE



Project Management Roles as per Master Plan

Project Cycle Stages	Oversight committee chaired by the president	Inter-ministerial Project Steering Committee	PMO ICTA	MCDA
Project conception			✓	✓
Project initiation	✓		✓	✓
Project planning			✓	✓
Procurement			✓	✓
Project execution		✓	✓	✓
M&E	✓	✓	✓	✓
Project closure		✓	✓	✓

GOVERNMENT ICT GOVERNANCE STRUCTURES

APPENDIX I: National ICT Project Governance Structures

	.	Membership	Terms of Reference
1	The ICT Oversight Committee	***His Excellency the President – Chair*** Members **Cabinet Secretary-;** ■ Ministry of Land Housing & Urban Development ■ Ministry of interior and Coordination ■ Ministry of Education Science and Technology ■ Ministry of ICT ■ Ministry of Devolution and Planning ■ Ministry of National Treasury **Chief Executive Officer ,** ICT Authority-Secretary	1. Review and approve projects for initiation 2. To provide oversight of flagship ICT Projects 3. To receive and consider reports from inter-ministerial Steering Project Committee 4. To resolve inter-ministerial Project challenges. **Appointing Authority**: H.E. The President Meeting: Bi-annual
2.	Inter-Ministerial Project Steering Committee	***Principal Secretary Ministry of ICT – Chair*** Members **Permanent Secretary -;** ■ Ministry of Lands, Housing and Urban development ■ The National Treasury ■ Ministry of interior and Coordination ■ Ministry of Education Science & Technology ■ Ministry of Devolution and Planning Chief Executive officer, ICTA –Secretary	1.Champion Implementation of Key Projects 2. Monitor and Evaluation Projects and take necessary action for the success of the project. 3. Prepare and report Projects status to oversight Committee 4. Resolve inter-ministerial Project challenges. 5. Receive and review quarterly reports from Project Implementation and Monitoring Committee. 6. Co-opt the ministry that own the key project(s) Appointing Authority: H.E. The President Meetings: Quarterly

APPENDIX II: Ministries, Agencies and Counties

1.0 Project Implementation and Monitoring Committee

Role	Membership	Terms of Reference
Project champion (Chair)	A top-ranking officer from the organ Ps for Ministry and CEO for Agencies	1. Initiate projects within Ministries, Agencies & Counties 2. Review and approve project concepts and implementation plans 3. Resolve project challenges to ensure smooth implementation 4. Review and approve project budget 5. Monitor and evaluate projects at implementation stage 6. Prepare and present quarterly progress report to inter-ministerial project Steering committee 7. Appoints Project implementing team[s] 8. Co-opt stakeholder's representatives or other members Meetings: Regularly Appointing Authority: Cabinet secretary/ Governor/CEO appropriately
Project owner	The user of the system	
Chair of Technical committee	This is the person who is responsible for the implementation of the system. [Head of ICT]	
Project Management Office	Project Manager ICT Authority	

All MCDAs must comply to this governance structures

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 ICT Authority and respective Ministries, Agencies and Counties will provide the technical and functional knowledge base required to drive the e-Government agenda successfully.

In the public sector, ICTA will work with all the ministries in the national government, county governments and a variety of agencies. Some of the key institutions and agencies that ICTA will work with include:

1. **Communication Authority (CA)**. CA is responsible for creating the appropriate regulatory environment for the ICT sector, a critical issue in the Policy, Legal and Regulatory Framework foundational theme. It also operates the Universal Service Fund that will be crucial for ICTA to extend critical digital infrastructure and services to marginalized areas.
2. **Office of the Data Commissioner.** The Data Commissioner role as the protector of citizen

data rights will become increasingly critical as the level of digitization in both the public and private sector matures. Citizen trust and confidence in adopting and using digital services, particularly in the public sector will depend on the assurance that their data is safe, secure and is not being abused - deliberately or otherwise.

3. **Kenya Innovation Agency (KENIA).** KENIA, under the Ministry of education, is responsible for managing the national innovation system, which includes digital innovations. ICTA will work with KENIA in the Digital Innovation Enterprise and Digital Business pillars.
4. **Konza Technopolis Development Authority**: Established as a vision 2030 strategic initiative to develop Konza Technopolis as a globally competitive smart city by creating an enabling environment through utilization of ICT for socio-economic development of Kenya leveraging knowledge economy propositions. ICTA will work with Konza in the Digital infrastructure, Digital services and Data management, Digital skills,Digital innovation, entrepreneurship and digital business as well as the execution of key foundational and cross cutting themes in this strategy.
5. **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 digital infrastructure and systems in marginalized counties.
6. **National Communication Secretariat (NCS)**. NCS is under the State Department of ICT and is responsible for policy development. ICTA will work with NCS in addressing policy issues identified under the Policy, Legal and Regulatory Framework foundational theme.
7. **Universities and Research Institutions.** ICTA will work with universities and research institutions in implementing projects under the Research & Development foundational theme.
8. **Kenya Educational Network (KENET)**. The KENET is the National Education and Research Network (NREN) for Kenya. Its digital infrastructure connects educational and research institutions. ICTA can leverage this infrastructure to provide last mile connectivity to its customers, especially schools and hospitals. ICTA can also use the KENET infrastructure as a back-up for certain links and outsource the construction and/or maintenance of specific connectivity links to KENET.
9. **KENIC** is the central registry for dot ke (.ke) county code top level domain. It is mandated with the responsibility to manage and administer the dot ke.

The projects to be implemented cut across different ministries, departments and agencies. It recommended the formation of a Digital Master Plan (DMP) Steering Committee to be headed by the Cabinet Secretary in charge of MoICT, with membership from relevant key institutions. This committee will provide strategic oversight for the effective implementation of DMP 2022-2032 and will coordinate all the necessary project inputs and resources as necessary. Its membership will comprise key agencies that will be implementing various aspects of the Master Plan.

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 to enable and facilitate digital businesses.

The table below shows the roles and responsibilities of the key actors in the management of the flagship ICT projects.

Actors	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
Ministry of ICT	■ Provide oversight and coordination of all ICT Government Projects
ICT Authority`	■ Chair the Technical Implementation committee ■ Provide PMO Services to delegated GOK projects ■ 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 ■ Coordinate overall implementation of the masterplan ■ 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) ■ Initiate review and development of masterplan. ■ Monitor and report on implementation status of masterplan ■ 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

6.3 STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION

6.3.1 Definition of Terms

Stakeholder - groups & entities without whose support or buy-in the organization/programme/initiative would cease to exist (Freeman & Reed, 1983).

Stakeholder Engagement - This is the process of consulting and involving the relevant stakeholders to harvest their views and input for use in improving decision making to achieve programme objectives.

Communication -Sharing information to achieve a shared meaning.

6.3.2 Rationale for Stakeholder engagement & Public Participation

The ICT sector in Kenya has grown and is now integrated into the economy and to the day-to-day life of every Kenyan citizen and residents. However, there have been gaps in the way information on ICT initiatives is disseminated and the factors range from:(a) Limited coordination of information sharing within the sector on critical issues like data integration and business process re-engineering (b) Inadequate understanding/misinterpretation of Programme objectives (c) Budgetary constraints hence limited stakeholder engagement activities (d) Poor perception/little understanding and support of ICT Programmes by stakeholders in other sectors (e) Limited collaboration amongst implementing agencies (f) resistance to change and adoption of emerging technology.

The Constitution of Kenya, 2010, Chapter 35, clarifies that government and public institutions have the responsibility of providing the citizens with information they possess. This includes programs funded by the exchequer and activities meant to benefit the common citizen. It is important for the citizens to access information on programmes and projects, their implementation status, achievements and the impact it has created on their livelihoods.

In addition, the Constitution of Kenya Article 10(2) a, b and c states that public institutions must pay attention to national values and principles of governance which include; transparency, inclusion and accountability.

Moreover, Chapter 35 of the Constitution of Kenya (1 a & b) and 3 on Access to Information stipulates that every citizen has a right to information and this is defined further in the Access to Information Act, 2016.

The National Digital Master Plan aspires to transform the operational processes of key sectors, e-Government services, access to data and information, and the perspective of citizens to ICT.

This document takes into account the local, regional and international multi-stakeholder environment and dynamics in which Kenya's ICT sector operates. The document also recognizes that each stakeholder involved in the decision-making process of proposed activities has a valid view, knowledge and experience that can add value to the final decision. It is founded on the conviction that inclusive and participatory approaches are more likely to make stakeholders have a greater sense of ownership of decisions made and subsequently comply where required.

For this to be achieved, there has to be, among other things, continuous engagement with all stakeholders who have been mapped out. The ICT Authority will require their support, buy-in, good will and endorsement of key stakeholders. There will also be a need for change in the attitudes, perceptions, beliefs and cultural practices in some stakeholders.

This document has identified several stakeholders whose cooperation is of utmost importance. The stakeholders include Government of Kenya MCDAs, private sector, development partners, the media, academia and research institutions, general public and civil society as shown in Table 6.2.

Table 6.2: Stakeholder engagement

Stakeholder	Responsibility/ Role	Expectation of the Stakeholder	Expectation from the stakeholder	Activities/ Items to support
The Presidency	Owner of all Programmes initiated by government	Programmes /initiatives that best support their Manifestos and Vision	Issuance of Executive Orders and Directives Coordination of all implementing agencies to realise the objectives in the Digital Master Plan	A Cabinet paper
Citizens	Consumption of ICT infrastructure services Participation of policy formulation Ownership of ICTs	Infusion of their needs into policy formulation	Uptake of ICTs	A Sensitization Plan
Development Partners	Financing ICTs development Consultancy services Capacity building	Plans for Financing Uptake of project funds M & E	Availing of funds Credit issues	Implementation Plan
Vendors, Contractors, Consultants & Suppliers	They implement proposed projects to realise objectives	Good governance in project implementation Honoring contractual terms Transparency during tendering Payments	Knowledge Transfer Post project management support Honoring contractual terms	Implementation Plan Vendor guidelines
MCDAs	Initiatives proposed in the Master Plan will take place in their institutions Consumption of ICT services Implementation of ICTs and services Increase digital literacy of citizens through training Provision of sustainable ICT services	Projects prioritization Conducive work environment for uptake of tech	Compliance with provisions of the Digital Master Plan	Implementation Plan

Stakeholder	Responsibility/ Role	Expectation of the Stakeholder	Expectation from the stakeholder	Activities/ Items to support
ICT Industry Thought leadership	They critique & review the Master Plan	Infusion of their ideas into the document and during implementation of initiatives Assessment of cybersecurity levels Digital business ecosystem	Sector supports the implementation of the Master Plan Promote sharing of ICT infrastructure	Connected Kenya Summit
Communities & Opinion leaders	The ICT infrastructure projects are rolled out in their areas and so have a say They are consumers of ICT services	Their ICT needs catered for in the Master Plan Direct benefits from the projects to the communities	Support project implementation Protect/safeguard the infrastructure	Project community outreach and stakeholder engagement plans
Media	They Educate and inform Sensitization of Citizens	Served with accurate, current information Build capacity of media to report on ICT Infrastructure	Unbiased reporting Framing of strategic issues touching on ICT Infrastructure	FAQs & Fact Sheets
Ministry of ICT	Policy formulation and enforcement of policies to support ICTs in the country Allocation of resources for development and operation of ICT Quality control Oversight, Quality control and M&	Support from sector Information/data from sector	Successful and effective implementation of initiatives outlined in the Master Plan Information sharing/reports within sector Co-messaging (One sector, one voice) Mobilize resources	Implementation Plan
ICT Authority	Lead implementer of the Master Plan Development of Standards Capacity Building	Support from sector Compliance with the standards	Mobilize resources Coordinate sector and implementing agencies	Implementation Plan

Stakeholder	Responsibility/ Role	Expectation of the Stakeholder	Expectation from the stakeholder	Activities/ Items to support
The Business Community Start Ups KEPSA	They implement initiatives outlined in the Master Plan Participate in policy formulation Consumption of ICT services Provision of ICT services Financing ICTs development through Public Private Partnership	Ideas on how to achieve the digital business objectives	Support from government for a robust ICT ecosystem	Funding & Resource Mobilization Plan
(Academia and research hubs think tanks)	They support the implementation of the Master Plan	Support the digital skills	Involvement R & D	Surveys Assessments
Private sector	Promotion of entrepreneurships	Accurate data/ information Conduct business with Government	Venture into production of devices and software development Support government endeavours	White Paper
Association of persons living with disabilities	Integrate the provisions of the Master Plan in their community plan	Accurate information	Articulate their needs for inclusion into the Master Plan	White Paper
Non-Governmental Organizations (NGOs) & Civil Society Organisations	Community mobilization for development Consumption of ICT services Participation in policy formulation	Accurate data/ information Be involved in implementation	Support, sensitization and community mobilization Protection of Critical ICT infrastructures	Community outreach Plan

Stakeholder	Responsibility/ Role	Expectation of the Stakeholder	Expectation from the stakeholder	Activities/ Items to support
Government communicators	Link between the government and the citizens Communicate government policies, programs, projects and plans	Accurate data/ information Be involved in implementation Capacity building Facilitation	ICT is part of your day -to-day messaging in speeches etc Implementation of communication plans Enhanced media engagement with the ICT sector	Master Plan communication strategy
Political leaders (National Assembly, Senate, County Assembly)	Provide political leadership Legislation and oversight Budget and resource allocation	Involvement Data and reports Successful implementation	Support the implementation of ICT programmes/projects Mobilization of communities to support initiatives outlined in the Master Plan Mobilisation of resources to fund identified activities Support operators through harmonising the wayleave charges across the 47 counties	Advocacy Plan
Religious/ community/ opinion Leaders	Community opinion shapers School sponsorship	Involvement Data/reports Successful implementation	Support the implementation of ICT programmes Mobilization of their communities to support ICT Mobilization of resources for infrastructures in facilities they manage (ICT Hubs) Oversee protection of Critical ICT infrastructure	Advocacy Plan
KICD	They develop and regulate the curriculum	Involved in Master Plan Development	Integrate ICT innovation programmes into curriculum development	MOU

6.4 MONITORING AND EVALUATION

The purpose of monitoring, evaluation and reporting, is to ensure that the implementation of the master plan is undertaken according to schedule and in the event of any deviation, appropriate and timely action is taken. The master plan will be monitored and evaluated during and after its implementation to assess the extent of achievements of planned activities and results. Further, the section presents how data will be collected, analysed, reported and disseminated. In addition, it outlines linkages between monitoring and evaluation with the key performance indicators that will be used to measure success.

Monitoring, evaluation and reporting is a critical component for the successful implementation of this Master Plan that will provide the necessary feedback and enable management to make evidence-based decisions. The monitoring and evaluation framework is geared towards improving the achievement of desired results, optimization of available resources and at realizing the impact of the initiatives.

Monitoring, evaluation and reporting process will be undertaken at both the implementing units and management levels. However, successful implementation will require putting in place an adequate monitoring and evaluation committee and framework.

6.4.1 Monitoring and Evaluation Committee

A monitoring and evaluation committee shall be established consisting of heads of Ministry Directorates with the ICTA CEO as the secretariat. ICTA's mandate will be to champion the implementation of the Master Plan by providing technical support as well as facilitating capacity building on monitoring and evaluation of the Plan. The use ministry/agency must be incorporated in the committee.

6.4.2 Monitoring, Evaluation and Reporting Approach

The Master Plan will be monitored through routine supervision, data collection, evaluation, and reporting. Data collection on the Plan will be spearheaded by ICTA. The data will be collected, analysed and reported to the monitoring and evaluation (M&E) committee. The ministry implementing units will monitor programmes and projects administered within their respective jurisdictions and subsequently submit progress reports, on a quarterly and annually basis. These reports will be reviewed against the set targets to measure progress and lessons learnt. To ensure effective implementation of the Plan, units will be required to develop annual workplans and budgets aligned to the Master Plan, and ensure the targets are aligned to the workplans. The following reports presented in Table 6.3 will be prepared to keep the planned activities on track and to assess the extent of achievement of strategic results.

Table 6.3 M&E Reports

Report	Prepared By	Compiled By	Submitted to
Quarterly Progress Report	All ministry Agencies Directorates	ICTA	PS ICT Ministry
Annual Report	All ministry Agencies Directorates	ICTA	PS ICT Ministry
Mid Term Evaluation	ICTA	M&E Committee	PS ICT Ministry
End term Evaluation	ICTA	M&E Committee	PS ICT Ministry

The evaluations will be carried out based on relevance, efficiency, effectiveness, sustainability and impact measures.

6.4.3 M&E Framework

A standard M&E framework is essential to guide the monitoring and evaluation of the Master Plan. A framework will explain how the programme is supposed to work by laying out the components of the initiative and the order or the steps needed to achieve the desired results. A framework increases understanding of the programme's goals and objectives, defines the relationships between factors key to implementation and articulates the internal and external elements that could affect the programme's success.

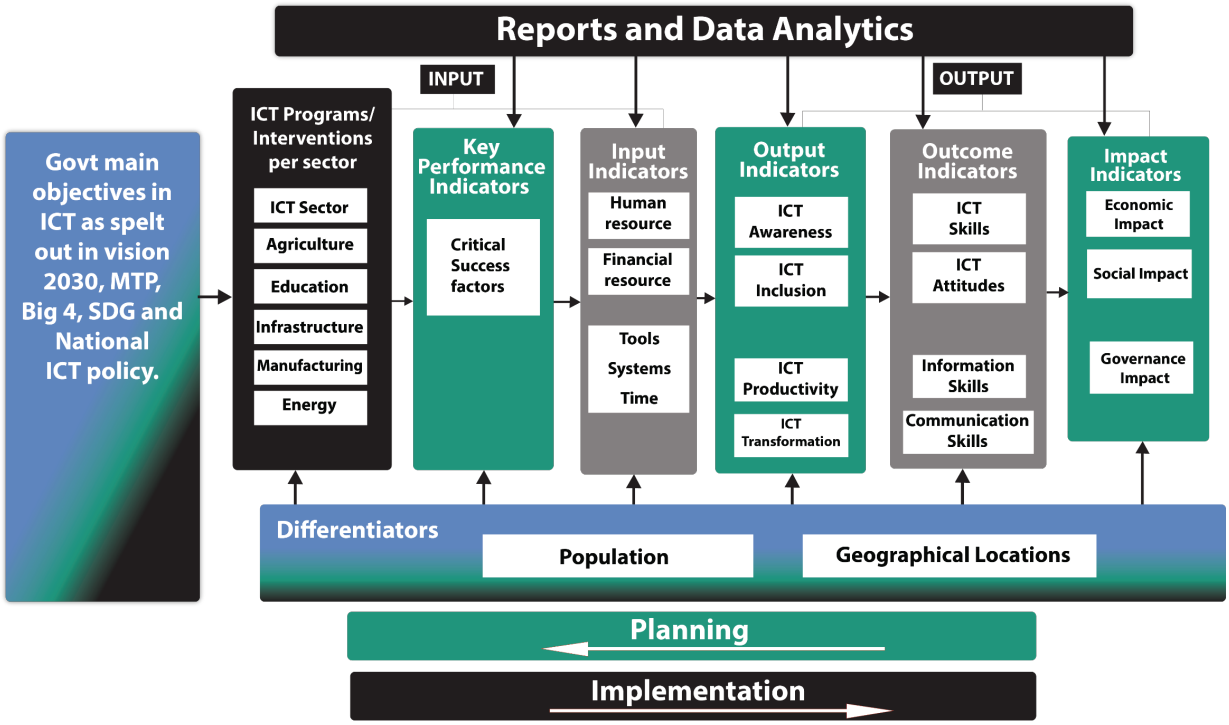


Figure 6.1: The Monitoring and Evaluation Framework

This framework takes into account all government plans as captured in Kenya Vision 2030, the Medium-Term Plans, the Big 4 Agenda and Sustainable development goals. It further takes into consideration the existing M&E activities of the Ministry of ICT and Innovation and the ICT Authority by establishing a practical monitoring and evaluation system, which not only reports on activities, but also tracks progress in terms of achieving results. It will adopt a consultative approach while dealing with implementers of the programmes so as to achieve the intended objective of reporting the results based on facts and reality on the ground.

The monitoring framework will be employed to track actual performance against the plans and will involve continuous collection and analysis of data as well as results and recommend corrective measures. On the other hand, evaluation will aid in understanding why and to what extent intended and unintended results

are achieved and their impact on stakeholders which is an important source of evidence for performance and the achievement of the set objectives. Evaluation results feed into decision making processes for planning, budgeting, and implementation and reporting cycle of Master Plan.

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

- 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 Digital Master Plan is presented to the public and private sectors, followed by a discussion and the way forward.

6.4. 4 Dissemination of M&E Reports

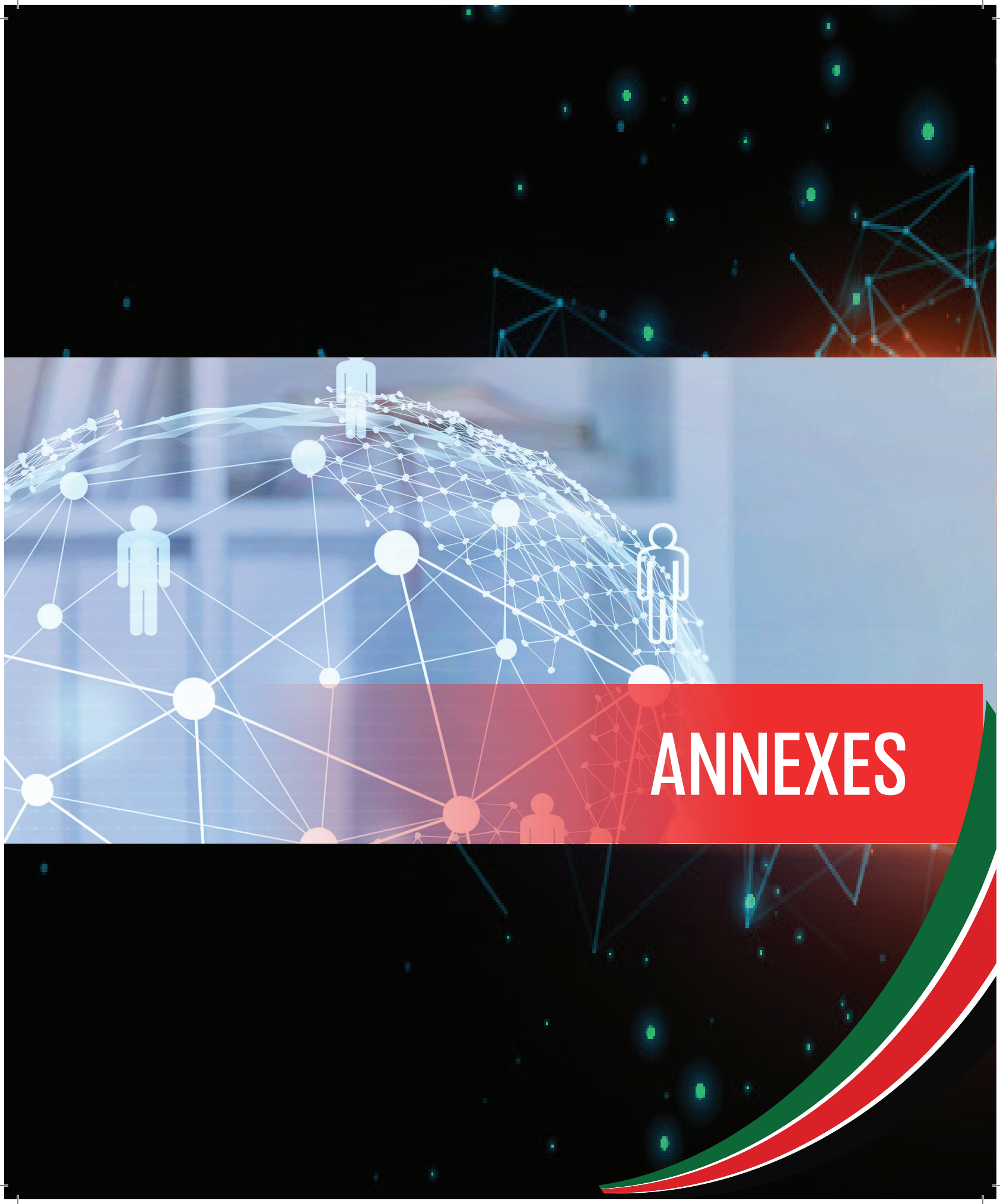
ICTA and the M&E Committee will ensure that relevant reports are properly disseminated to the ministry. This will help to consolidate support in achieving the overall goal of the institution. Similarly, forums such as meetings, retreats, workshops, seminars, colloquia, will be used to share findings and recommendations of reports.

6.5 RISK MANAGEMENT

The Master Plan identifies several uncertain events or conditions that may affect its implementation and proposes a risk mitigation plan, to eliminate or minimize the impact of such events; due to critical success factors which must be satisfied, and various risks managed in order to successfully implement this National Digital Master Plan. The following is a table outline of the risks and mitigation measures:

Class	Risk	Risk Rating	Risk Mitigation Strategies
Executive championship and leadership:	Conflict of interest	Medium	1.Top leadership to be involved in the flagship projects identified in this National Digital Master Plan as a means of communicating the importance of ICT as a driver, enabler and contributor to Kenya's economy. 2.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 Digital Master Plan.
Strategic	Failure to fully implement the Strategic Plan	Medium	1. Allocation of adequate resources to implement and monitor the Strategic Plan. Annual cascaded targets well incorporated in the workplans for implementing lead teams. Stakeholder engagement and buyin 2. Structured plan on sensitization of Ministry employees on the new strategic direction.
Institutionalized governance structures	Unclear governance & structures	Medium	1.To provide mechanisms to plan, implement, and monitor progress of national ICT projects. 2. To mitigate & propose institutional changes in sections 6.2 must be implemented in 2022/2023.

Technology	Security risks	High	Investment in security risk infrastructures
	Technology Utilization	Medium	User sensitisation and awareness on IT functionality and benefits
	Technological Changes	High	1.Keeping abreast of the latest technological trends 2.Continuous acquisition and training on new technologies. 3. Improve on ICT hardware and software
Support for start-up businesses.	start-up businesses created out of ICT innovations have not been sufficiently financed	Medium	1.Risks reduction through engagement with the commercial banks to support those businesses. 2. Government must set up an innovation fund to support these businesses.
Financial	Inadequate financial Resources	Medium	1.Resource mobilization 2.Gazette Ministry Fund Regulations & operationalization of the Fund
	Misappropriation of funds and Revenue/ Deposits loss	Medium	1.Automation of accounting and auditing processes 2.Enhance accountability and strengthen internal controls 3.Prudent financial management
Organizational/ Operational	Inadequate Human Resource Capacity	Medium	1.Timely recruitment on need basis 2.Enhance succession planning and Management 3.Retention strategy implementation 4. Attract and retain competent, motivated and resourceful professional staff.
	Policies, Laws Enforcement	Medium	Full implementation of all policies and procedures manuals
	Business disruption due to disaster	High	Develop and implement Disaster Recovery Plan and Business Continuity Plan (BCP)
	Inappropriate organizational culture	Medium	Institute culture change and change management initiatives.
Political	Change of government	High	Re-align the master plan to manifestos of new government Influence the new leadership to adopt the plan.
Availability of funds	Lack of enough funds	High	1.balanced, well planned, ICT projects funds 2.setting up data hubs that drive the e-Government systems and applications and the recurrent expenditure for operations. 3. 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.



ANNEXES

ANNEXES

ANNEX 1: KEY PROJECT DETAILS, BUDGETS, TIMEFRAMES AND RESPONSIBILITIES

A1.1 Digital Infrastructure

Key Project Names	Objectives	Impact/ Benefits	Time-frame	Budget (Kshs)	Responsibility
52,000Km of NOFBI for Government Networks	To improve access to ICT services & bridge digital divide	52,000 Km of fibre cable laid Reliable and stable interconnectivity in Government Networks – Education institutions, health institutions, Metro, Government offices, counties and wards-	2022 - 2030	118.0B	ICTA MoIIYA MOINC MED COG National Treasury Development Partners.
48,000Km for private networks- homes, business and rural centres).	To improve access to ICT services	48,000 Km of fibre cable laid -48,000Km for private networks- homes, business and rural centres).	2022 - 2028	60.0B	Private Sector.
Installation of 25,000 Hotspots in public installation in rural areas and other public spaces.	To improve access to ICT services	Increased and enhanced broadband connectivity across the country	2022 - 2028	20. B	-ICTA -National Treasury -Development Partners.
Nairobi and County Metro to 4500 km and implementation of the active devices	Provide all the Government building with reliable connectivity	Reliable and stable interconnectivity in MDA's	2022- 2024	17.0B	-MOTI -ICTA -National Treasury -Development Partners.

Key Project Names	Objectives	Impact/ Benefits	Time-frame	Budget (Kshs)	Responsibility
Data centre (Main, DR, Smart hub)	Smart hub) To Ensure continuity in Government operations	To Ensure continuity in Government operations	2022-2022	10.0B	ICTA MOICTIYA MOTI / KOTDA -National Treasury -Development Partners.
Regional Data Centre and Network Operation Centre (NOC) including recovery Data Centre, NOC and Government Cloud.	Ensure business continuity	To Ensure continuity in Government operations	2022-2028	80.0B	ICTA/ KONZA MOICTIYA MOTI -National Treasury -Development Partners.
Secure redundancy Gateway for submarine cable	Redundancy of internet connectivity	Second cable to Kenyan Coast	2022-2022	1.0B	ICTA MOICTIYA MOTI -National Treasury -Development Partners.
Activation of TEAMS to 100G	Improve on services	Activation of minimum 100G capacity	2022-2022	0.5B	ICTA MOICTIYA -National Treasury -Development Partners.
Installation of 15,000 mobile connectivity sites	Improve mobile coverage	Improve mobile network coverage	2022-2032	75.0B	-CA -MOTI, -ICTA -MOICTIYA -National Treasury -Development Partners.
Establishment and operationalization of Konza National Data Centre and Smart City Facilities.	Provide a Centralized Government and private data services for Efficient, effective and secure data centre and Smart City services	Efficient, effective and secure data centre and Smart City services	2022 -2027	18 B	KOTDA -MOICTIYA -National Treasury -Development Partners.

Key Project Names	Objectives	Impact/ Benefits	Time-frame	Budget (Kshs)	Responsibility
Rollout mobile network infrastructure and services (3/4G) in 101 sub-locations in 17 Counties. Subsequent Phases of the project target 278 sub-locations in 25 Counties.	To bridge the digital divide by ensuring universal mobile services by all in Kenya	To enable communities to exchange and access information for social economic development.	2022 - 2032	6.1 B.	CA -MIIYA -National Treasury -Development Partners.

A1.2 Digital Government Services, Products and Data Management

Key Project Names	Objectives	Impact/ Benefits	Time-frame	Budget (Kshs)	Responsibility
Digitization 5 billion government records.	To develop digital services plans for each MDA	Allow for periodic implementation reviews of the plan	2022-2023	5B	ICTA /MCDAs / KOTDA -MIIYA -National Treasury -Development Partners.
Improve legal and regulatory frameworks to Support the development and use of digital services	To align legal and regulatory frameworks with digital services needs	End to end system architectures and implementations that are supported by legal frameworks	2022-2025	0.20M	ICTA/ Legal officers/ MCDA -MIIYA -National Treasury -Development Partners.
Integration and interoperability of Government services.	Promote information sharing within government	Improved quality of government data	2022-2030	1.0B	ICTA/ MCDAs MOICTIYA/ KOTDA -National Treasury -Development Partners.
Government unified communication (email, websites, VOIP, Audio/Video/ Web conferencing, IP Telephony, Active Directory Domain Control Service and Instant Messaging)	To enhance service delivery to the Public.	Effective and efficient delivery of e-Government services.	2022-2030	1.0B	ICTA/ MCDAs MOICTIYA/ KOTDA -National Treasury -Development Partners

Key Project Names	Objectives	Impact/ Benefits	Time-frame	Budget (Kshs)	Responsibility
Coordinate/ review, automation of critical Government services (health, education, immigration, lands, birth and deaths, judiciary, parliamentary, tax, Agriculture, Security, Election, Transport, Registration of persons).	Improve efficiency in service delivery by allowing access to services anywhere anytime	Quick turnaround time Improved services to the citizenry	2022-2030	10 B	ICTA/ KOTDA -MIIYA -National Treasury -Development Partners.
Government shared services platform	Convenience in accessing government services	Improved user satisfaction in accessing government services	2022-2030	2 B	ICTA /KOTDA -MIIYA -National Treasury -Development Partners.
County Automation	Enhance county service delivery	Improved uptake of digital services by MCDAs Reduce cost of business	2022-2032	10 B	ICTA, COG Ministry of Devolution / KOTDA -MIIYA -National Treasury -Development Partners.
Digitize 25 billion government records (500 Million per county records)	Enhance service availability	Reduce on system failure	2022-2030	2.5B	ICTA, MOICTIYA/KOTDA Key agencies -MIIYA -National Treasury -Development Partners.
Capacity building for ICT support team	Improve availability of the system	Improved the support of the system	2022-2030	300 M	ICTA/ MCDAs MOICTIYA -MIIYA -National Treasury -Development Partners.
Develop software industries	To enhance GDP & provide employment opportunities	Reduce unemployment Increase GDP	2022-2030	2 B	ICTA/MCDAs/KOTDA -MIIYA -National Treasury -Development Partners

A1.3 Digital Skills

Key Project Names	Objectives	Impact/ Benefits	Time-frame	Budget (Kshs)	Responsibility
Develop and implement a strategy for digital Literacy capacity for 20 million Kenyans, including Special Interest Groups on digital skills.	Increase digital literacy to ensure citizens and businesses have the skills and motivation to use digital services.	Digital inclusivity Improve citizens literacy levels for quality life Improved provision and consumption of digital services	2022-2030	4.5B	ICTA, partners
Digital Literacy Programme. (Laptops for upper Primary, cloud infrastructure for learning materials, teacher capacity building, schoolnet, digital learning materials, learner assessments materials, and NEMIS).	Integration of ICT in learning and teaching.	Digitally enabled Kenya Society	2022-2032	45 B	ICTA -MIIYA -National Treasury -Development Partners.
Establishment of 1450 ICT Centres in every ward. (The centres will undertake Research and Development, Innovations, digital devices refurbishment, cyber security training, repair and maintenance, recycling, e-waste management, practical training and provision of other ICT services)	Increase access to devices and internet usage in targeted communities, especially along the ASAL communities, working with partners	-Promote citizen's economic participation and enhance digital inclusion by seizing digital opportunities -Local communities around the academia and business for knowledge building and exchange of ideas	2022-2032	7.4 B	ICTA/ KOTDA -MIIYA -National Treasury -Development Partners.
Carry out digital skills surveys in the country to establish digital skill gaps for a digital economy requirement for all sectors (5M Each)	To assess current digital skills to improve on skills development	Improve citizens Digital literacy levels	2022	500M	ICTA -MIIYA -National Treasury -Development Partners.

Key Project Names	Objectives	Impact/ Benefits	Time-frame	Budget (Kshs)	Responsibility
Development and maintenance of multilingual e-learning platform	To promote online and provide an environment for Continuous skills development for all ethnicity	ICT literate population capable of exploiting ICT products and services for improved quality of life Optimization/ sharing of training resources	2022-2030	800M	ICTA/ KOTDA -MIIYA -National Treasury -Development Partners.
Development and maintenance web-based skills database system to track citizens skills information demand and supply	To streamline skills development	Improve Kenya's global Human capital index on skills development	2022-2030	300M	ICTA -MIIYA -National Treasury -Development Partners.
Establish an ICT capacity building fund	To Continuous improvement on skills development Promote citizen's economic participation and enhance digital inclusion by seizing digital opportunities	ICT literate population capable of exploiting ICT products and services for improved quality of life	2022-2030	5B	ICTA -MIIYA -National Treasury -Development Partners.
Establish digitization support centres for People with Disabilities (PWDs)	To ensure reach and inclusion	Empower & increase participation of individuals families, communities in the digital economy	2022-2030	1B	ICTA/ KOTDA -MIIYA -National Treasury -Development Partners.
Develop/adapt digital skills curriculum to train professionals, workforce and everyone to improve productivity and enhance digital inclusion	To facilitate the skills development process through the use of streamline curriculum and interactive digital contents	Mainstreaming Digital Services in Priority Sectors	2022-2030	700M	ICTA -MIIYA -National Treasury -Development Partners.
Conduct a baseline for ICT local talents and professional's ecosystem	Provide a Sectorial digital skills gap report on professionals in the country - demand & supply	Increase a pool of skilled talents	2022-2023	300M	ICTA -MIIYA -National Treasury -Development Partners.

Key Project Names	Objectives	Impact/ Benefits	Time-frame	Budget (Kshs)	Responsibility
10 ICT Centres of Excellence.	To improve the development of ICT ready workforce	Improve coordination in skills development	2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.
Expanding & ICT Graduate Internship & inclusion Diploma Internship with sponsored international change programme	Broadened future talent pipeline for ICT and digital skills	Availability of sustainable local high-end ICT skilled workforce to meet the needs of the industry	2022-2030	5B	ICTA -MIIYA -National Treasury -Development Partners.
Financing and institutionalize a six months ICT Management trainee program in State Agencies	Create an enabling environment to collaborate with private, NGOs& public to improve professional skills through management training.	Ready professional skills workforce to support digital transformation in the economy	2022-2030	1B	ICTA -MIIYA -National Treasury -Development Partners.
Training of 10,000 officers in Public Service in High-End Specialized ICT areas.	Increase ICT skilled professionals and support talent development	Adequate workforce to transform and innovate business using ICT	2022-2030	1B	ICTA -MIIYA -National Treasury -Development Partners.
Capacity building of 20,000 ICT professionals for the sector.	To facilitate the skills development process through the use of streamline curriculum and interactive digital contents	Mainstreaming Digital Services in Priority Sectors	2022-2032	700M	ICTA -MIIYA -National Treasury -Development Partners.
Develop Youth Productivity and Employment Opportunity programmes	Increase employment through digitals skills development and expand employment markets and opportunities	Growth in business and improvement in household quality life	2022-2032	2B	ICTA -MIIYA -National Treasury -Development Partners.
350,000 teachers trained on digital services by 2030	Expanding digital skills training to foster capacity and enhance capabilities for civil servants to deliver effective and efficient citizens service and transform government of the future	95% of public services delivered online No of public servants delivering services using ICT	2022-2032	800M	ICTA -MIIYA -National Treasury -Development Partners.

Key Project Names	Objectives	Impact/ Benefits	Time-frame	Budget (Kshs)	Responsibility
300,000 civil servants trained on digital services by 2030	Expanding digital skills training to foster capacity and enhance capabilities for civil servants to deliver effective and efficient citizens service and transform government of the future	95% of public services delivered online No of public servants delivering services using ICT	2022-2032	800M	ICTA -MIIYA -National Treasury -Development Partners.
To sensitize 10 Million data subjects to promote public awareness of fundamental rights to personal data privacy and protection	To create awareness on data protection framework	Compliance	2022 - 2032	2.5B	ODPC -MIIYA -National Treasury -Development Partners.
Sensitization 200 top leaders on digital transformation.	Improve leadership capacity to support Digital Transformation	Strategic leaders championing ICT across the MCDAs and Counties	2022-2030	700M	ICTA -MIIYA -National Treasury -Development Partners.
Develop an e-learning portal with content from academia and leading technology partner to ensure continuous learning for ICT Technical workforce training and certification	Create an environment for self-directed learning mechanism to promote continuous staff development and certification processes	Promote continuous staff development and increase in skills development and certification processes	2022-2030	500M	ICTA -MIIYA -National Treasury -Development Partners.
Develop a centralized portal to digital skills inventory and track public servants digital skills training	To provide a coherent system to track public sector skills availability to streamline skills development	Improve Kenya's global Human capital index on skills development	2022-2030	100M	ICTA -MIIYA -National Treasury -Development Partners.
Establish an ICT Smart Academy at KONZA	Coordinate public servants, stakeholders and professional skills development in Kenya	Provided a digital skill and professional development coordination point strengthen and structure ICT skills and professional development in Kenya	2022-2030	3B	ICTA/ KOTDA -MIIYA -National Treasury -Development Partners.

A1.4 Digital Innovation, Entrepreneurship and Digital Business Budget

Key Project Names	Objectives	Impact/ Benefits	Time-frame	Budget (Kshs)	Responsibil-ity
Establish 10 Regional ICT & Innovation Centre of Excellence	To develop innovators in the area entrepreneurship, Intellectual property, product development, market entry and emerging technologies. To develop innovative ICT solutions which will address the needs for the Kenyan government and public. To showcase and sensitize on viable Kenyan innovations	Increased number of digital innovators and digital products/ services Increase in number of Start-ups	2022 - 2026	900M	ICTA, MOICTYA, Innovation hubs, Development partners, Private sector
Formation of a special purpose vehicle for government ICT innovations commercialization.	To commercialize and scale innovation	Increase in number of sustainable Start-ups Increased revenues/ income Increased employment opportunities	2026 - 2030	800M	ICTA, MOICTYA, National Treasury, Private sector
Collaboration and Dissemination of applied research	To support innovators and start-ups with research outputs to assist in commercialisation	Increase in number of sustainable Start-ups Increased number of digital products/services	2025 - 2028	100M	ICTA, Research institutions, Development partners -MIIYA -National Treasury -Development Partners.
Start-up development, support and advisory services	To provide a supportive legal, regulatory and policy environment for Start-up development in Kenya	Increase of start-ups Increase of consumption of local innovations by government Increase in number of innovation hubs Increase in number of sustainable Start-ups	2022 - 2026	500M	ICTA, MoICTYA, Parliament, The National Treasury, KRA/ KOTDA

Annual International Innovation Expo to showcase and sensitize on viable Kenyan innovations.	To showcase and sensitize on viable Kenyan innovations.	Increase the National competitive edge Globally.	2023 - 2030	1 B	ICTA, MOICTYA, Private sector, Development partners, KRA, Ministry of trade

A1.5 Policy, Legal & Regulatory Framework

Key Project Names	Objectives	Impact/ Benefits	Timeframe	Budget (Kshs)	Responsibility
Review the IP law to include software as an intellectual property	Review all laws that relate to ICT and establish gaps	Harmonized and enabling ICT policy, legal and regulatory framework	2022-2030	6.836B	ICTA, -MIIYA -National Treasury -Development Partners.
Develop the draft ICT Bill into an Act	Revise existing laws and create new ones to address gaps				ICTA, -MIIYA -National Treasury -Development Partners.
Develop Policy and guidelines for integrated infrastructure development.	Integrated infrastructure policy Enactment of Integrated Infrastructure law Enactment of Critical Infrastructure Protection Law				ICTA, -MIIYA -National Treasury -Development Partners.
Policy and Legislations to enable adequate funding for implementation of government ICT flagship Programmes	Updated National ICT policy enactment of Tax Levy for ICT services and products				ICTA, -MIIYA -National Treasury -Development Partners.
Policy and Laws for Smart Technologies	Plan for Smart Technology Policy for Adoption of Smart Technologies Adopted Smart Technologies by government.				ICTA, -MIIYA -National Treasury -Development Partners.

Policy and legislations for e-government	Updated National ICT Policy Enactment and Enforcement of E-government Legislations				ICTA, -MIIYA -National Treasury -Development Partners.
Implement the open data policy	Review the policy frameworks to support the development and use of digital services				ICTA, MoICTYA,

A1.6 Research & Development

Key Project Name	Project Objectives	Project Impacts/ Benefits	Timeframe	Budget (Kshs)	Responsibility
Create and implement a framework for government ICT R&D	Develop and implement a streamlined approach/ methodology on ICT R&D in government	A streamlined methodological/ approach on R&D in government	2022-2030	0.05B	ICTA, -MIIYA -National Treasury -Development Partners.
Create a government ICT R&D centre of excellence				2.1B	
Form partnerships with research institutions to carry out R&D and solve government problems	Solve government digital challenges using local government resources or local innovative solutions	Increased capacity for government to develop and produce digital products and services	2022-2030	0.03B	ICTA, -MIIYA -National Treasury -Development Partners.

A1.7 Data Protection and Cyber Management

Key Project Name	Project Objectives	Project Impacts/ Benefits	Time-frame	Budget (Kshs)	Responsibility
Review, and development of cybersecurity legal and policy frameworks i.e., eTransaction Act, NPKI	■ Enhance the country's cyber policy to address current and emerging threats. ■ Enhance the capacity and capability of information security enforcement		2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.
Develop and implement fair and Safe internet Usage policy for school net to support Digital Learning			2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.
Development, adoption and operationalization of the National Cybersecurity Maturity Model.	■ Improve MCDA's Information Security & Cybersecurity Management and Business Operation (Government, CNII and Business) ■ Provide and ensure a resilient and secure Digital Infrastructure and Services Platform to facilitate the achievement of a digitally enabled economy ■ Strengthen and Build Capability to effectively deter, detect, and respond to Incident Management and counter the threat from the cyber activities targeted to government systems	An enhanced and structured information security and cybersecurity governance and management in MCDAs	2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.
Development and operationalizing of Security Incident Response Plans for MCDAs.			2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.
Design, development and operationalization of Zero Trust framework across Government digital platforms.			2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.
Design, development and implementation of a cyber-protection system for critical government infrastructure to provide visibility on infrastructure and digital assets (GCCN, NOFBI, Data centres, Cloud Gov-Applications, E-mail Systems and Websites)			2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.
Design and implementation of threat detection and prevention mechanisms across government digital assets			2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.

Key Project Name	Project Objectives	Project Impacts/ Benefits	Time-frame	Budget (Kshs)	Responsibility
Establishment and implementation of a multi stakeholder Autonomous Security operation centre (Gov-Soc) leveraging big data analytics, Artificial Intelligence, machine learning and threat intelligence	"	"	2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.
Establish and operationalize a cyber-security centre of excellence (Cyber Excellence Centre)	■ Enhance the National Cyber Security Capacity and Capability Building through a robust cyber talent pipeline and an Informed government workforce on information security ■ Raise the general level of cybersecurity Awareness in Kenya for individual users, communities, enterprises, and organisations ■ Increase public and investor confidence in the government delivering secure digital services	Enhanced capacity on information security and cyber management in government	2022-2030	5B	ICTA -MIIYA -National Treasury -Development Partners.
Development and rollout nationwide Security Education Training and Awareness			2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.
Development and implementation of cyber security curriculum for early learning			2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.
Build collaboration with international CIRTs and threat intelligence research hubs	■ Enhance international cyber cooperation on matters cybersecurity regionally and globally with our international partners ■ Demonstrate governments' commitment in promoting secure, stable and peaceful cyberspace to uphold international cybersecurity norms	Strengthened national posture on information security and cybersecurity collaboration	2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.
Develop and sign bilateral and multilateral inter institutional agreements on sharing and disseminating information on information security			2022-2030	2B	ICTA -MIIYA -National Treasury -Development Partners.

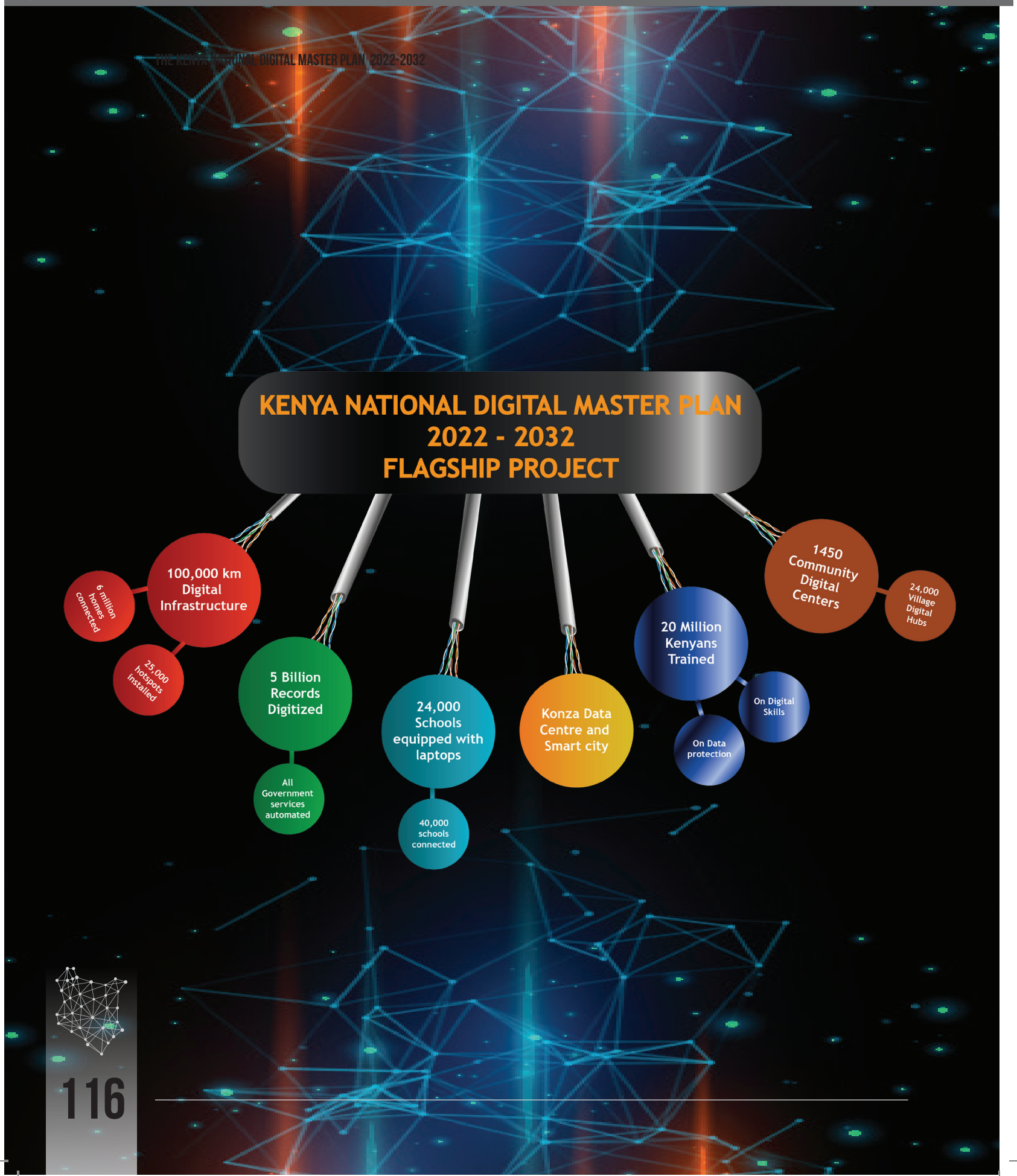
Key Project Name	Project Objectives	Project Impacts/ Benefits	Time-frame	Budget (Kshs)	Responsibility
National Public Key Infrastructure – on board 270 MCDAs	To provide online digital identity to support e commerce and digital economy	To provide online digital identity	2022 - 2032	1.6 B	ICTA CA -MIIYA -National Treasury -Development Partners.
Government International Gateways cybersecurity controls. (Information security and cybersecurity controls on International Gateways)	Structure and enhance information security and cybersecurity controls on International Gateways, Landing ports and Internet Traffic Burst-	Enhanced cybersecurity controls on International Gateways	2022 - 2032	2 B	ICTA CA -MIIYA -National Treasury -Development Partners.

A1.8 Emerging Technologies

Key Project Name	Project Objectives	Project Impacts/ Benefits	Time-frame	Budget (Kshs)	Responsibility
Deployment of AI-Driven voice, image and text projects driving access of government services (communications) – DIY Government	Access to government services by all	One-Kenya Inclusivity of all citizens in accessing govt	2022 - 2026	1B	ICTA -MIIYA -National Treasury -Development Partners.
Deployment of an IoT framework and infrastructure for the tracking of government assets	Foundations of an IoT digital industry	Savings within government Easier asset tracking	2022 - 2028	2B	ICTA, KENAO, MCDAs -MIIYA -National Treasury -Development Partners.
Creation of a digital assets framework to support government registries as the basis for distributed ledgers to support access to credit and financial facilities	Foundations of a blockchain industry	Accuracy of registries Reliability of data	2022 - 2030	2B	ICTA -MIIYA -National Treasury -Development Partners.
Establish the foundations for a "Data Centric" government, Through a National Big Data Repository, Deploy and implement a big data framework for collaborative data sharing between government and the private sector	Establish national data as a national resource	Evidence based interventions Basis of many other emerging technologies	2022 - 2030	1B	ICTA -MIIYA -National Treasury -Development Partners.

Key Project Name	Project Objectives	Project Impacts/ Benefits	Time-frame	Budget (Kshs)	Responsibility
Emerging technologies virtual government zones; Drive open government through the provision of secure APIs to home grown Kenyan Independent Software Vendors to create business productivity applications	Spur innovation Open up new business models through co-creation	Extended network of availability of government services	2022 - 2030	1B	ICTA, -MIIYA -National Treasury -Development Partners. MCDAs
Research fund / Research loan scheme; Establishment of an Emerging technologies research fund	Financing of Research Knowledge repository	Incremental innovation	2022 - 2030	3B	ICTA, -MIIYA -National Treasury -Development Partners. Academia
Drive a 24-Hr government through the establishment of a government sharing economy [On-demand services]	Government Sharing economy Actionable whole-of govt approach	New e-Gov models Savings within govt	2023 - 2030	2B	ICTA, -MIIYA -National Treasury -Development Partners. MCDAs
Develop curriculums and deliver courses around emerging technologies within Academic institutions	Establishment of a Knowledge Economy Supply of creative future talent	New courses Revenue Job creation	2022 - 2025	400M	ICTA, -MIIYA -National Treasury -Development Partners. Academia
Increased international partnerships with leading R&D Actors in emerging technology space	Knowledge Transfer	Foreign Direct Investment	2023 - 2030	200M	ICTA -MIIYA -National Treasury -Development Partners.
Have critical and substantive involvement in discourses, working groups and trainings and the creation of local action groups around emerging technologies	Thought leadership New industry leadership	Foreign Direct Investment	2022 - 2030	200M	ICTA -MIIYA -National Treasury -Development Partners.
Host a global conference on emerging technology applications in Africa	Africa Leadership	FDI, knowledge tourism	2023 - 2030	500M	ICTA, -Min. of Tourism -MIIYA -National Treasury -Development Partners.

Key Project Name	Project Objectives	Project Impacts/ Benefits	Time-frame	Budget (Kshs)	Responsibility
Develop a government and private sector Emerging technologies sandbox	Technology Incubation Research and Development	Large local emerging tech companies Exports	2022 - 2030	500M	ICTA, -MIIYA -National Treasury -Development Partners. Academia
Create channels of govt service delivery in the private sector	Co-creation and Innovation New Industries (eGov)	Increased access to govt services	2022 - 2030	500M	ICTA, -MIIYA -National Treasury -Development Partners. MCDAs
Expand the trust-based and future oriented infrastructure (Development of Inclusive systems)	Open and reliable future oriented systems Inclusive systems	Easier integration to/of emerging technologies	2022 - 2030	500 M	ICTA, -MIIYA -National Treasury -Development Partners. MCDAs
Develop Technology exchange partnerships and royalty programs with partner governments	Technology Exports	Economic Growth	2025 - 2030	300M	ICTA, -MIIYA -National Treasury -Development Partners. Min. of Foreign Affairs
Kenya as a case study for deployment of emerging technologies for government service delivery	Technology Cultural Heritage Technology Destination	Technology leadership	2025 - 2030	50M	ICTA -MIIYA -National Treasury -Development Partners.
Housing an international organ or organization around eGovernment application	Technology Destination	Jobs Economic growth	2023 - 2026	50M	ICTA -MIIYA -National Treasury -Development Partners.


KENYA NATIONAL DIGITAL MASTER PLAN
2022 - 2032
FLAGSHIP PROJECT
100,000 km Digital Infrastructure
6 million homes connected
25,000 hotspots installed
5 Billion Records Digitized
All Government services automated
24,000 Schools equipped with laptops
40,000 schools connected
Konza Data Centre and Smart city
20 Million Kenyans Trained
On Digital Skills
On Data protection
1450 Community Digital Centers
24,000 Village Digital Hubs

ANNEX 2: FLAGSHIP PROJECTS

A	Digital Infrastructure		
	Flagship Projects	**Sub - Projects**	**Output/ Applications**
A1	Construct 100,000 kms of national fibre optic connectivity network. (52,000Km for Government Networks – Education institutions, health institutions, Metro, Government offices, counties and wards- and 48,000Km for private networks- homes, business and rural centres).	Construction of 52,000Km for Government Networks Construction of 48,000Km for private networks- homes, business and rural centres).	■ Provision of connectivity to Education institutions, health institutions, Metro, Government offices, counties and wards. ■ 25,000 Hotspots in public installation in rural areas and other public spaces. ■ Establishment of 24,000 village digital hubs and studios ■ Development of Government and private Cloud services.
A2	Konza Technopolis.	Finalize construction and operationalization of Konza Technopolis.	Fully operational Konza Technopolis: **Establishment and operationalization of Konza National Data Centre and Smart City Facilities.**
A3	Establishment of Regional ICT hub	Development and operationalization of the Regional ICT hub.	Operational Regional ICT hub.

B	Digital Services, Products and Data Management		
	Flagship Projects	**Sub - Projects**	**Output/ Applications**
B1	Digitization 5 billion government records.	Digitized 5 billion of records in all MCDAs.	All government critical services digitized.
B2	Integration and interoperability of Government services.	■ Integration and interoperability Framework and standards for Shared Government Platform (SGP) ■ Implement Integration and Interoperability platforms. ■ To develop and implement a Government business continuity plan	■ Government services integrated.
B3	Coordinate/ review, automation of critical Government services (health Management System Integrated , education, immigration, land Management System, birth and deaths, judiciary, parliamentary, tax, Agriculture, Security, Election, Transport, Registration of persons, company registration system).	■ Review all government critical services. ■ Identify and automate all government critical services.	■ Critical Government services automated at (health Management System Integrated , education, immigration, land Management System, birth and deaths, judiciary, parliamentary, tax, Agriculture, Security, Election, Transport, Registration of persons, company registration system).

B4	Develop Government security intelligence and surveillance systems.	Develop and operationalize the intelligence and surveillance system.	Intelligence and surveillance system.
B5	Digitize 25 billion government records (500 Million per county records)	Digitize 25 billion government records.	25 Billion Government records (500 Million per county digitized).

C	Digital Skills		
	Flagship Projects	**Sub - Projects**	**Output/ Applications**
C1	Build capacity on digital Literacy for 20 million Kenyans, including Special Interest Groups on digital skills.	Training, awareness and sensitization to the public.	**Digital** Literacy capacity for 20 million Kenyans, including Special Interest Groups on digital skills
C2	Digital Literacy Programme. (Laptops for upper Primary, cloud infrastructure for learning materials, teacher capacity building, schoolnet, digital learning materials, learner assessments materials, and NEMIS).	Provision of Laptops for upper Primary, cloud infrastructure for learning materials, teacher capacity building, schoolnet, digital learning materials, learner assessments materials, and NEMIS.	■ Laptops provided primary schools. ■ cloud infrastructure for learning materials ■ teacher capacity building ■ schoolnet ■ digital learning materials ■ learner assessments materials ■ NEMIS.
C3	Establishment of 10 Regional ICT & Innovation Centres of Excellence.	Establish and operationalize 10 Regional ICT & Innovation Centres of Excellence.	■ Complete and operational10 Regional ICT & Innovation Centres
C4	Establishment of 1450 Community Digital Multipurpose Centres, one in every ward. **(**The centres will undertake Research and Development, Innovations, digital devices refurbishment, cyber security training, repair and maintenance, recycling, e-waste management, practical training and provision of other ICT services)	Build 1450 Community Digital Multipurpose Centres, one in every ward.	■ Established and operationalized Community Digital Multipurpose Centres, one in every ward Nationally.

D	Digital Innovation, Entrepreneurship and Digital Business		
	Flagship Projects	**Sub - Projects**	**Output/ Applications**
D1	**Establish 10 Regional ICT & Innovation Centre of Excellence** – to upskill innovators in the areas of entrepreneurship, intellectual property, product development, market entry and emerging technologies, promote innovation investment in the county.	Establish and operationalize 10 Regional ICT & Innovation Centre of Excellence	10 Regional ICT & Innovation Centre of Excellence established and operational.
D2	National Physical addressing system.	Implement the National Physical addressing system	National Physical addressing system implemented.
D3	Establish a software industry.	Establish a software industry.	Software industry.

E	Research and Development		
	Flagship Projects	**Sub - Projects**	**Output/ Applications**
E1	Establish ICT research hub.	Establish and operationalize ICT research hub. Kenya White Box Project	ICT research hub.

F	Information Security and Cyber Management		
	Flagship Projects	**Sub - Projects**	**Output/ Applications**
F1	Establish and operationalize a cyber-security centre of excellence **(Regional Cyber Security Excellence Centre)**	Establish and operationalize a cyber-security centre of excellence.	cyber-security centre of excellence (Cyber Excellence Centre)

ANNEX 3: KEY PRIORITY PROJECTS

A3.1 Digital Infrastructure

Outcomes	Objectives	Strategies	Priority Projects
Outcome 1: Increased and enhanced broadband connectivity across the country.	(a). To connect underserved and unserved population (b). To reduce on digital divide (c). To build sustainable capacity to support infrastructure (d). To enhance business continuity services. (e). To enhance equity and fairness through reaching all disadvantage groups	■ Develop and implement a digital integrated infrastructure plan which incorporates all designs, deployment and management for all networks. ■ Develop digital infrastructure standards and guidelines. ■ Develop, implement connectivity management framework, shared infrastructure policies, guidelines, standards and structures ■ Develop a training plan for all ICT experts required to support ICT infrastructure. ■ Develop and implement business continuity strategy. ■ Develop broadband plans for disadvantaged groups ■ Develop and implement plans for village digital hubs ■ Development of technical support centres across the country	1. Rehabilitation of 2500KM of damaged/old fibre network. 2. Rollout latest technology for mobile network infrastructure across the country. 3. Regional integration Connectivity network [inter-states] 4. Regional Smart Digital Hub 5. ICT Infrastructure for disadvantage groups 6. Establishment of regional submarine maintenance depot 7. Establishment of additional landing site for submarine cables
Outcome 2: Availability of secure, high quality and affordable digital infrastructure	(a). To enhance the availability of ICT services	■ Develop a business continuity plan including a comprehensive power management plan. ■ Develop personnel to provide adequate technical support. ■ Develop and implement cyber security plan ■ Promote infrastructure integration through establishment of critical infrastructure policy.	8) Establishment of Network Operation Centres (NOC) in all the 47 counties 9) Establishment of a repository portal for all critical infrastructure for the country. 10) Establishment of cyber security management system 11) Upgrade key connectivity equipment to a minimum of 100Gb/s 12) Reengineer 2 satellites hubs 13) Establish green energy power plan

	(b). Provide affordable digital Infrastructure.	■ Develop appropriate policies to support affordable digital infrastructure.	14) Portal for all government common services. 15) Policies/ regulations for affordable digital infrastructure. 16) E-Health Systems programme
Efficient, effective, affordable and secure data centre and Smart City services.	a) Provide a Centralized Government and private data services for Efficient, effective and secure data centre and Smart City services	■ Develop policies and standards to support utilization of the data centre and Smart City facilities. ■ Develop and implement a marketing plan of the data centre and Smart City facilities. ■ Develop the operational framework of the data centre and Smart City facilitie	17) Metro-city smart programme.

A3.2 Digital Government Services, Products and Data Management

Outcomes	Objectives	Strategies	Key Projects/ programmes
Outcome 1: Effective and efficient delivery of e-Government services.	a) To enhance service delivery to the Public through ICT.	■ Develop digital service plan ■ Develop plan for Automation of all government critical services. ■ Strategy to ensure all government common services are on online platforms. ■ Government paperless office strategy ■ Develop Government digitization strategy ■ Realign and evolve data centre practices in line with data protection act. ■ Develop strategy to enhance security intelligence and surveillance of the country ■ Develop and implement a unique identifier. ■ Review Building Code for ICT services ■ Develop of National Spatial Data Infrastructure policy and implementation of initiative	1) Government unified communication System 2) Government online portal System. 3) National Data Center 4) Smart ID card. 5) National Building Code 6) National Spatial Data Infrastructure programme

	c) Enhanced Government systems integration, interoperability and availability	■ Strategy to review the existing Government Systems. ■ Develop a central repository plan of all existing automated Government systems ■ Develop business continuity and disaster recovery plan for the country	7) Government business continuity Infrastructure
Outcome 2: Effective and efficient delivery of e-Government services by County Governments.	To enhance county service delivery to the public	■ Develop county automation strategy. ■ Formulation of county e-waste policy.	8) County E-waste guidelines 9) County capacity building programme
Outcome 3: Development of ICT Products and Services	To enhance development of ICT products and services	■ Develop ICT Product development strategy ■ Develop policies and legislations for IP protection for ICT products and services	10) Programme for ICT Product development

A3.3 Digital Skills pillar

Outcomes/Impact	Objectives	Strategies	Key Projects
Outcome 1: Digitally enabled Kenya Society.	(a).To increase by 50% digital literacy of citizens from current level. (b). To train adequate workforce to manage ICT services nationally and regionally (c). To enhance Digital skills inclusion for Special Interest Groups: Senior citizens, and Women in SMEs, PWD & Youth Groups & other disadvantaged Communities (d).To increase Digitally Enabled job opportunities for youth. (e). To create awareness on data protection framework (f). To integrate technology from early learning	a) Develop and implement strategy for capacity building for citizen b) Develop and implement digital training programme for each category of learners c) Partnership and engagement with Government and non Governmental organizations on capacity building. d) Utilization of technology in teaching and learning.	1) Establishment of an open online training portal with features including Multilingual e-learning facilities. 2) Establishment of A centralise web-based ICT skills inventory database system to track skills information on demand and supply for ICT Professionals and citizens. 3) Expansion of the AJIRA, PDTP and CIHs programmes to assure sustainable job opportunities.

Outcome 3: Adequate and competent public sector ICT workforce.	(a).To develop an adequate and competent ICT workforce. (b). To enhance governance and professionalism of the ICT workforce in Government.	a) Develop and deploy programmes targeted for ICT staff working for government b) Develop a database and register all ICT officers for public sector c) Develop career guide for ICT staff in public service	4) Capacity building Programme for public service ICT staff (target -10,000 officers in Public Service in High-End Specialized ICT areas.) 5) Capacity building of 20,000 ICT professionals for the sector. 6) Digital literacy Capacity building for 300,000 civil servants 7) Establish a Smart Academy for ICT professionals. 8) Training of 250,000 county staff on digital skills. 9) Sensitization 200 top leaders on digital transformation.

A3.4 Digital Innovation, Entrepreneurship and Digital Business pillar

Outcomes	Objectives	Strategies	Key Projects
Outcome 1: Enhanced government innovation value chain that turns ideas into sustainable businesses.	a) Create and promote a digital innovation and entrepreneurship culture in government	■ Enhance strategic partnership and collaborations to train on key strategic competencies to stimulate innovative thinking and improve performance for the growth of the digital economy ■ Collaborate with local and international research institutions, innovation hubs and organizations to develop innovative ICT solutions which will address the needs for the Kenyan government and public ■ Formation of a special purpose vehicle for government ICT innovations commercialization. ■ Promote the establishment of e-market places	1) National Agriculture commodity exchange. 2) Establish and operationalise the startup Fund for innovators

	b) Accelerate commercialization of government innovations for deployment in local, regional and global markets	■ Establish strategic partnership & collaboration between private sector and government to commercialise and scale innovations created in government ■ Collaboration between national and local government in development of innovation support infrastructure to provide innovators with support services required	3) Annual International Innovation Expo to showcase and sensitize on viable Kenyan innovations.
Outcome 2: A globally attractive ecosystem that provides adequate support to start-ups	a) A supportive legal, regulatory and policy environment for Start-up's development in Kenya	■ Improve legal frameworks that support and promote investments in innovation and enterprise development. ■ Develop an e-commerce strategy. ■ Establishment of start-up development, support and advisory services ■ Development of a program to improve government procurement of innovation. ■ Development of preferential business growth measures, acceleration hubs and sandboxes.	4) Development of supportive innovation and entrepreneurship policies, legal and regulatory environment. 5) Establish intergrated constituency-based digital marketplaces in 290 Constituencies.
Outcome 3: Increase in Government revenue through provision of ICT services and products.	To increase the quality and number of ICT services and products by Kenya firms.	■ Establish a framework for software testing and certification. ■ Develop software strategy for government use and export ■ Develop strategy for manufacturing & assembling strategy	6) Establishment of a testing and certification scheme for software, hardware, and ICT professionals. 7) Establish a robust software industry.

		■ Identify personnel and institutions for software development. ■ Develop software commercialization strategy. ■ Develop standards and guidelines for software development and deployment. ■ Review/Develop guidelines and standards to protect technopreneurs, innovators and customers products	8) Annual International Innovation and ICT Expo to showcase and sensitize on viable Kenyan innovations. 9) Establishment of two software industries with 1000 trained software engineers 10) Establishment of two manufacturing plants

A3.5 Legal and Regulatory framework

Outcomes	Objectives	Strategies	Key Projects
Enabling ICT policy, legal and regulatory framework	a) Review policy and laws that relate to ICT and establish gaps b) Revise existing laws and create new ones to address gaps c) Legislations to enable resource mobilization to fund master plan flagship programmes	■ Review/create acts and legislation for implementing agencies. ■ Move software intellectual property issue from the Copyright Act to the IP Act ■ Amend the public procurement law to allow the government to competitively procure innovative solutions from the local market ■ Develop an open data policy ■ Enhance strategic data and knowledge management guidelines ■ Harness existing public and private data sets for social-economic development ■ Develop policy and legislations for resource mobilization for masterplan programmes	1) Review the IP law to include software and other ICT products as an intellectual property. 2)Enact policy to finance ICT and Innovation initiatives. 3) Enactment of ICTA Law. 4)Legislation to introduce levy tax on ICT products and 5) services to fund the master plan. 6)Enactment of KOTDA law 7)Policy to consolidate government ICT budget into one vote to enhance management of the fund of the masterplan. 8)Develop Policy and guidelines for integrated infrastructure development. 9)Implement the open data policy

		■ Policy and law for National physical addressing system ■ Policy and law for National Spatial Data Infrastructure ■ Review policy and legislations for building code	10) Enactment E-government legislation 11) Policy and legislation for National Physical Addressing Systems 12) Policy and Legislations for Critical infrastructure Protection Law 13) Policy and Legislation for Building Codes 14) Policy and Legislation for National Spatial Data Infrastructure.

A3.6 Research and Development

Outcomes	Objectives	Strategies	Key Projects
Outcome 1: Streamlined approach on ICT R&D in government	a) A streamlined approach on ICT R&D in government	■ Create a framework for ICT R&D in government ■ Support ICT R&D in government ■ Develop National ICT knowledge management framework. ■ Collaborate locally with academia and industry in solving, government digital challenges through R&D	1) Establish ICT research hub.

A3.7 Data Protection and Cyber Management

Outcomes	Objectives	Strategies	Key Projects
Outcome 1: Enhanced information security and cybersecurity legislative framework.	■ Enhance the country's cyber policy to address current and emerging threats. ■ Enhance the capacity and capability of information security enforcement.	■ Review the legal, policy gaps, and regulations on ICT systems and infrastructure.	1) Formulation of legislation to protect ICT Infrastructure. 2) Review cybersecurity legal and policy framework.

Outcome 2: Enhanced Governance and cybersecurity management in MCDAs.	■ Improve MCDA's Information Security & Cybersecurity Management and Business Operation (Government, CNII and Business). ■ Provide and ensure a resilient and secure Digital Infrastructure and Services Platform to facilitate the achievement of a digitally enabled economy. ■ Strengthen and Build Capability to effectively deter, detect, and respond to Incident Management and counter the threat from the cyber activities targeted to government systems.	■ Conduct Information Security/cyber security maturity assessments in all MCDAs – (Critical Services). ■ Developing and operationalizing National Security Incident Response Framework. ■ Adapt and Implement "Zero Trust" Strategy across all government digital platforms. ■ Establishing and operationalizing the Government CIRT. ■ Develop plan for disposal of government ICT systems and equipment.	3) National cyber-protection system. 4) Establishment of Cyber Security Operation Centre (Gov-Soc).
Outcome 3: Enhanced capacity on information security and cyber management in government.	■ Enhance the National Cyber Security Capacity and Capability Build ing. ■ Raise the general level of cybersecurity Awareness in Kenya for individual users, communities, enterprises, and organisations. ■ Increase public and investor confidence in the government delivering secure digital services.	■ Establish a cyber-security resource centre. ■ Roll out a robust cybersecurity capacity building program ■ Conduct Government wide Cyber security drills. ■ Incorporate cyber security training in early learning curriculum through institute of curriculum development. ■ Conduct a cyber security awareness monitoring.	5) Establish and operationalize a cyber-security centre of excellence (Cyber Excellence Centre). 6) Training for key officers from MDAs on data protection and Cyber Security best practices.

A3.8 Emerging Technologies

Outcomes	Objectives	Strategies	Key Projects
Outcome 1: Kenya as a leader in emerging technology adoption, localization, and utilization for development	a) Create an enabling environment for the absorption and implementation of emerging technologies.	■ Develop and expand e-Government services using emerging technologies ■ Develop strategy for adoption of smart technologies	1) Incorporate AI-Driven in deployment of government services. 2) Deployment of IoT, blockchain systems and infrastructure for the tracking of assets, transactions and legal documents. 3) Creation of a digital assets framework to support government registries as the basis for distributed ledgers to support access to credit and financial facilities

Outcomes	Objectives	Strategies	Key Projects
			4) Develop a framework for big data sharing for the public. 5) Establish a government framework for adoption and utilization of smart technologies (AI, IoT, Blockchain, crypto currency) 6) Enactment of laws for smart technologies.
		■ Drive government services through collaborative mechanisms	7) Provision of secure APIs to home-grown Kenyan independent software developers and vendors to create business productivity applications for emerging technologies. 8) Establishment of an R & D fund dedicated to emerging technologies, ICT research. 9) Establish automated 24hr On-Demand Government services.
	b) Lead in emerging technology discourses and discussions globally	■ Promote R&D and centres of excellence within academic institutions	10) Develop curriculums and deliver courses around emerging technologies within academic institutions and ICT centers of Excellence. 11) Increased international partnerships with leading R&D actors in the emerging technology space
		■ Develop digital talent on emerging technologies.	12) Establish formal discourses, working groups and courses on emerging technologies 13) Host an Annual global conference on emerging technology applications.
Outcome 2: New solutions and industries created with the adoption, localization, and utilization of emerging technologies	a) Localize, co-create, partner, and build upon emerging tech producers	■ Creating new e-Government ecosystem that co-exists with industry and academia	14) Develop a government, academia and private sector Emerging technologies sandbox.
	b) Harness the knowledge and export emerging technology products	■ Promote regional and continental e-Govt cooperation	15) Develop technology exchange partnerships and royalty programs with partner governments
		■ Globalizing our best e-Government knowledge base and practices (eCitizen, Huduma Centres)	16) Commercialize the best in class e-Government systems.

ANNEX 4: DETAILED ICT INDICATORS

A	**Policy, Legal and Regulatory Framework**
A1	No. of ICT policies, laws and regulations formulated or reviewed.
B	**Digital Infrastructure**
B1	Number of kilometers of fiber connectivity to Government and private networks.
B2	100% availability of broadband connectivity across the country.
B3	99% reliability of broadband connectivity
B4	100% connectivity of all schools and other education institutions
B5	50% reduced cost in internet connectivity
B6	90 % internet accessibility and utilization by the public
B7	50% increase in SMEs.
B8	50% of 12.5 Million homes connected to the internet.
B9	100% availability of broadband connectivity across the country.
B10	99% reliability of broadband connectivity
B11	100% connectivity of all schools and other education institutions
C	**Digital Government Services, Products and Data Management**
C1	99.99% availability of e-government services.
C2	80% of Government records Digitized
C3	80% of government critical services automated
D	**Digital Skills**
D1	20 million citizens each accessing and using at least 5 e-Government services
D2	20 million citizens trained.
D3	10,000 local high-end ICT professionals trained by 2030
D4	300,000 trained civil servants trained on digital services by 2030
D5	350,000 teachers trained on digital services by 2030
D6	2,000,000 short- and long-term employment opportunities for youths in ICT (Digitisation, Refurbishment and Innovation) realised.
D7	250,000 county staff trained on digital skills.
D8	Establishment of 1450 ICT Training Centres in every ward.
D9	20 million citizens each accessing and using at least 5 e-Government services
E	**Digital Innovation, Entrepreneurship and Digital Business**
E1	No. of constituency-based digital marketplaces in 290 Constituencies.
E2	Establish 10 Regional ICT & Innovation Centre of Excellence
E3	Establishment of a testing and certification scheme for software, hardware, and ICT professionals.
E4	No. of constituency-based digital marketplaces in 290 Constituencies.
E5	Establish 10 Regional ICT & Innovation Centre of Excellence
F	**Research and Development**
F1	No. of ICT research & Development conducted.
F2	No. of ICT innovations adopted.
G	**Policy, Legal and Regulatory Framework**

G1	Critical Information Infrastructure (CII) Bill
G2	300 MCDAs that have adopted the National Cybersecurity Maturity Model.
G3	cyber-security centre of excellence (Cyber Excellence Centre)
G4	300 Security Incident Response Plans for MCDAs
G5	Critical Information Infrastructure (CII) Bill
G6	300 MCDAs that have adopted the National Cybersecurity Maturity Model.
H	**Emerging Technologies**
H1	4 AI, IoT, Big data and blockchain projects implemented.
H2	5 Automated On-Demand 24hr Government services.
H3	4 curriculums on emerging technologies in academic institutions
H4	10 Institutions delivering the emerging technology courses.

A4.1 Digital Infrastructure

- No. of km of fibre laid
- No. of MDA's, Hospitals, Schools, Police etc with stable reliable connectivity
- No. of km last mile fibre laid
- No. of MDA's connected
- Percentage of establishment of a functional DRC
- Percentage of data stored in the NDCs
- Second cable and 3T of capacity
- Capacity activated
- No. of sites constructed
- No MCDAs and enterprises boarded to the Konza National Data Centre.
- No of operational smart city facilities

A4.2 Digital Government Services, Products and Data Management

- 100% digitization of government records by 2025?
- Number or new and revised legal and regulatory frameworks
- Number of digitized government services
- Number of online services accessible by citizens
- Turnaround time for service delivery
- Number of systems integrated
- Number of data sets in the central repository
- Number of people using Huduma centres per County
- Number of services fully accessed through the one-stop shop online portal
- % Of services accessible by people with disabilities (deaf, blind)
- Number of citizens and Government officers accessing e-Government services
- Number of stakeholders outside government represented in taskforce committee that will oversee implementation of the National Digital Master Plan
- Number of datasets across Government uploaded on the open-data platform
- Number of MDAs with digital master plans
- Number of MCDAs using shared digital services infrastructure and services
- Number of MCDAs providing data
- Number of systems integrated with business intelligence
- Number of private sector companies sharing data with the government (mobile operators, research labs, etc.)
- Number of government staff actively using official communication channels
- % Reduction on investments in ICT by the government
- % increase on ICT contribution to GDP

A4.3 Digital Skills

A. Outcome 1: A digitally inclusive Kenya society for improved quality of life

1. 10 million citizen each accessing and using at least 5 e-Government services
2. 20million (50% increase in digital literacy) adult citizens trained by 2030.
3. 2,000,000 local high-end ICT professionals available by 2030
4. 300,000 trained civil servants trained on digital services by 2030
5. 2,000,000 short- and long-term employment opportunities for youths in ICT (Digitisation and, Refurb and Innovation) realized
6. 300 Rural Community Digital training centres and 47 e-mobile trucks to facilitate training
7. No. of citizens accessing at least 5 e-services on various government platforms (target 10 million by 2030)
8. Percentage access to public services and improvement in utilization of infrastructure (target 90%)
9. No. of youths aged between 12-24 effectively using ICT tools for learning
10. No. of Child Online Protection trainings
11. No. of reports on citizens digital skills and requirements
12. No. of publications developed on digital skills performance
13. Centralized Multilingual eLearning portal with relevant courses and skills tracking system
14. No of youths transitioning to business and employment as a result of digital skills empowerment
15. No. of centres established yearly
16. No. of e-mobile trucks operating in regional markets and marginalized areas
17. No. of women accessing affordable devices to facilitate skills development, access to ICT jobs and business opportunities
18. No. of PWDs accessing and using digital services
19. No. of citizens sensitized on data protection.
20. No. of civil servants trained on data protection compliance.

Outcome 2: Availability of sustainable local high end ICT skills and professionals that meet the needs of Kenya's digital economy

1. No. of formal partnerships with 200 tertiary institutions in Kenya and 40 technology leaders both local and multinational
2. No of digital advanced skills curriculum for specific digital work guided by industry needs and youth preferences
3. No. of advanced training leading to certification of 2,000,000 High-end ICT skilled professionals over a period of five years in various competencies including emerging technologies (AI, Block chain, Cloud, Robotics, Security, Programming, Networking)
4. % Level and quality of online testing and certification
5. Sectoral digital skills gap report on professional's demand & supply in the country
6. No. of collaborations to train high-end ICT professionals
7. Inventory with no. of professionals with specialized skills in different areas
8. Established Digital Centre of excellence for the development of ICT high end skills
9. No. of national qualification skills and certification framework in the ICT sector
10. No of University Graduates completed internship and doing business, no of technology innovations and no employed by the sector yearly
11. No of Digital skills and work curriculum implemented in all universities and TVETs
12. No. of partnerships and collaborations on digital skills development and on specific employment opportunity areas
13. No. of digital innovations that provide work for the students and youths in the community

Outcome 3: Adequate and capable public sector workforce responsive to the needs of the citizens and businesses

1. ICTA Smart Academy in place to coordinate skills development
2. 95% of public services delivered online
3. Report on ICT sector skills on demand and supply

4. No. of civil servants trained (tactical, operational and strategic end users) on digital services (Target 300,000 over the 10 years)
5. Deployed and operationalise GOK eLearning system (with digital skills MOOC courses) for technical, end-users and citizens

A4.4 Digital Innovation, Entrepreneurship and Digital Business

Outcome 1: Enhanced government innovation value chain that turns ideas into sustainable businesses and operating models

- No. of viable innovations developed

Outcome 2: A globally attractive innovation ecosystem that provides adequate support to start-ups

- No. of partnerships established
- No. of trainings conducted
- No. of surveys on support requirements
- No. of start-ups owned by LLP
- Percentage of implementation
- Number of forums organized/attended that has resulted into business deals
- No. of start-ups scaled to have national reach
- No. of innovation hubs established

Outcome 3: An end-to-end digital enabled environment for businesses

- No. of Kenyan businesses online

A4.5 Policy, Legal & Regulatory Framework

- Number of licensees
- One government email system
- Number of SAGAS with digitized records
- Growth in access and coverage

A4.6 Research and Development

- No. of policies and frameworks developed.
- No. ICT of research innovation centres
- No. of innovators accessing innovation centres.
- No. of innovation successfully commercialized
- No. of frameworks developed.
- No. R&D of partnerships
- No. of ICT centres created

A4.7 Data Protection and Cyber Management

Outcome 1: Strong information security and cybersecurity legislative framework

- An enacted CII bill and the eTransaction Bill to law
- Number of enforcement officers trained
- A gap analysis report
- Harmonized legislation on Information Security
- Percentage of Info-security audits conducted to MCDAs
- Implemented policy and deployment of secure school net

Outcome 2: An enhanced and structured information security and cybersecurity governance and management in MCDAs

- Maturity assessments reports
- Incident reports procedures (Play books)
- Road maps to address gaps identified.
- Reduced number of successful breaches by a predefined matrix (%)
- Operational Gov SOC with defined Matrix
- Level of detection and response to cyber threats (MTTD & MTTR)

Outcome 3: Enhanced capacity on information security and cyber management in government

- A functional Cyber Excellence Centre
- Number of Security Education Training and Awareness programs conducted annually
- Number of successful cyber security drills conducted
- Developed and adopted Cyber security curriculum for early learning
- Publishing Annual Cybersecurity awareness survey reports

Outcome 4: Strengthened national posture on information security and cybersecurity collaboration

- Membership to global Cybersecurity forums
- Number of cybersecurity bilateral and multilateral agreements established
- Number of MCDAs accredited/ certified on cybersecurity best practice frameworks

A4.8 Emerging Technologies

- Number of languages structured
- Number of turnkey jobs created (Ajira)
- Number of services accessed
- Asset classification framework
- Number of valued assets tagged
- Savings from asset management
- Number of registries onboarded (lands, IEBC...)
- Digital coin deployed
- TBs of data shared
- Monetized income from data
- Establishment of secure sharing framework
- Number of services shared
- Number of projects successfully deployed
- Amount of funds disbursed
- Number of technologies supported
- Number of services onboarded
- Amount of government resources saved
- Number of courses accredited
- Number of students enrolled
- Number of partnerships established
- Number of projects deployed
- Number of citizens engaged
- Number of local action groups created
- Number of actively engaged locals
- Number of conferences held
- Agreement framework
- Number of projects
- Number of private sector players onboarded
- Develop delivery framework
- Number of services onboarded/integrated
- Trusted digital identity
- Number of integrated systems
- Number of governments partnered
- Number of systems shared
- Number of projects documented
- Number of organizations hosted
- Number of jobs generated

ANNEX 5: KEY STAKEHOLDERS CONSULTED

S/N	Name	State Departments
1.	JEROME OCHIENG, CBS	STATE DEPARTMENT OF ICT AND INNOVATION
2.	ESTHER KOIMETT	STATE DEPARTMENT OF BROADCASTING AND TELECOMMUNICATION
3.	CHARLES SUNKULI	STATE DEPARTMENT OF YOUTH AFFAIRS

S/N	Name	Title/Organisation	Role
MASTER PLAN LEAD COORDINATION TEAM			
1	Dr. Kipronoh Ronoh P.	Ag. Ceo ICT Authority	Lead Champion
2	Mr. Michael Odhiambo	Director Shared Services	Pillar-Director Service, Products and Data Mgnt
3	Mr. Thomas Odhiambo	Ag. Director P&S	Pillar-Digital Infrastructure
4	Ms Zilpher Owiti	Director -IPC	Pillar-Digital Innovation, enterprise and Businesses
5	Mr. Sylas Tomno	Ag. DD-Strategy and Planning	Lead- Secretariat and Editorial
6	Ms. Lucy Mulili	Director Adm. MOICTIYA	Policy
7	Eng. John Tonui	CEO-Konza Technopolis	Moderator
8	Ms. Immaculate Kassait	Data Commissioner	Moderator
9	Mr. Timothy Owase	CEO- KFC	Moderator
10	Mr. David Omwoyo	CEO-MEDIA Council	Moderator
11.	Mr. Christopher Wambua	Ag. Ceo KFCB	Moderator
12	Dr. Njeru James	Director - CA	Regulator
13	Lucy Mulili	MOIIYA	MOIIYA
14	Pamela Ongwae	Director Planning	MOIIYA
15	Lilian Kimeto	DD Communication	ICTA
LEAD CONSULTANT TEAM			
16.	Prof Timothy M. Waema	Senior Lecturer - University of Nairobi	Lead Consultant
17.	Dr, Migrate Nyambura	Research ICT Africa	Consultant
18	Mr. Brian Omwenga	Panoply Digital	Consultant
19	Mr. John Walubengo	Lecturer- MMU	Consultant
MASTER PLAN SECRETARIAT TEAM			
20	Anthony Lenaiyara	Infrastructure Lead - ICTA	Infrastructure Project Lead
21	Jairus Kipkorir Koech	Planning Dept - ICTA	ICT Authority
22	Alex Njihia	Infrastructure Dept -ICTA	A.g Head Infrastructure
23	Kevin Atibu	Innovation Dept - ICTA	ICTA
24	Mary Kerema	Application Dept -ICTA	ICTA

S/N	Name	State Departments	
25	Francis Mwaura	Standards Dept - ICTA	ICTA
26	Philip Irode	Information Sec Dept - ICTA	ICTA
OTHER KEY STAKEHOLDERS			
27	Prof. Victoria Wambui	VC. JKUAT	JKUAT
28	Alfred Osiko	Safaricom	Safaricom
29	Gideon Chesang	Director ICT	Baringo County
30	Arnold Ndukuyu	ISACA	ISACA
31	Mukunya Mugo	Oracle	Oracle
32	Kigen Rotich	Telkom Kenya	Telkom Kenya
33	Caroline Simba	Jamii Telkom	Jamii Telkom
34	Ken Kyeva	KEPSHA	KEPSHA
35	Salma Shaban	TESPOK	TESPOK
36	Albert Mungai	Airtel Kenya	Airtel Kenya
37	Patrice Mutua	ODPC	ODPC
38	Dr. Jane Munga	NCS	NCS
39	Margaret Nyambura Ndungu	INTEL	INTEL
40	Kennedy Murambi	ICT Manager	CRA
41	Boniface Asiligwa	ISACA	ISACA
42	Kellingto Kituku	Country Director	Microsoft
43	Fiona Nakitare	Paloalto Networks	Paloalto Networks
44	Fiona Malmqvist	Paloalto Networks	Paloalto Networks
45	David Luhombo	Isolutions Associates	Isolutions Associates
46	James Kinyua	Isolutions Associates	Isolutions Associates
47	HUANGYUM RUI	HUAWEI	HUAWEI
48	Paul Sang	HUAWEI	HUAWEI
49	Rahab Juma	ODPC	ODPC
50	Nick Wambugu	Director Government Digital Payments	E-Citizen
51	Mongo Chamwage	SDYA	SDYA
52	Pius Muchai	Ass. Director ICT	MOIIYA
53	Edwin K. Ngetich	BET	BET
54	Francis Juma	ICT Officer	Department for B & C
55	Esther Kahuro	Senior Administration Officer	MOIIYA
56	Sally Washiko	AA/PS	MOIIYA
57	Hillary Nyandwa	SPO	KoTDA
58	Anne Njenga	PA ODPC	ODPC
59	Peter Okongo	Editorial Manager	KYEB

S/N	Name	State Departments	
60	Margaret Maina	Finance	ICTA
61	Stephen Wambua	A.g KFCB	KFCB
62	David Mukara	KFCB	KFCB
63	Tony Ajode Otieno	RICTO	ICTA
64	Johnstone Wambugu	CFO	MoIIYA
65	Everlyne W. Mwangi	MoIIYA	MoIIYA
66	Joseph Kuria	Director ICT	CRA
67	Jared Ochieng	Information Arch Security Solution	Information Arch Security Solution
68	Arnold Wafula	ICTA	ICTA
69	Esther Ngang'a	AD/AOS	MoIIYA
70	Humprey Odhiambo	Concept Hub	Concept Hub

KENYA BY 2032

THE EXPECTED IMPACTS OF THE KENYA NATIONAL DIGITAL MASTERPLAN

DIGITIZATION FRAMEWORK

MINISTRY OF ICT, INNOVATION & YOUTH AFFAIRS
National Broadband Strategy

- Data Protection Legislation
- National ICT Insfrastructure Plan
- National ICT Policy

NATIONAL TREASURY PLANNING
Kenya vision 2030 Blueprint

- Africa 2063 Agenda
- Digital Eonomy Blueprint
- MTPII

MINISTRY OF EDUCATION
Digital Skills & Innovation

- Digital Literacy Programme
- CBC Plan
- National Education Sector Plan
-

Rural Revolution

NOFBI BACKBONE FIBRE OPTIC CABLE

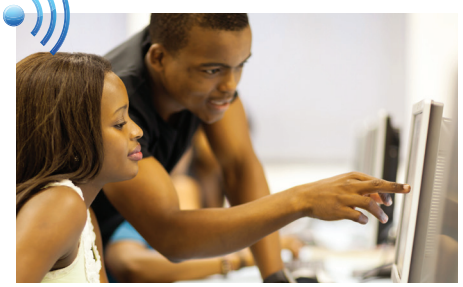
FIREWALL

COUNTY & SUB-COUNTY CONNECTIONS

Smart School & Polling Centres

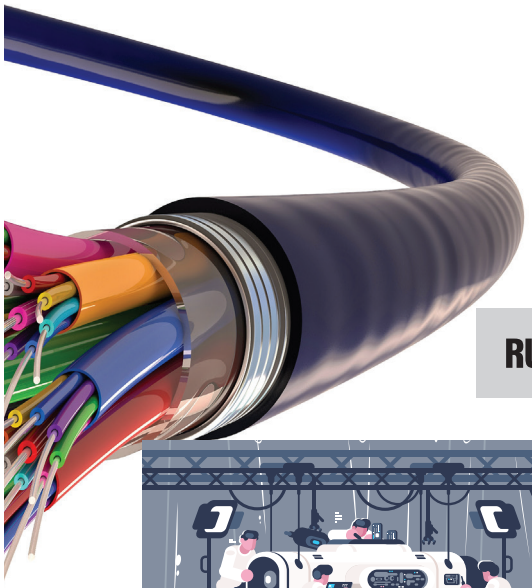
Smart Village with intergrated health care

Smart Villages



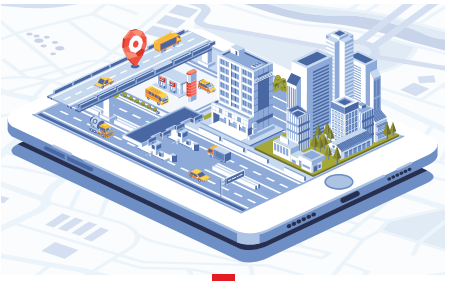
Youth Centres

Smart Farming



RURAL TRANSFORMATION

SMART TVET



Smart Business Centres

County Innovation hubs (CIH)

Smart Health Care

Community Learning Centres

Smart Government

Smart Shopping Centre

TARGETS

1. 6 Million households with internet
2. 40,000 schools connected
3. 13,000 Health Centres Connected
4. 20,000 Govt offices Connected
5. 25,000 Hotspots & 24,000 Rural business
6. 2 Software Industries
7. 10,000 trained Software Engineers
8. 100,000 Km of fibre infrasturacture
9. High speed broadband connectivity
10. Konza City - Kenya Silicon Valley
11. Paperless Government offices
12. Growth of cloud services
13. Growth of ICT services
14. Enhanced policies for ICT sector
15. 'Zero'digital divide
16. Improved teachibbg and learning
17. All government common services online
18. Citizen full participation in economic development
19. Improved government service delivery
20. Growth in SMEs
21. Enhance regional intergaration from ICT
22. Smart villages / Cities and public spaces
23. Growth of film industry and media
24. Full Protection of Data
25. Kenya Global Centre for innovation

Ministry of ICT, Innovation
and Youth Affairs

KENYA DIGITAL BLUEPRINT