INTERSESSIONAL PANEL OF THE UNITED NATIONS COMMISSION ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT (CSTD)

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Contribution of Kenya

to the CSTD 2017-18 priority theme on 'Building digital competencies to benefit from existing and emerging technologies with special focus on gender and youth dimensions'

REPORT ON UNITED NATIONS COMMISSION ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT-CSTD

THEME 2: BUILDING DIGITAL COMPETENCIES TO BENEFIT FROM EXISITING AND EMERGING TECHNOLOGIES, WITH SPECIAL FOCUS ON GENDER AND YOUTH DIMESNIONS

KENYA'S MASTER ICT PLAN

Introduction

Kenya's Information and Communication Technology Master Plan is derived from multiple stakeholder consultations; review of documents from both private and public institutions; review of Master Plans from other countries; and comparison and benchmarking various development indices with other developed and developing countries. This is in recognition of the fact that ICT has a critical role in driving the economic, social and political development of Kenya as espoused in Vision 2030; and it is a roadmap to a knowledge economy and society that will lead to real socio-economic growth. It is therefore imperative to address key challenges that may hinder the ICT sector from playing its rightful role in national development.

The ICT Master Plan is based on The ICT theme, "strengthening the foundation for a knowledge-based economy"

Identified Strategies

Issue 1: Enhanced public value

Strategy: Enhancing the delivery and access of public services for all through strategic and innovative use of ICTs and achieve exemplary governance

Issue 2: Development of ICT businesses

Strategy: Develop Kenyan ICT Business that lead the world in understanding emerging market needs

Issue 3: Strengthen ICT as a driver of industry

Strategy: Transformation of key Vision 2030 economic sectors to significantly enhance their productivity and global competitiveness and growth

STRATEGIES FOR MAIN ISSUES IN ICT

   A. SHARED SERVICES
- Develop and implement shared services standards, guidelines and policies that promote data and information sharing culture
- Develop and implement a public service cloud computing strategy

- Enhance/develop reliable shared ICT infrastructure
- Enhance or develop reliable shared ICT information infrastructure
- Manage Flagship Projects in the National ICT Master Plan
- Promote and facilitate open access and affordable broadband
- Create appropriate legal framework to facilitate sharing of data, infrastructure, services and systems

B. ICT INNOVATIONS AND ENTERPRISES
- Facilitate the use of public data by the private sector
- Create programs to support commercialization of innovations
- Promote outsourcing of government ICT services
- Promote effective partnerships for local ICT companies abroad
- Enhance capacity of local firms to undertake outsourced work
- Market the local ITES industry

C. INFORMATION SECURITY
- Develop and adopt information security standards and guidelines
- Implement the national cyber security Masterplan and strategy
- Strengthen the information security function within ICTA
- Develop a comprehensive ICT asset register including classification and document handling methodology
- Implement public key infrastructure (PKI)
- Develop a risk assessment programme
- Undertake periodic risk assessment on government information infrastructure

D. HUMAN CAPITAL
- Build and strengthen the technical, management and leadership capacity of ICTA
- Equip strategic leaders in public service with appropriate ICT leadership skills and understanding of the role of ICT
- Develop and sustain the ICT capacity of the public sector workforce to effectively exploit ICT infrastructure and systems
- Collaborate with academia and ICT industry to develop structured ICT training geared towards building high-end skills technical expertise, competencies and experience required to implement flagship ICT projects

E. ICT GOVERNANCE
- Adopt and operationalize the national ICT governance framework for the selection, implementation and evaluation of public ICT projects
- Design and operationalize a Government Enterprise Architecture
- Design and operationalize a Government ICT Project Management Office

- Develop, disseminate and enforce ICT standards for infrastructure services, systems and human capacity

NATIONAL BROADBAND STRATEGY

Issue 1. Open access:

Strategy: Broadband access and use will be available without discrimination. Multiple service providers will   be encouraged to compete on shared platforms and service

Issue 2: Technology neutrality:

Strategy: Use of common, interoperable standards and protocols will be encouraged. All local broadband networks shall have the right to nondiscriminatory and cost-based interconnection with other broadband networks.

Issue 3: Research and innovation:

Strategy: Endeavour to develop and provide sustainable services through research and innovation. Kenya will pursue continuous innovation and productivity improvements by enhancing global connectivity for research and development, and by promoting and applying world class, innovative broadband technologies, applications, content and services.

Issue 4: Equity:

Strategy: Universal access to broadband services will be promoted. High-capacity broadband connectivity shall be affordable and widely accessible. Government policy will pay close attention to barriers of price, location, culture and language. Local communities will have access to interactive, open, broadband networks with sufficient capacity to meet the increasing information on communications and entertainment needs of their residents, businesses, institutions and local governments. Particular concern will be given to impoverished, isolated and disadvantaged populations including people with disabilities and women.

Issue 5: Co-ordination and collaboration:

Strategy: Public, Private Partnerships (PPP) shall be promoted. Industry stakeholders and the national and county   governments will work together to deploy infrastructure and build awareness and capacity for use of broadband.

Issue 6: Sustainable interventions:

Strategy: Broadband policies,   regulations and other initiatives will endeavour to be transparent and flexible so as to build foundations for sustainable contestable markets including innovative technology solutions

Issue 7: Competitive choice of technologies:

Strategy: Broadband networks use several wire-based and wireless technologies with different transmission bandwidth, reliability characteristics and capabilities. It is recognized that it will not be economically feasible to deliver fibre optics to all communities in the near term. Where fibre connection is not practical, other technologies such as high capacity wireless broadband may be deployed.

Issue 8: Policy responsiveness:
Strategy: Technology, user needs and markets are highly dynamic. Therefore policy settings and programmes will be responsive and adaptive. Policies and regulations will embrace technological and competitive neutrality. Regulatory principles such as transparency and open competition will be applied to new technologies.

Issue 9. Market-based investment:

Strategy: Competitive markets in which service providers receive appropriate returns on their investments will drive the provision of broadband connectivity, applications and content. Where markets do not deliver services in a timely, affordable, efficient or equitable manner, government will intervene in the public interest. In all cases, commercially sound and sustainable investment will underpin decision-making and market operation.

Issue 10. Promotion of a national value system that catalyzes Vision 2030 and safeguards Kenya's cultural heritage:

Strategy: Efforts will be made to ensure that utilization of the broadband is towards fulfilling the requirements of the constitution in regard to human rights to communication and information and in line with Vision 2030 of Kenya becoming a globally competitive and prosperous nation with a high quality of life by 2030

STRATEGIES FOR SUB-ISSUES

Strategy for Infrastructure, Connectivity and Device

Sub-issue: Quality broadband network

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- Government sponsored PPPs to fund infrastructure development
- Use of Universal Service Fund to extend broadband network penetration
- Enhance regulatory oversight with respect to quality of service

Sub-issue: Coordination and complimentary services

- Provide a framework for synchronized planning of civil and ICT data projects
- Promote and ensure operators share common infrastructure

- Government to provide rebates/tax incentives for operators providing complimentary services (utilities) in marginalized area

Sub-issue: Accessibility and affordability

- Provide subsidies for access devices
- Promote local production of access devices
- Promote and avail online local content (e.g. e-Govt. information and services) to spur demand
- Continued expansion of power, road, security infrastructure across the country
- Review regulatory framework to optimize spectrum
- Re-farm and avail additional spectrum to enhance   last-mile solution

Sub-issue: Availability and reliability

- Establishing redundancy at the international gateways and Landing Points
- Establishing redundancy within the domestic network   (county level)
- Building data-centres of international standards
- Enhance capabilities of Local Exchange Points

Strategy for Content, Applications and Innovation

Sub-issue: Availability of local content in digital form

- Digitize existing local content
- Capture new local content
- Create public awareness on available online content

Sub-issue: Access to local digital content

- Promote development of relevant applications to serve content online
- Promote development of solutions for   universal accessibility
- Provide incentives for businesses to offer   online services
- Develop standards and guidelines for quality assurance of applications
- Fund R&D to identify viable solutions
- Create public awareness on available application

Sub-issue: Unstructured Innovation chain

- Establish certified incubators across the country
- Create a one-stop shop to support and promote innovation services to incubators
- Establish an innovation fund
- Undertake capacity building to strengthen technical skills of content and application developer

Strategy for Capacity Building and Awareness

Sub-issue: Digital Literacy

- Implement e-governments curriculum on citizen's digital literacy
- Implement Primary-school level ICT curriculum
- Review and implement secondary school, TVET and TTCs ICT curricula in line with the required skills for a knowledge-based society
- Ensure digital literacy for women is comparable

Sub-issue: Technical expertise

- Enhance quality standards for higher education curricula implementation and assessment of core technical program

Sub-issue: Awareness

- Use various media platforms to create awareness
- Deploy mandatory use of e-services on different platforms in all sectors
- Create and disseminate multilingual publicity content

Sub-issue: Coordination of and access to capacity building and awareness activities

- Strengthen coordination of capacity building initiatives
- Establish capacity building centres and strengthen existing ones

Strategy for Policy, Legal and Regulatory Environment

Sub-issue: Policy framework on broadband

- Review and align the National Information and Communications Policy guidelines to reflect issues of broadband.
- Create a National Broadband Policy.
- Leverage on regional and international frameworks for collaboration on broadband.

Sub-issue: Legal and regulatory framework on broadband

- Review and align existing legislation (Kenya information and Communication Act CAP 411A} and other relevant Acts e.g. Roads Act, Building and Construction Act) with the requirements of the new constitution and National broadband policy.
- Review and align relevant regulations with the requirements of legislation

Strategy for Financing and Investment

Sub-issue: Financing of ICT projects

- Develop innovative financial funding mechanisms (e.g. Broadband Infrastructure Bonds, Government Supported Broadband Venture Capital Fund).
- Exploit existing innovative financial mechanisms (e.g. Growth Enterprise Market from NSE)

- Operationalize the USF to avail opportunity for extending broadband coverage.
- Enhance the role of Government in promoting broadband-related investments.
- Develop linkages between the financial and   the ICT sectors.
- Develop ICT-related insurance schemes
- Devolved funds for regional projects

Sub-issue: ICT-related financial services and application

- Promote and expand the use of ICTs in Government related financial transactions
- Tighten security of financial systems through cyber related legislation and enforcement
- Promote the use of shared ICT financial applications amongst MFIs/SACCOS/SMEs
- Promote collaboration amongst service providers within the Financial Sector

CHALLENGES

Key challenges that face Kenya in its quest to provide e- Government services are:

- Low automation levels of business processes, thus threatening effective service delivery against the backdrop of increasingly high demands for efficiency in Government.
- Public data and information is stored in silos and disparate non- standard formats that are difficult to access.
- Silo provision of government services by government agencies that are not citizen centric.

The capacity challenges that Information, communication and Technology Authority (ICTA) faces include:

- ICTA does not yet have the project management, engineering, and information systems capacity required for providing procurement support services to the Government and public institutions.
- The advanced ICT and engineering project management capacity required in the large projects envisaged by the Master Plan is also lacking.
- Capacity is lacking for the information systems professionals required to operate the information systems and networks to be deployed. This is in the area of eRP deployment, network engineering and administration, data center support engineers and cyber security administrators.

The current challenges in using ICT to achieve significant impact on the GDP include:

- Domination by a small number of favoured local and foreign companies offering ICT solutions to Government and various businesses
- Organizations in various economic sectors find it difficult to appropriately use ICT in the business value chain due to inadequate capacity to perform or scale up ICT operations
- Inadequate process maturity across the various economic sectors where there is lack of best practice, standards and discipline in use of ICT in the value chain

- Limited understanding of the implications of service level agreements (slas) to activities of various economic sectors; and
- A large percentage of informal activities in most economic sectors that are not easily traced and accounted for.

SUCCESS STORY

KENYA'S DIGITAL LEARNING PROGRAMME IN PRIMARY SCHOOLS

Background

Kenya's free primary education opened a door for increased access to education at primary school level. In 2014 the Kenyan government that it would launch a "one laptop per child" programme in lower primary schools. This announcement offered the country a new avenue in eLearning.

It was realized that some of the children, especially in rural and slum areas do not have access to suitable educational materials, and their parents cannot afford the text books required. This is why eLearning proposes an exciting way of improving the quality of the education via an interactive and engaging curriculum. And also reduces the costs overall, by providing gadgets that could host thousands of eBooks. The programme being implemented gives students content-ready tablets and offers interactive learning experience such as animation and video as part the curriculum. Stakeholders agree that with the number of children swelling in primary schools, sometimes a lot of schooling is not the same as a lot of learning.

There have been discussions and arguments, to and for the programme. The main problem was no one knew how the programme was to be implemented, what the technology would look like or how it would be used. From the beginning concerns were raised on five issues. These were; Device, content, Infrastructure, electricity and connectivity. If great concern also was the portability and safety of the e-learning devices. For example stakeholders wondered, "If the glass on the device is easily breakable, then if put in a student's backpack, it might not be so safe," Infrastructure of the benefitting schools was also a pending question. Where would the devices be stored in schools; some of which hardly had enough classrooms? How would they be powered in areas not connected to the grid?

Application of ICT in education is a big issue especially for the teachers, as the majority do not have ICT skills. "The teachers have fear of this new technology. For example out of 300,000 teachers across Kenya, approximately 50,000 have computer skills. So how does the government train the other 250,000?

In Kenya, the KICD (Kenya Institute of Curriculum Development) has the responsibility to develop "The digital content". This needs to be rich with digital media (video and audio); localized and contextualized and be able to fit the cultural and environmental relevance of where the students are. The whole idea behind digital content is that you don't have to wait a whole

year to correct a spelling mistake. You can change that mistake immediately. It also needs to generate useful data such as which topics students take a lot of time on and which topics most students fail in.

Analytics about how students are using the content and their assessment scores can be used to improve the experience. On the other hand aggregators would need to work closely with the publishers to take care of the technology behind converting the books into eLearning materials.

> *(Aggregators are companies who have the technology, knowledge and experience to turn material into eBooks).*

SITUATION ANALYSIS

The ICT Integration in Primary Education (Digital Literacy project) is one of the key flagship Programmes being pursued under vision 2030. The main aim is "aligning integration of ICT into teaching and learning for standard one pupils in primary schools". The components of this programme include: Improvement of ICT infrastructure, Development of digital content, capacity building of the teachers and procurement of ICT devices.

During the 2013/2014 the Ministry received Ksh 24.5 Billion (about USD 245 million) to cater for the four components of the project. In 2014/2015, an additional Ksh.17.5 billion was allocated for the project. During this period, the following has been achieved: -

 i. 150 teachers trained as Master Trainers at the National level. The national trainers were drawn from the Ministry's semi-autonomous agencies mandated with training, namely; Kenya Education Management Institute (KEMI), Centre for Mathematics, Science, and technology Education in Africa (CEMASTEA), Kenya Institute of Special Education (KISE) and Kenya Institute of Curriculum Development (KICD). Others are high school teachers who are Computer studies teachers and had undergone prior training in ICT integration in teaching and learning.
 ii. 2555 teachers trained as Trainer of Trainers (ToTs) drawn from all the 47 Counties. This group underwent training at the Counties offered by the Master Trainers. The ToTs were expected to carry out training of teachers in their respective Sub-Counties.
 iii. Training of Teachers at the Sub-County Level. The Field Officers (County Directors of Education and Sub – County Directors of Education) coordinated the training of 62,784 teachers nationally drawn from all public primary schools.
 iv. Digital Content for standard 1 and 2 has been developed. The content has been piloted in 40 primary schools to ensure that it meets the curriculum objectives.
 v. Software for Special Needs Learners is being developed by Kenya Institute of Curriculum Development.
 vi. School Infrastructure Readiness - The Ministry has already carried out a needs assessment with a view to ensuring the schools have appropriate infrastructure for roll out of the ICT integration in primary schools. Each public primary school has received funding to cater for the following: ☐ Refurbishment of a classroom/storage rooms ☐ Purchase of Storage Cabinets ☐ Installing Window /door grills

In May 2015, the roles of the implementing agencies were reviewed by a Presidential Executive Order. The mandate of procurement was given to Ministry of Information, Communication and Technology. However, the Ministry of Education, Science and Technology is to conduct capacity building, develop digital content and improvement of ICT infrastructure in the primary schools.

Trials began with class one pupils in 150 selected schools countrywide receiving their first laptops as the content is being made available on the universal platform. Digital Content Wireless Server and Router (DCWSR) are being installed with content in all classrooms. The gadgets will be loaded with vetted content from publishers and innovators.

Two consortia; Jomo Kenyatta University of Agriculture and Technology (JKUAT) and Moi University are installing laptops, routers and servers in this pilot phase. They will then move on to deliver 600,000 laptops to marked schools later on.

REFERENCES

- Kenya Information, Communication and Technology Master Plan-2014
- The National ICT Policy-2006
- Data Protection bill 2009
- National Broad band strategy- 2013
- Programmes and Projects- Ministry of Education Website
- Performance Contracts 2013-2017

KENYA'S STRATEGIES FOR ICT

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