Managing the 4ᵗʰ Industrial Revolution in East Africa:

Insights from the first Kampala Digitalization Forum

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MINISTRY OF ICT & NATIONAL GUIDANCE

KONRAD ADENAUER STIFTUNG

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Introduction

On 15th & 16th November 2018, some of East Africa's key players in the digital sphere gathered at Speke Resort Munyonyo, Kampala, Uganda to discuss challenges and opportunities ushered in by Industry 4.0 and how to e ectively manage it, especially from a policy angle. At the conference, participants discussed the current status quo and development potential regarding digitalization and the fourth industrial revolution in East Africa. Focusing on innovation and technological advancement, regulatory frameworks and incentives, open data and data management, the conference facilitated an enthralling and informative exchange between experts, policy makers, entrepreneurs and innovators. Most importantly, the conference encouraged and intensified constructive dialogue between the private sector actors and government stakeholders in the East African region.

The first Kampala Digitalization Forum was initiated as a follow-up to a one-week dialogue and exposure programme in Germany with an East African delegation of politicians and entrepreneurs, led by the Permanent Secretary in the Ugandan Ministry of ICT. The programme was facilitated by the Konrad-Adenauer-Stiftung (KAS) and took place in June 2018. It was a commencement point for a series of follow-up activities on digitalization that will be organized by the KAS in partnership with other key stakeholders from both the civil society space, government and the private sector.

Contextual Background

At the global stage, digitalization and global interconnectedness is transforming economic, social and political developments at a rapid pace. Innovation in digital technology is not only changing the way we communicate and connect, or how we process and share data; it is actually leading us into a new industrial age, referred to as "Industry 4.0". The "Fourth Industrial Revolution" will take us beyond the previous big steps – automation and introduction of computers – into a

new era of smart and autonomous systems fueled by data and machine learning.

The digitalization trend is a challenge and opportunity for the African continent. If the transformative power of this trend is harnessed effectively it can contribute significantly to economic and human development and prosperity. While Africa as a whole is still lagging behind other world regions, it is at the same time the continent with the potential for the most rapid and radical transformations. Access to internet is spreading fast, mobile networks are reaching even remote areas, and local innovators are pushing for technological advancement. A number of countries in Africa have the highest growth rates regarding the extension of digital ecosystems in worldwide comparison.

Optimistic experts regard digitalization as a key factor for sustainable economic development and transformation. Some even expect African economies – especially in East Africa – to leapfrog to Industry 4.0 in the near future. But the challenges remain immense: from skilling labor, extending physical infrastructure to ensuring global competitiveness, attracting international investment and providing strong and conducive regulatory frameworks.

Countries in East Africa are recognizing the potential of ICT for social and economic development. The realization of the potential transformation to information - and knowledge-based economies, and ultimately to Industry 4.0, can foster economic growth, create employment and help reduce poverty. In order to achieve this, policy and institutional frameworks that are developed should ensure the necessary degree of regulation, provide incentives for investment, foster competitiveness and ensure harmonization of strategies within the sector. Since such policies and l egal frameworks need to be put in the context of the development of the East African region as a whole, a high degree of coordination and harmonization at the level of the East African Community is required.

What can East Africa learn from Estonia?

In 2016, the UN declared access to internet a universal human right. But 15 years earlier, Estonia, a Baltic country with just about 1.5Million people had made it a human right for its citizens to access internet. In 1997, six years after Estonia gained independence from the Soviet Union, electronic-governance (e-governance) was launched; e-tax came in 2000, a year before digital ID. "Some 370 million digital signatures have been provided, saving Estonia the equivalent of 2 per cent of gross domestic product every year," says Kaspar Korjus, managing director of e-residency[1]. It is officially called e-Estonia.

At the East Africa Digitalization Conference, Lembit Loo, the Europe, Middle East and Africa Director at Net Group shared some key insights from Estonia. Net Group is a technology company that helps to establish and develop businesses in Estonia. Mr. Lembit explained the E stonian model and experience in using technology to transform governance in the country. In his presentation, he explained the various sectors that have seen a total transformation thanks to the use of ICT and data.

Lembit Loo from Estonia sharing the Estonian digitalization experiences at the Conference

1 Pick up O (2018). Estonia: the world's most advanced digital society? Racconteur Article dated 05th Sept 2018

The digitalization in drive in Estonia would not have been occasioned without a supportive government policy and favorable political will. The government took a leap in faith and provided the necessary funding infrastructure to make digitalization a reality in Estonia. In the aftermath of independence, particularly progressive leaders decided to leverage advanced technology as a means of simplifying the lives of citizens. E-governance was adopted as strategy by the government of Estonia to improve the competitiveness of the state and increase the wellbeing of its people, while implementing hassle-free governance. As early as the mid-1990s, the government made radical moves to eliminate paper in its interactions with citizens, forming the basis of what would become an almost entirely digital society[2], the first in the world[3].

In Estonia, data is highly prioritized and used to make key policy and political decisions. According to Lembit, one of the immediate benefits of digitalization is not the sole access to data, but to accurate data. In Estonia, for instance,

the government has accurate information on employment, start-ups, investment hubs, the pensions in addition to all the information available from the ministries, banks, hospitals, schools, etc. All efforts are made to make sure that the data is cleaned, validated and verified before it is then shared with the public and other relevant stakeholders. The availability of accurate date is key in making crucial and relevant political and policy decisions.

Taxes in Estonia are declared online. When the tax season starts and people start declaring their taxes in Estonia, 90% of the declarations are done on the first day. This is unusual because people usually wait for the last day to do so, which is an unpleasant process and cumbersome. The reason people make declarations on the first day is that they get some money from the government and this is usually already in their accounts and due to be used from the day before the audit is done. The process is fully automated and the money is already in the bank accounts. It is, therefore, an easy process so people take advantage of that.

2 High P (2018). Lessons From Estonia, the Most Digitally Advanced Country In The World. Forbes Article dated 15th Jan 2018.
3 Ibid

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Medical digitalization in Estonia is a key priority. If an Estonian visits a hospital, the doctor will immediately have all access to his/her information. If there is an accident, you simply call an ambulance and by the time it arrives, the medical staffs already have your medical history, including allergies. So they start immediately to treat you; they do not have to go through the entire process of assessment. You also have access to your own medical information, results of the diagnosis, when you last visited the doctor, your x-ray images and so on. There is also a digital prescription service. If one takes a particular medication regularly, one does not need to go to the doctor or even take a prescription to the pharmacy to get the medication. One can simply email a doctor and have him respond to all of one's needs. One only goes to the doctor when one's condition is serious.

Over 85% of the schools use the e-school system. This means that all grades are tracked. However, the system is very unpopular because it cannot track whether students go to school or not. In some schools, the onboarding process of teaching some students technology courses and programming has already started with a view to building the students' digital thinking. Work is ongoing to have all studying materials on the system by 2020. By then studying should feel like a game to make studying more efficient. This is a long term plan and the ICT department is already working to make it possible.

Electronic IDs have been adopted as Estonia's lifeline. It is issued at birth. All Estonians have encryption IDs that are also used as SIM cards. There is even an e-ID version which can be put on a mobile phones. This smart ID is now accepted everywhere. The ID helps Estonians authenticate themselves for any service. The ID can also act as an electronic signature which is as valid as the written signature. A mobile ID or electronic ID can be used for any registration. Most importantly, the card acts as a unique identifier for every person and is used across different systems. Lembit noted that many countries have not tried to adopt the systems that Estonians have because, as a result of all the volume of information they gathered they have failed to connect all the data.

Estonia also has a framework for **connecting all the different registries and services.** Over 900 organizations are connected and the

framework can help to move and share data across all these organizations once it is needed. It is projected that the operations would bring in over $500 million per year.

All this was successful because of the good legislative systems across the organizations and MDAs. It allowed for smooth integration of the systems and, ultimately, sharing data across all connected platforms. Allowing the technology to be used and also agreeing to move this data across the platforms from every firm helped the process.

In Estonia, Block-chain technology is used to make sure that data is safe in the system. However, no government system is put on block chain and the systems are thus kept safe by the government. Block-chain is therefore used for property and land registration, and in tracking systems, the health system etc.

In Cyber-security security domain, Estonia still takes the lead but it's not resistant to cyberattacks. There is all this data and information online. The country has gone digital and services are easily accessible. How one keeps the data and information secure is something that comes up often. Estonia was the first country to be hit with a cyber-attack by a neighboring country. In 2007 the Estonian government decided to move the Bronze Soldier from the center of Tallinn to a military cemetery on the outskirts of the city. The decision sparked outrage in Russian-language media and Russian speakers took to the streets. Protests were exacerbated by false Russian news reports claiming that the statue, and nearby Soviet war graves, were being destroyed. Online services of Estonian banks, media outlets and government bodies were taken down by unprecedented levels of internet traffic. Massive waves of spam were sent by botnets and huge amounts of automated online requests swamped servers. The result for Estonians citizens was that cash machines and online banking services were sporadically out of action; government employees were unable to communicate with each other on email; and newspapers and broadcasters suddenly found they couldn't deliver the news[4]. The government increased investment in security systems and learnt a lot from the attack. Today, the Cyber-Defense Centre of excellence located

4 Damien McGuinness (2017). How a cyber-attack transformed Estonia. BBC News Article dated 27th April 2017.

in Estonia conducts a lot of trainings and assessments of everything related to security and as part of cyber defense league.

Estonia also has a **Data Embassy**, a concept that works on the same lines as the usual embassies in different countries. The concept was first put into use in Luxembourg, because there is a data center and server belonging to Estonia that very few people know about. The center has all the information about investments, agencies, ministries and the public sector. Even when worst-case scenarios, such as natural disasters, happen, the country will continue to exist and operate. In the embassies, there are land registries, population registries and much more. The government is opening other data embassies in other countries.

To further strengthen security, only authorized personnel are allowed access to particular systems and data. Everyone who logs into a public sector service to access any form of data or system is identified by an access number that is given to only a few people. This provides a great level of accountability and confidentiality.

The other measure is to determine the individuals who have access to the data. **In Estonia, you own the data that the government has about you**. The government is responsible for showing and reporting to you the people, who have been using your data and the reason why they have been accessing it. The system has analytics to show you the extent to which personal data is being accessed.

The Destrad system makes sure that none of your data is accessed without your permission. If at all it is, then the system is locked immediately and a report is sent. You are then immediately notified of the person accessing your data and why they are accessing it.

Where is Estonia's Digital Future?

The system is aimed at achieving zero-bureaucracy. They are looking to utilize the data to make better policies and decisions on governance, such as those related to taxation. The government is setting up different e-government hackathons that anyone can join to develop new solutions for the government. The overall aim is to build a real-time economy where everything is readily available. This will be achieved through consolidating on successful policies, improving on weak areas and forging strong partnerships with the private sector.

Timeline	1997	2002	2005	2008	2014
Milestones of Estonia becoming the world's most developed digital society	**E-GOVERNANCE**	**DIGITAL ID**	**I-VOTING**	**E-HEALTH**	**E-RESIDENCY**
	E-services are launched; 99 percent of public services are non available as e-services	Rollout of a mandatory national ID card that provides digital access to all secure e-services	Estonia becomes first nation in history to offer internet voting in a national election	Patient health data made available online; 95 per cent of data generated by hospitals/ doctors is now digital	Transnational digital ID for access to public e-services; e-residents can establish/ manage an EU business remotely

What lesson for East Africa from Estonia?

With National ID systems in countries like Uganda, mobile IDs could come in handy. For instance, **NIRA could share online versions of ID's to all citizens who would wish to have them.** This could then be accepted for use in all registration, documentation and other processes.

Again, **East African countries should work within their resource limits** just like Estonia did. Lembit explained that "when they started out, they had to work purely with what they had. The change was gradual and to get everyone on board, they had to make the systems very easy to use while accessing public services. When they made access to services easier, very many people were attracted to join and use the services".

In addition, t**he available resources should be put in the best use.** Many of the solutions that were

built in Estonia were custom-built to cut down on costs. They make their systems open source to any country that needs it but it is not, however, fully open source.

Sometimes in the digital sphere, policies come in after some practices have been tested. East African policy makers should be confused about whether to prioritize policies or practices. The most important thing is having the will and the right intentions. For Estonia's case, the two decisions that were made about the ID number and that the systems had to be interconnected and have all information. Rather than trying to map all connections that may exist in the future, it was decided that one framework had to be adopted.

There has to be a pragmatic and effective data management framework: In Estonia, data is stored and managed in different locations and it's kept in different departments, which is done intentionally. However, there is coordination between these systems that manage this data but they work on separate systems and are also managed by law.

Data Management, Ownership and Protection:
Presentation by Dr. Pencho Kuzev, Data and Digital Policy Coordinator, Konrad-Adenauer-Stiftung

Whilst the world's most important resource now is data, there is a crucial need for a fervent understanding of how best to manage, own and/or protect it. Dr. Pencho's presentation offered key insights on global perspectives around data management, ownership and protection.


Dr. Pencho Kuzev, the Data and Digitalization Cordinator at the Konrad-Adenauer-Stiftung making a presentation on Data Management, Ownership and Protection

The Data Spectrum

He noted that data can best be managed if we know what kind of data it is because data can exist on a spectrum: from Open via Shared to Closed. Open data is the idea that some data should be freely available to everyone to use and republish as they wish, without restrictions from copyright, patents or other mechanisms of control[5]. It has gained momentum due to the recent adoption of open government policies by many governments around the world. Closed data is data that can only be accessed by its subject, owner or holder[6]. Closed datasets are not shared with the public. Some reasons that the owner might decline to make their dataset open to the public is because they are concerned about competitors stealing their research findings, or for privacy reasons[7]. Here is a illustration of the data spectrum by the Open Data Institute.
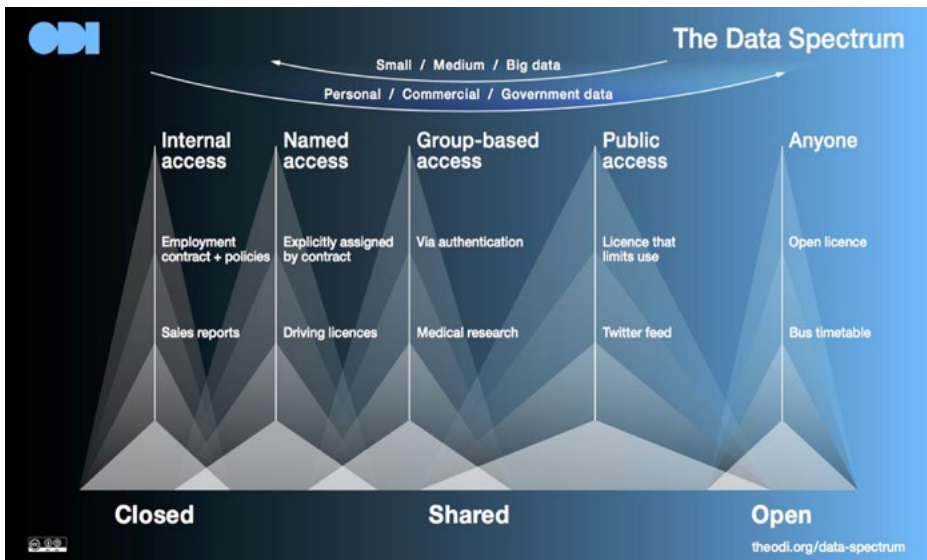
5 https://www.opengovpartnership.org/theme/open-data
6 Open Data Institute
7 Rei Morikawa (2018). Response to Quora Question: What are "open" and "closed" data sets?

The Data Ecosystem Barriers

Data management, ownership, protection and access to it is riddled with many barriers, For instance;

- If data is held by another person and they do not want to share it, it becomes a big problem.

- In many case, legislation does not fully addresses challenges around data ownership, protection and management. Case studies and examples around this are comprehensively captured in the proceeding sections of this report which captures insights from the panel discussion sessions.

- As already noted, data is now the new currency with significant monetary value. This means that corporations sharing data as they wish and usually for their best interests.

- Usually, there are a plethora of unanswered questions regarding data management, protection and ownership. Moreover, it is extremely difficult to set policy guidelines because of the ever-evolving nature of data. Questions like, can data be processed for any purpose? Can we use data for another purpose? How much data can be collected?

To illustrate this complexity, Dr. Pencho painted this scenario: a bank has a contract with a client to provide the client with a bank account and a personal loan. At the end of the first year, the bank uses the client's personal data to check whether they are eligible for a better type of loan and a savings scheme. The same bank wants to share the client's data with insurance firms. This scenario enabled the audience to discuss some key questions: should the bank use the client's existing data to determine where or not to give him another loan? Should the data be shared with the insurance company in question? What should be the limit of data that clients give to their service providers?

Many contending opinions where expressed. For instance, it was noted that the bank can use the existing data to give or deny the client loan if there is a session where the client is taken through the basics of why the decision was made. Another participant noted that the bank data of the client can be shared with another insurance company if the permission of the client is sought in advance.

EU's Data Regulatory Framework

During the session, Dr. Pencho gave some insights about the new EU Data Framework, highlighting its key challenges and opportunities. The framework was introduced to adopt European standards and regulations to support the competitiveness of EU industries and enterprises in the digital economy by allowing for a swifter and flexible uptake of innovative technologies[8]. One of the key aspects of the new EU Data Regulatory Framework is the General Data Protection Regulation (GDPR). According to the EU, the new GDPR which replaces the Data Protection Directive 95/46/EC is the most important change in data privacy regulation in 20 years[9]. The regulation will fundamentally reshape the way in which data is handled across every sector, from healthcare to banking and beyond[10]. The GDPR is designed to[11]:

- Harmonize data privacy laws across Europe,
- Protect and empower all EU citizens data privacy
- Reshape the way organizations across the region approach data privacy.

GDPR reshapes the way in which sectors manage data, as well as redefines the roles for key leaders in businesses, from CIOs to CMOs. CIOs must ensure that they have watertight consent management processes in place, whilst CMOs require effective data rights management systems to ensure they don't lose their most valuable asset – data[12].

GDPR Principles

The EU General Data Protection Regulation (GDPR) outlines six data protection principles that organizations need to follow when collecting, processing and storing individuals' personal data. The data controller is responsible for complying with the principles and must be able to demonstrate the organization's compliance practices.

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8 EU Digital Transformation Monitor (2017). Big data: a complex and evolving regulatory framework
9 EU GDPR Website
10 ibid
11 ibid
12 Ibid

The principles are summarized below as explained by the IT Governance European Blog[13].

i. Lawfulness, fairness and transparency

The first principle is relatively self-evident: organizations need to make sure their data collection practices don't break the law and that they aren't hiding anything from data subjects. To remain lawful, you need to have a thorough understanding of the GDPR and its rules for data collection. To remain transparent with data subjects, you should state in your privacy policy the type of data you collect and the reason you're collecting it.

ii. Purpose limitation

Organizations should only collect personal data for a specific purpose, clearly state what that purpose is, and only collect data for as long as necessary to complete that purpose. Processing that's done for archiving purposes in the public interest or for scientific, historical or statistical purposes is given more freedom.

iii. Data minimization

Organizations must only process the personal data that they need to achieve its processing purposes. Doing so has two major benefits.

First, in the event of a data breach, the unauthorized individual will only have access to a limited amount of data. Second, data minimization makes it easier to keep data accurate and up to date.

iv. Accuracy

The accuracy of personal data is integral to data protection. The GDPR states that "every reasonable step must be taken" to erase or rectify data that is inaccurate or incomplete. Individuals have the right to request that inaccurate or incomplete data be erased or rectified within 30 days.

v. Storage limitation

Similarly, organizations need to delete personal data when it's no longer necessary.

vi. Integrity and confidentiality

This is the only principle that deals explicitly with security. The GDPR states that personal data must be "processed in a manner that ensures appropriate security of the personal data, including protection against unauthorized or unlawful processing and against accidental loss, destruction or damage, using appropriate technical or organizational measures". The GDPR is deliberately vague about what

13 The GDPR: Understanding the 6 data protection principles

measures organizations should take, because technological and organizational best practices are constantly changing. Currently, organizations should encrypt and/ or pseudonyms personal data wherever possible, but they should also consider whatever other options are suitable.

The Konrad-Adenauer-Stiftung and Data Management

Dr. Pencho noted that, KAS will actively be involved in the discourse around data management, especially at a political and policy level by;

• Contributing to reshape clearer data management policy frameworks in Germany and Europe
• Proposing an alternative Data Ownership Concept
• Shifting from a Target Culture to a Data Culture in Society
• Promoting the concept of Open Governments around the world
• Promoting Data Literacy

Institutionalization of ICT by the Government of Uganda: Presentation by Judith Odoi, Assistant Commissioner for Human Resources, Ministry of ICT and National Guidance (MoICT&NG).

Judith Odoi from the MoICT&NG

The Cabinet under Extract No. 77 (CT 2016) approved the creation of the Ministry of Information, Communications Technology and National Guidance and also appointed the Minister and Minister of State to be responsible for it. The creation of the Ministry was occasioned by the fact there was/is *"ineffective communication of Government programs in all the communications (Television, Radios, Newspapers and social media) and inadequate sharing of information about Government programs and achievements".*

The government of Uganda realizes that ICT offer a wide array of transformational tools to improve communication and the delivery of public services. Increased use of Information and Communications Technology and other technological advancements will undoubtedly contribute toward the achievement of development goals in Uganda in line with other key

national and international policies and strategies such as: The Uganda Vision of 2040 of "Transforming Uganda Society from a peasant to a Modern and progressive country with 30 years"; the National Development Plan II 2016/17 – 2019/2020 vision of "Improving Public Service Management, by creating and approving operational structures and systems for effective and efficient service delivery"; the NRM Manifesto (2016-2021), roadmap of *"taking Uganda to a Competitive middle Income Country from predominantly a low income society";* the sustainable Development Goals (Global Agenda) of "ending extreme poverty and fighting inequality and injustice" as a means of achieving a better future for all within the next fifteen years; the ICT Sector Strategic and Investment Plan 2015/16 -2019/20 Mission which is *"to provide leadership and enabling environment for promotion of ICT as an industry and enabler to Uganda's Social Economic Development".*

Ministry of ICT and National Guidance (MoICT & NG): An Overview.

In 2016, the Ministry of Public Service approved the Structure and Establishment Analysis of the Ministry in line with its Mandate *"To provide Strategic Leadership and Supervision in Information Management and Dissemination, Communications Technology and Ideological Orientation for sustainable Development"*

Vision: *"A knowledgeable and productive Society driven by Information, Communications Technology and National Ideology".*

Mission: *"To provide effective communication, utilization of Communication Technologies and ideological orientation for socio-economic transformation".*

Key Functions of the Ministry

- Developing and reviewing Policies and legal framework on acquisition, collation, dissemination and utilization of Information and Communication Technology.
- Coordinating communication of Government Policies, programs, projects and achievements
- Providing guidelines for collection of information; and acquisition and utilization of Information and Communications Technology
- Coordinating the planning and development of Information and Communications Technology
- Enhancing E-government

- integration of information and Communications Technologies in Government functions and processes and procedures
- Developing Policies, Standards and Guidelines on safe use and disposal of Information and Communications Technologies
- Developing a National Ideology that supports the Socio-Economic Transformation Agenda
- Promoting a positive change of mind set, attitudes and perceptions of the Citizenry towards National Development
- Coordinating the implementation of the Government Communication Strategy

Structure of the Ministry

The Ministry is headed by the Political leadership and supported by the Permanent Secretary who is the Accounting Officer. The ministry has 3 main directorates, namely;

i. Directorate of Information, Communications and Technology Services with the following Departments: Department of Communications Services and Department of Information Management Systems.

ii. Directorate of Infrastructure and Investment with the following Departments: Department of Information and Communication Technology, Infrastructure and Department of Information and Communication Technology, Research and Investment.

iii. Directorate of Information and National Guidance with the following Departments: Department of Information Dissemination and Public Relations and Department of National Guidance.

iv. Support Department and Units reporting directly to the Permanent Secretary are as follows; Department of Finance and Administration, Human Resource Management Division Policy and Planning Unit, Procurement and Disposal Unit, Internal Audit Unit, Communications and Resource Centre,

v. Affiliated Institutions

1. National Information Technology Authority Uganda

2. Uganda Communications Commission

3. Posta Uganda

4. Uganda Institute of Communications Technology (UICT)

5. Uganda Media Centre

6. Uganda Broadcasting Corporation

7. New Vision Newspaper.

vi. The Ministry is also the parent Ministry for all Information and Communications Technology Professionals and Communications officers.

Government of Uganda ICT Sector Plans and Programmes

Information and Communications Technology as a Sector is expected to greatly improve the citizenry because it has the potential to:-

- Boost the Country's export and foreign exchange

- Create employment and wealth

- Improve national productivity by making Government and business enterprises more efficient, effective and globally competitive.

- Improve availability of digital content and e-products, automation of Government processes and inter-agency connectivity and innovation.

- Bridge the gap between industry and the academia and commercialization of research and development. This industry is therefore, expected to greatly contribute to the national GDP.

The Sector Strategic plan has spelt out three (03) areas of activation which are:-

i. Foundational support to ICT development; includes all components that render foundational support to the initiatives of the sector i.e. policy, legal, infrastructure, manpower resources and information security.

ii. Enabling environment to support ICT growth and utilization; includes components to which initiatives will inspire trust, confidence in the use of ICTs and thereby bring about growth in ICT and its utilization.

iii. ICT for service delivery; includes all interventions aimed at harnessing the potential of ICTs as an enabler of growth and service delivery.

In all these action areas, the **Human Resource** is the most critical factor in driving the sector to spur growth. The Re-organized structure will deliver the sector goals with the appending structures in all the Ministries, Departments and Agencies. It is therefore the responsibility of the ICT Ministry to ensure that all MDAs have:-

- Appropriate ICT structures
- ICT positions filled

- ICT Units are equipped with functional tools and equipment.
- ICT staffs are appropriately skilled
- ICT staffs are appropriately

placed and utilized.
- ICT staffs can exhibit professionalism and appropriate guidance to their structures.

Key challenges faced by the government for using ICTs as transformative tools

Glaring gaps exist in most Ministries, Departments and Agencies and Local Governments levels as shown below.
- Un-harmonized ICT structures in MDAs.
- ICT skills gaps among government officials.
- No recruitment and succession plans for ICT and Communication Cadres
- Lack of proper career

guidance, growth and development for ICT Cadres
- No competence profiling for these cadres
- No schemes of service for ICT and Communications Cadres
- Lack of a comprehensive skilling program for the cadres
- Lack of career guidance for decentralized ICT services

Possible solutions to the Problems

The ministry has identified and is set to implement the following activities to address the problems;
- Compare and learn from Institutions within the country i.e. Ministry of Finance, Ministry of Public Service and Office of the President, among others as well other countries like both in Africa and beyond.

- Analyze ICT Structures and nomenclature in MDAs and LGs.
- Analyze ICT programs across MDAs
- Develop a National Activity Plan/roadmap for the management of ICT officers.
- Conduct more orientation programs for ICT officers and their supervisors

- Form the Communication and Information Officers forum for heads of Departments and Units in MDAs.
- Conduct Annual ICT Conference.
- Formulate an M&E Strategy of ICT Cadres.
- Harmonization of structures in MDAs and Local Government

Welcome to the 2018 Digitalization Public Dialogue: Remarks by Mathias Kamp, Country Representative, Konrad-Adenauer-Stiftung, Uganda and South Sudan

Mathias Kamp, Country Representative of the Konrad-Adenauer-Stiftung giving welcome remarks at the conference

On the second day of the conference, the conference was open to the general public who work in and/or is interested in the various fields of the fourth industrial revolution. In his welcome remarks, Mr. Kamp reiterated that the Digitalization Forum was a milestone event meant to create an opportunity to critically discuss digitalization and industry 4.0 for development considering the fact that data is the most precious resource of the 21st century. Mr. Kamp also explained the objectives of the conference noting that it provides a platform for further

understanding the digitalization policy landscape in East Africa in addition to identifying the existing opportunities and challenges and how best to address them. *"Bringing together all these different players from various sectors - government, private sector and the delegates from other countries will undoubtedly elicit relevant conversations that will matter in shaping better policies and practices on digitalization in East Africa"*

Although the pertinent issues around digitalization couldn't be exhausted in one day, Mr. Kamp expressed his optimism that the forum would generate some ideas for debate and future action. The Forum, Mr. Kamp advised *"should fuel our quest for knowledge and intrigue us to understand the key forces that shape digitalization and how we can harness the benefits of industry 4.0"*.

Uganda 4.0? Opening Remarks by Julius Torach
The full address by the Acting Permanent Secretary at the Ministry of ICT and National Guidance is quoted below;

Julius Torach from the MoICT addressing the conference

Managing the 4th Industrial Revolution in East Africa:
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I welcome you all to Munyonyo; a very pleasant place. I thank you all for coming. It gives me great pleasure to welcome our regional and international delegates to the First Kampala Digitalization Forum 2018 organised by the Ministry of ICT & National Guidance in partnership with Konrad-Adenauer-Stiftung. I wish to thank Mr. Mathias Kamp, the Country Representative for Uganda and South Sudan for this support.

We are glad that the participants have turned up in large numbers to discuss such an important and timely subject of harnessing the Fourth Industrial Revolution (4IR) in the transformation of Africa. As a Ministry, we have embraced the developments in this area and are glad to work with entities and stakeholders such as the UN, the Block-chain Association of Uganda, the private sector, the Academia and our agencies to explore how best we can maximize these technologies. Our aim is to ensure the development of a comprehensive ecosystem for the adoption and promotion of 4IR technologies.

In that regard, the Ministry has developed a Digital Uganda Vision with 4IR as one of its core enablers. Government of Uganda through the Ministry has also started training its ICT officers in emerging technologies in the context of the Fourth Industrial Revolution (4IR) covering wide-ranging fields such as Artificial Intelligence (AI), Big Data, Blockchain Technologies and Cloud Computing. Associated cyber security and privacy concerns are also being addressed.

During the First Africa Block-chain Conference that was held in Kampala in May 2018, Hon. Frank Tumwebaze, the Minister of ICT & National Guidance pledged to set up an Expert Team to develop a Framework for the adoption and promotion of 4IR technologies in the country.

Internal consultations have been concluded and he will soon announce the roadmap. This Conference therefore has come at the right time to provide input into what we are doing. For the 4IR to be the first sustainable industrial revolution, governments and regulators will need to adapt quickly with the rapidly evolving 4IR landscape and provide the enabling environment, safeguards, investment and oversight to guide the future that is being built. Support and partnerships will be needed to unlock and scale innovation on emerging – and potentially game-changing – technologies and solutions for the people.

Foresight, public policies and technological governance will be needed to avoid or minimize unintended consequences and protect public interests. Africa must NOT be left behind in this Digital Revolution. We need an Africa 4.0. As country we believe in regional integration and Pan-Africanism. I am therefore glad to hear that there are a number of delegates from the East African Community here today.

I wish to urge you to continue working together to maximize the opportunities of the Fourth Industrial Revolution. The Ministry is looking forward to having an engagement about the creation of an East African 4IR Taskforce or Committee. To our friends from other parts of the world, we wish to inform you that the region is ready to welcome you to invest here. The natural resources, the weather and the people are very pleasant. I hope you will enjoy your stay and bring your families back for Christmas.

Panel Discussion Sessions

One of the key highlights of the Kampala Digitalization Forum were a series of high level panel discussion sessions that provided a unique platform for key players in the digitalization field in Uganda to share insights, ideas, learnt lessons and network with each other.

Industry 4.0: Obstacles and Opportunities for East Africa

In this panel discussion session, experts discussed the current digitalization landscape and major digital development trends in East Africa. They also discussed the opportunities of the fourth industrial revolution for economies in East Africa and the role of digitalization in promoting sustainable economic growth. The experts also explored pertinent question about whether leapfrogging to Industry 4.0 will provide solutions for some of the major economic challenges in East Africa, for example with regard to value chains, productivity and employment. They also looked at the level of 4IR preparedness visa vie the initiatives being undertaken by governments and the private sector to taps it's potential.

The panelist discussants were both from the public and private sector organizations from across the East African region. They included; Julius Torach, a Commissioner for Information Technology at

Uganda's Ministry of ICT and National Guidance; Jones Mrusha, Co-Founder of KINU Innovation Hub in Tanzania; Kenneth Legesi, Manager of Strategy and Innovation at Deloitte Uganda; Ronald Mukasa, Business Development Manager at Enterprise Uganda; and Maureen Agena, an ICT4D professional from the Regional Universities Forum for Agriculture (RUFoRUM). The session was moderated by Doreen Komuhangi, Business Journalist with NBS TV, Uganda.

Session panelists

The session started with an exploratory discussion on the meaning of the fourth industrial revolution and its key variables. Julius Torach noted that Uganda as a country is getting ready for the 4th Industrial Revolution because the government is creating reliable connections and taking necessary actions that we need to get us there. For this to happen at a faster pace and more effectively, Torach emphasized that there is an urgent need to have the right legislation, skillsets and the infrastructure. He gave an example of the Data Protection and Privacy Bill that has been tabled before Parliament noting that "this legislation will help with privacy and the protection of data in line with digital security for the country". Furthermore, "the government has set up a data center to critically look into digital security", Torach noted.

According to the ICT Commissioner, the Ugandan government wants to create awareness of the potential and opportunities for the 4th Industrial Revolution and prepare the country for the emerging technologies. The government is also focused on supporting innovation in the country through, for example increased funding. The president promised to spend UGX 5bn annually for innovation programs. Part of this money was used to set up the Nakawa Innovation Centre.

This investment is also spreading out to support the private sector. For instance, "12 startups and 5 innovation hubs have received funding from the government of Uganda to support the innovation and tech ecosystem", said Kenneth Legesi from Deloitte.

Kenneth Legesi from Deloitte Uganda

However, according to, Mrusha Jones from KINU Innovation Hub, most African countries like Tanzania where he comes from are not prepared to tap into the opportunities provided by Industry 4.0 and address challenges around it because governments are seriously underestimating its potentials. For example, he noted that "Africa generates billions of data but none of it being in our possession, which means we are losing out a lot". Indeed, Africa has a chance of participating in the 4IR

not as consumers but as owners of the revolution - with data at hand, Africa is ready for the digital age. As a continent, we need to critically learn and understand the potentials of the 4IR in order to come up with informed policies to influence and guide relevant actions.

Mrusha Jones from KINU Innovations Hub, Tanzania

It should be noted that the impact of the 4th Industrial Revolution revolves around defending what we call a digital economy and how to work around it. We need to know what lies ahead and get to learn how we can work with it.

During the session, Maureen Agena also decried the stifling regulatory environment which will continue making the 4IR a farfetched reality in the lives of most people in Uganda. For instance, "how can we be here talking about innovation and its promotion while at the same time taxing social media?" she questioned. She also hinted on patent and copyright dysfunctions in Uganda noting that many people are innovating and their ideas are being stolen. Therefore, instead of drafting policies that stifle the digitalization ecosystem in Uganda, the government should instead have supportive policy guidelines and procedures that cover the entire data development chain/ data life-cycle of collection, processing, storage, and analytics.

Maureen Agena from the Regional Universities Capacity Building Forum on Agriculture

Ronald Mukasa from Enterprise Uganda warned that although there is a small section of Ugandans who are excited about the 4th Industrial Revolution, the majority probably do not even know that we are in the 4th Industrial Revolution and yet among these are the entrepreneurs who control the economy. He stressed the need to take this debate to the entrepreneurs and get the question of exposure out of the way. He added that there is need to bring the entrepreneurs on board and get them to adapt to these technologies.

Ronald Mukasa from Enterprise Uganda

He also stressed the need to stop expecting the government and government officials to do everything for us. To illustrate the need for private initiatives, he said that the emergence of Safe Boda is a vivid example of how boda-bodas can be regulated. *"The rapid pace at which Safe Boda revolutionized and brought order to the boda-boda transport industry even when the government had failed is simply unbelievable",* he remarked. To Mukasa, Africa has the possibility of leapfrogging but there is an urgent need to have a conversation with an everyday trader and the ordinary citizens on what the possibilities are.

Conclusively, conversations at the session alluded to the fact that East African governments and their citizens seems to be taking different paths and are detached. This dilemma must be addressed henceforth. Similarly, there was also a general consensus that there have to be better ways to enhance and encourage innovation rather than stifling it through taxation of platforms like mobile money and not providing safeguards against innovation malpractices such as theft of ideas.

There was a call for the Ministry of ICT and National Guidance to stop focusing on the things it has done because it is running late and time is running out fast. Instead the government should borrow a leaf from other neighboring countries like Kenya and beyond in taking the much desired actions to fuel Industry 4.0.

There was also a clarion call to stop limiting digitalization to only mobile applications because there are very many problems that need to be solved using innovative approaches and models. For instance, what is being done to get people in the rural areas join the online spaces? This is particularly important in the context of Uganda where the majorities, up to 87% of the people live in rural areas.

The key lesson from the session was that although the unprecedented pace of the speed of Industry 4.0 and multifaceted nature, we'll probably never be ready. But at the very least, we should be able to learn more about it and learn and share relevant experiences as much as we can. Moreover, a collaborative approach at the policy and infrastructure level within the East African region can give us more leverage.

Frameworks for Digital Markets: A Look at Past and Present Trends. Presentation by John Walubengo

John Walubengo from the MultiMedia University, Kenya

John Walubengo, an ICT expert and Dean of the Faculty of Computing and IT at Multimedia University in Kenya gave an input presentation showing the origins and the key features of the past Industrial Revolutions (1st to 3rd) up to the current one (4th Industry Revolution). His presentation also provided key digitalization statistical trends and the indicators of digitalization in Kenya, highlighting the most critical ones. He also discussed the currents trends of digitalization in East Africa and how this is impacting/could impact current and future developments in the region. A comprehensive synthesis of his presentation is elaborated below;

Industry 1.0: Fed-up with the prevailing status-quo characterized by absolute poverty, limited production capabilities mostly because of using hands and the sole resource in production, the Brits had to do something. The pockets of scientists and mercantilists of the time thought about ideas to graduate from hand to machine use in production processes. In the late 18th century, steam engines were introduced helping the British industrial class to mass produce goods, especially textiles, steel and iron. Soon, the technologies spread across Europe sparking off significant structural reforms across the continent. With the increase in production efficiency and scale, small businesses grew from serving a limited number of customers to large organizations with owners, manager and employees serving a larger number[14].

Industry 2.0: The beginning of 20th century marked the start of the second industrial revolution. The main contributor to this revolution was the development of machines running on electrical energy. Electrical energy was already being used as a primary source of power. Electrical machines were more efficient to operate and maintain both in terms of cost and effort unlike the water and steam based machines which were comparatively inefficient and resource hungry . During this era, various production management techniques such as division of labor, just-in-time manufacturing and lean manufacturing principles refined the underlying processes leading to improved quality and output[16].

A classic example of Industry 2.0 is Fords' adoption of conveyer belts technology in car manufacturing. Henry Ford took the idea of mass production from a slaughterhouse in Chicago: The pigs hung from conveyor belts and each butcher performed

only a part of the task of butchering the animal. Henry Ford carried over these principles into automobile production and drastically altered it in the process. While before one station assembled an entire automobile, now the vehicles were produced in partial steps on the conveyor belt—significantly faster and at lower cost[17].

Industry 3.0: Advances in the electronics industry in the last few decades of the 20th century ushered in the third industrial revolution. The invention and manufacturing of a variety electronic devices including computer hardware and software substantially resulted in reduced effort, increased speed, greater accuracy and even complete replacement of the human agent in some cases. The automation processes and software systems have continuously evolved with the advances in the electronics and IT industry since then[18].

Industry 4.0: This is a further build-up of the developments that took place during the Third Industrial

Revolution but is much faster in terms of velocity, scope and systems impact. The Fourth Industrial Revolution is disrupting almost every industry in every country and creating massive change in a non-linear way at unprecedented speed[19]. The Fourth Industrial Revolution describes the exponential changes to the way we live, work and relates to one another due to the adoption of cyber-physical systems, the Internet of Things and the Internet of Systems[20]. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres, collectively referred to as cyber-physical systems[21]. It is marked by emerging technology breakthroughs in a number of fields, including robotics, artificial intelligence, nanotechnology, quantum computing, biotechnology, the Internet of Things, the Industrial Internet of Things (IIoT), fifth-generation wireless technologies (5G), additive manufacturing/3D printing and fully autonomous vehicles[22].

14 Howard, E (2018).The Evolution of the Industrial Ages: Industry 1.0 to 4.0. Simio Blog Article
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16 Ibid
17 Dossenter (2018). Industrial Revolution - From Industry 1.0 to Industry 4.0
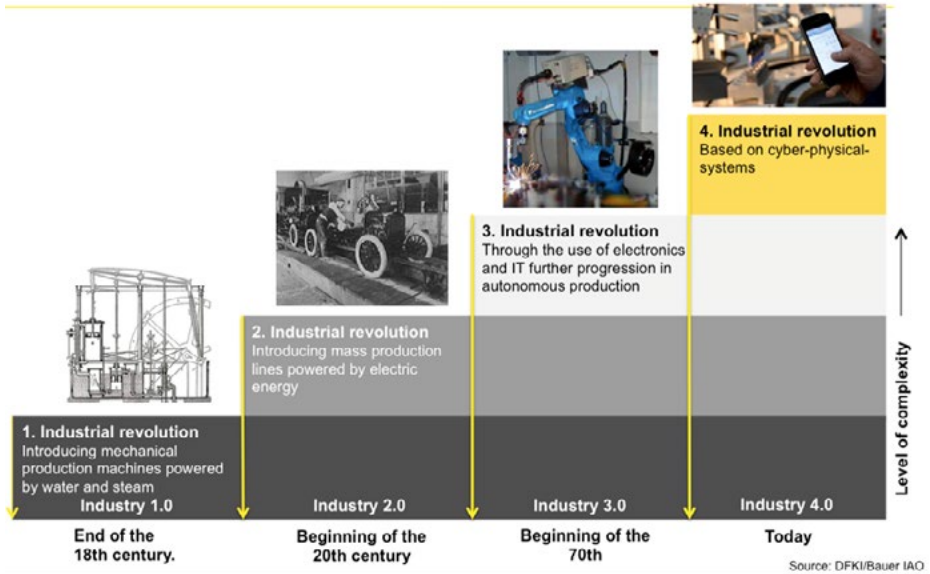18 Howard, E (2018).The Evolution of the Industrial Ages: Industry 1.0 to 4.0. Simio Blog Article
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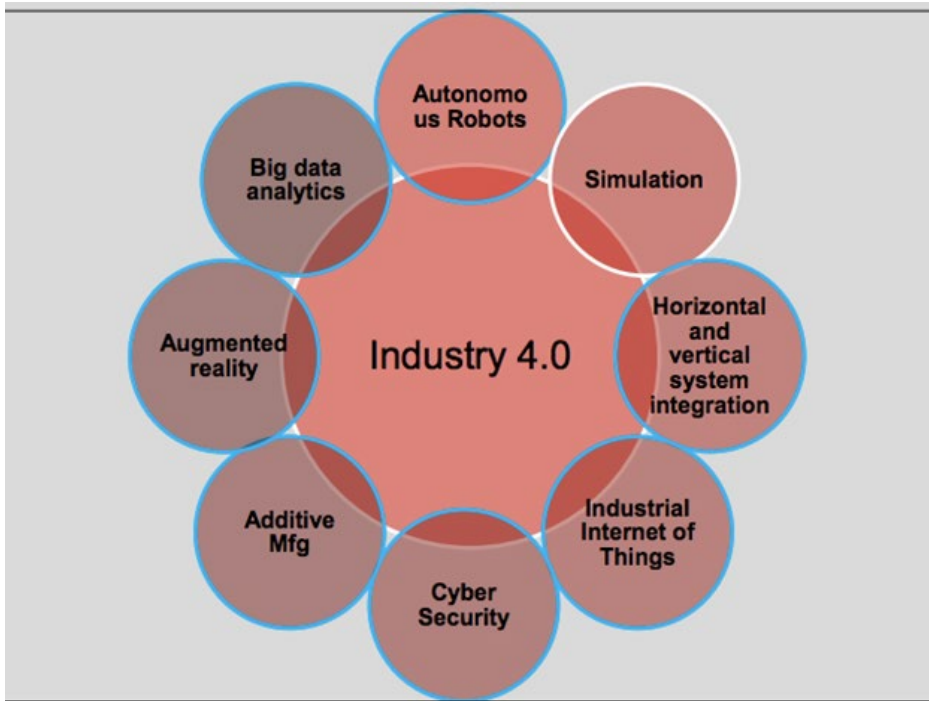20Marr B (2018). The 4th Industrial Revolution Is Here - Are You Ready? Forbes Article dated Aug 13th 2018.
21Ibid
22WEF (2018). "The Fourth Industrial Revolution: what it means and how to respond". World Economic Forum

The Four Industrial Revolutions

4. Industrial revolution
Based on cyber-physical-systems

3. Industrial revolution
Through the use of electronics and IT further progression in autonomous production

2. Industrial revolution
Introducing mass production lines powered by electric energy

1. Industrial revolution
Introducing mechanical production machines powered by water and steam

Level of complexity

Industry 1.0	Industry 2.0	Industry 3.0	Industry 4.0
End of the 18th century.	Beginning of the 20th century	Beginning of the 70th	Today

Source: DFKI/Bauer IAO

Key triggers of Industry 4.0

Industry 4.0

- Autonomous Robots
- Big data analytics
- Simulation
- Augmented reality
- Horizontal and vertical system integration
- Additive Mfg
- Cyber Security
- Industrial Internet of Things

Cloud Computing Capability as a Proxy Measure for Digital Economy

According to BSA (Business Software Alliance), Policies that create an environment conducive to cloud computing will produce significant, positive results for the growth of digital economies/ markets. Examples of cutting-edge technologies enabled by cloud computing include:

Data Analytics: Cloud computing allows a tremendous amount of data, collected from multiple locations, to be stored and analyzed in a cost-effective way. This enables data analytics to be performed on a large scale.

Artificial intelligence uses vast amounts of data to "train" algorithms to solve complex problems and achieve certain goals. Cloud computing allows this data to be collected and analyzed efficiently.

Block-chain: There are multiple uses for block-chain technology from financial transactions to manufacturing, and many new uses are constantly emerging. Cloud computing allows participants in block-chain transactions to remotely record information in decentralized ledgers and subsequently access them.

What are the key indicators of a Digital Economy and how can they be measured?

These inconclusive parameters are the stimulants for a thriving Digital Economy;

Data Privacy: Digital or Cloud users need to trust that their data, which may be stored anywhere in the world, will not be used or disclosed by a cloud provider in unauthorized ways. Countries can provide these assurances with appropriate privacy laws. But it is a delicate balance unnecessarily burdensome restrictions will hinder the important advantages of cloud computing that users want and need.

Measurement yardstick

• Is there a data protection law or regulation in place?

• Is the data protection authority enforcing the data protection law or regulation in an effective and transparent manner?

• Is the cross-border data transfer too restrictive?

Security: Users of cloud computing and other digital services need to be certain that cloud service providers can manage the security risks of storing their data and running their applications on cloud systems. Largescale national and international cybersecurity attacks are now common.

Measurement yardstick

• Is there a national cybersecurity strategy in place?

• Is the national cybersecurity strategy current, comprehensive, and inclusive?

• Are laws or guidance on security requirements transparent, risk-based, and not overly prescriptive?

Cybercrime: The huge quantities of data that companies and governments store in their computer networks have long attracted the attention of bad actors. In order to protect data holders and deter cyber criminals, governments must use legislative, investigative, and enforcement tools.

Measurement yardstick

• Are there cybercrime laws or regulations in place?
• Are cybercrime laws or regulations consistent with the Budapest Convention on Cybercrime?

• Are arrangements in place for the cross-border exchange of data for law enforcement purposes that are transparent and fair?

Intellectual Property: As with the creators of other highly innovative and fast-evolving products, providers of cloud computing services rely on a combination of patents, copyrights, trade secrets, and other forms of intellectual property protection. To encourage investment in cloud research and development, intellectual property laws must provide clear protections and effective enforcement of misappropriation and infringement. Online intermediaries should be offered incentives to operate responsibly and should enjoy safe harbor from copyright liability when they do so.

Measurement yardstick

Are copyright laws or regulations in place that are consistent with international standards to protecti ntermediaries (Cloud providers/ISPs/Content Providers/ etc.)
Are copyright laws or regulations effectively implemented?

Are there clear legal protectionsin place for software-implemented inventions?

Industry Standards/Data Portability: Users need data portability and seamless interoperable applications if they are to make full use of cloud-computing services and the digital economy. IT industry organizations are developing international standards that will ensure optimal portability. Government support for these voluntary, industry-led efforts is highly important. Countries must also promote global harmonization of e-commerce rules, tariffs, and relevant trade rules.

Measurement yardstick

• Is there a regulatory body responsible for standards development for the country?

• Does the government participate in international standards setting process?

• Is there a law or regulation that gives electronic signatures clear legal weight?

Free Trade: Cloud services operate across national boundaries, and their success depends on access to regional and global markets. Restrictive policies that create actual or potential trade barriers will inhibit or slow the evolution of cloud computing.

Measurement yardstick

• Is a national strategy or platform in place to promote the development of cloud services / digital products?

• Are there any laws or policies in place that implement technology neutrality in government?

• Has the country signed and implemented international agreements that ensure the procurement of cloud services is free from discrimination?

Broadband Readiness: Digital economies and cloud computing require extensive, affordable broadband access, which in turn requires incentives for private sector investment in infrastructure and laws and policies that support universal access.

Measurement yardstick

• Is there a National Broadband Plan & to what extend is it implemented?

• What are the key statistics about the; ITU ICT Development Index (IDI); Active Mobile Broadband Subscriptions (% of population); Average Mobile Data Connection Speed Cost of Broadband as percentage of the Average Incomes?

Balancing Regulations and Incentives for the Growing Digital Economy

This panel discussion session explored the regulatory challenges with regard to digitalization and the virtual economy in East Africa. It also discussed the steps that have been undertaken by governments in East Africa to provide adequate responses in terms of regulation and policy-making. Gaps within the digital economy were also identified and discussed during the session. Similarly, the experts during the session explored the major trends with regard to key regulatory challenges, for example regarding aspects such as data (access, ownership, and security); how the local private sector could be supported to benefit from opportunities ushered in by digitalization; the actual and potential incentives for local business development and innovation as well as international investment as well as how the competitive advantages in the region could be strengthened. Moderated by Michael Niyitegeka, the Uganda Country Manager for ICDL Africa, the session also had inputs from Ali Hussein from KICTANet, Kenya; Angela Mirembe from Coding with Heels; Hon. Godfrey Osotsi, a Member of Kenya's National Assembly Committee on ICT; Badru Ntege from the Private Sector Foundation of Uganda

Panel Discussion session moderated by Michael Niyitegeka

Niyetegeka opened the discussion by asking the panelists about the kind of incentives that need to be created to make sure that the people in the East African community are not passive but active participants in the digital economy. The panelists agreed that East Africa's youth continue to be kept in the background yet they constitute the biggest proportion of the population. The inexorable march of digitalization is leaving them out and yet they need to be put at the forefront of these efforts so that they can start thinking fast. Thus, if we do not respond fast enough, the majority of young people will be left behind and this is disastrous from security, stability and development perspectives.

One of the panelists, Angella Mirembe reiterated that the problem of youth exclusion in the digital economy could be solve by equipping them with the requisite digital skills and changing their mindsets. "If we are to fully tap into the possibilities of the digital world, we need to start early and encourage the younger generation to get knowledgeable early. Right now, life is not about what you studied or what you are qualified for. The issue that we should be addressing is what you can do rather than what you qualified in", she emphasized.

Angella Mirembe from Coding With Heels

Despite the exclusion, a lot is being done by the East African countries in terms of involving the young people and this is a promising venture for young people. Innovation hubs are being put in place and incentives are also being rolled out by countries to improve on innovation.

The panelists also noted that technology is growing faster than legislation and there is need to strike a balance between legislation and technology. In Africa we have very many laws but the real challenge lies in their implementation in the various policies. For instance, Ali Hussein decried the current situation where 21st century challenges are being solved with 20th century systems with 19th century mindsets.

In terms of regulations, though, Kenya is making significant progress but, admittedly, has not yet attained its target. There is strong public participation, and that is a good step towards coming up with a human-centered design for making policies. In the mobile telecommunication industry, the government has made it easy for local investors to get incentives to invest in Kenya. The Government of Kenya has amended the law so that local investors can benefit from a tax grace period of up to 10 years. Kenya is in the process

of working on a Data Protection Bill in its legislature. Data is critical and countries that will manage their data well will make a great deal of progress.

The people are the employers of the government and a civil servant is meant to serve the people. There is, therefore, need to enhance civic participation.

One of the insights that were generated during the plenary discussion was the need to involve the judiciary in this discourse. The argument here was that if legal policy makers have a better understanding of the challenges and the opportunities of the digital economy, they would be able to come up with inclusive laws and policies to support the evolutionary and revolutionary processes of digitalization.

During the session, East Africa's youth were encouraged to let their passion for innovation drive their initiatives. As Angela noted; *"when you look at great innovators, you will notice that they did not really give up because of the unfavorable political landscape but instead went ahead to build something because of what they believed in. "You have to ask yourself what you can do. I think it is time we*

stopped being spoon-fed, get up and get things done", she called the youth to action.

A clarion call for a massive investment in intellectual property management was also made by Hon. Osotsi. This is in light of the fact that the value and relevance of intellectual property in the new digital age is now more important than ever because in the digital economy, most businesses are online and with intangible assets. In the digital age, millions new innovations and content is being created at the same time and it is imperative that there rights of ownership of these contents and applications is guaranteed.

Hon. Osotsi from the Parliament of Kenya

Another point of concern noted by Hon. Osotsi was also the difficulties around policy formulations and implementation around the digital economy. For instance *"we are talking about private companies like Safaricom where government in Kenya has failed to figure out what it is. Is it an Insurance company, is it a bank, and is it a Telecom company? It has advanced so quick that we don't know how to regulate them"* - Hon Osotsi noted. He also warned that failing to regulate ICT sector in East Africa

is dangerous for development. A case in point as he noted was recent a MPESA in Kenya that caused a lot of inconvenience and many made losses. *"This reminds us of the urgent need to decisively deal with dominance in the telecommunications sector in our country - lest we expose the country to the real risk of a catastrophic state capture"* he stated.

While it is sensible to make policies that will guide the digital economy, Joseph Kaizzi, an innovator from Thin Void noted that sometimes *"it is logical for innovatio n to run faster than policy otherwise it wouldn't be innovation or disruptive like some would say"* he argued

Moreover, *"policy needs to be researched and well thought out and this can best be perfected through practical iterations and past experiences"* he stressed.

An important point from this session was that the young people and those in the innovation ecosystem should just take control and continue with their endeavors. As Badru Ntege noted, "You can wait for the government to come and help you and you may have to wait forever. So get done with work and start doing your stuff already and government will find you along the way".

Badru Ntege from NFT Consult LTD

Ntege also noted that one of the best strategies for fueling the digital economy is the strong involvement of the private sector. He stated that one of the reasons why it is so difficult for government to involve and engage the private sector is that it is mostly being done to "tick the box". He thus suggest that getting the private sector involved through focusing on their innovations and what they offer should be an important decision making tool by the government.

The key take-away from this session was that there is an urgent need to focus our conversation on regulation as an enabler and not as an instrument for clamping down the digital economy.

Robots, Codes and Brains - Harnessing the Emerging Technologies of the Fourth Industrial Revolution

The illiterate of 21st century is the one is not able to learn, unlearn and learn. "There's no excuse to be ignorant in this era of the 4th Industrial Revolution" – Mark Kaigwa, Nendo

Session Panel discussants: L-R; Mendoza, Faraja, Kaigwa, Onyango, Kwameh & Loo

This session explored the opportunities for East Africa in robotics and artificial intelligence, cloud computing, internet of things, block chain technologies etc. and the role of local entrepreneurs and innovators playing with regard to the new technologies among others. The speakers at the session included; Lembit Loo, EMEA Director at Net Group, Estonia; Kwame Rugunda from the Blockchain Association of Uganda; Mark Kaigwa, Founder of Nendo; Douglas Onyango from Deron Technologies and Faraja Nyalandu the Executive Director of Shule Direct, Tanzania. The session was moderated by Teddy Ruge, from Hive-Colab, Uganda.

To set the ball rolling, the moderator presented the following puzzle: The factory of the future will only have one human and a dog. The dog will be there to keep the human from touching the machines. How many of those factories will be prideful manufacturers and how many human manufacturers? Of the two which will remain and which will go?

To open the discussion, the moderator inquired from Kwame Rugunda about the different opportunities ushered by block-chain technologies to countries in the East African region. Kwame noted that there is a lot of potential in the emergence of block-chain. He added that there is keen interest in block-chain in the banking sector and the land registry and that there is much more potential that block-chain technologies can offer.

Kwame Rugunda from the Block chain Association of Uganda

Bridget Mendoza from Andela, one of the foremost global organizations catalyzing an interconnected global tech ecosystem also offered her insights pertaining to software development and programming in the new digital age. She noted that at Andela they have harnessed and welcomed the 4th Industrial Revolution by sharing skills with people who have no idea about software development and programming. She added that people who simply have the passion for these technologies have been taught how to be developers. They are contributing to the revolution by bringing in people who will run the machines, data and artificial intelligence in the 4th Industrial Revolution. Mendoza also emphasized that we have a duty to prepare our children to write code since the illiterates of the 21st century are those we can't code. The great new is that Andela is doing exceptional work and they are already on a mission to change the world, one code at a time.

Bridget Mendoza from Andela

Regarding the fear that the Industry 4.0 tools will replace human beings and be the new face of the labor market, Faraja Nyalandu from Shule Direct reiterated that while this is true, there are still jobs that cannot be replaced by machines, for instance, assignments that require emotional intelligence and creative applications. Even then, "the fourth industrial revolution also comes with it more jobs that are being created but all we need is a high degree of preparedness and readiness" she noted. "We have to go back to the drawing board and identify the core purpose of education" she suggested. She also noted the need to address the gender gap and include women as we harness Fourth Industrial Revolution in East Africa.

Faraja Nyalandu from Shule Direct

The session sparked fundamental discussions about the ethical considerations and its implications in the digital age. For instance, Onyait Odeke, the head of digital communications at Dignited implored the participants and Industry 4.0 proponents to be cognizant of this. The good news according to Mendoza is that most tools of Industry 4.0 are learning to cope up with issues

of ethical consideration because of the enormous research being undertaken in the field. According her, we should be more hopeful and not discard digitalization because of the threats they present to our morality and ethical standards. She also noted that *"there will always be bugs, so you always have to update and always learn".*

On the question of morality and ethics in the face of the technological revolution, Douglas Onyango argued that "for all the bad that machines can do, humans have done worse" so this limiting the emancipotory and progressive capacities of machines based on fear is an unhealthy discouse. Moreover, as noted by Faraja Nyalandu *"machines are not here to program humans, humans are the ones to program the machines"*

The session also recommended that there is need to have more constructive discussions with policy makers on what kinds of laws would apply because, clearly, they have been left out. The laws we have right now cannot be of any help. Policy makers have to reach out to the coders and programmers to understand how we can come up with policies that can help.

Some ICT innovators and experts at the conference felt that the sector is being over-regulated, mostly because of lack of better and well informed ideas. *"We need to solve some serious issues when it comes to creating a true enabling environment. Current regulations are all about control, not about creation"* noted Teddy Ruge, the Co-Founder of Hive-Colab, Uganda's first tech incubator and co-working space.

Session moderator, Teddy Ruge from Hive Colab

To conclude the discussion, Mendoza from Andela noted that as programming and AI (artificial intelligence) grow, the software industry is also always learning and so we need to deepen on how fast we are learning and copying up with digital trends.

According to Kwame Rugunda, since our biggest challenge is our inability to predict what is next and be prepared, it is critical that we pay attention to the industry and how it is evolving and prepare the generation for it.

Managing the Data Revolution
"Countries that will manage their data well will progress" - **Hon. Godfrey Osotsi - Member, National Assembly Committee on ICT, Kenya**

The final session explored how best the data revolution could be managed. It discussed the major trends regarding data; the opportunities arising from transformative developments in the gathering, processing, sharing and storage of data and how local innovators are contributing to the data revolution in East Africa. Similarly, the session also explored the actual and potential benefits of big data and open data for public administration, business growth, human and economic development in East Africa and how the risks regarding data protection and data privacy can be addressed without stifling the innovative and data's transformative potentials.

Session Panel discussants

Among the speakers were Dr. Pencho Kuzev, the Data and Digital Policy Coordinator at the Konrad-Adenauer-Stiftung; Antony Otieno from Internet Society of Kenya (ISOC); Joshua Akandwanaho from NITA-Uganda; Alice Namuli Blazevic, Intellectual Property Rights Lawyer and Dr. Godfrey Justo, Engagement and Management Advisor, Tanzania Data Lab and Dr. Peter Misiani Mwencha, a research fellow at Kenyatta University. The session was moderated by Michael Katagaya from Evidence and Methods Lab, Uganda.

The hard conversation about data access was the beginning point of this session. The points raised cemented the fact that there is a general need to address data access challenge, which is a problem being confronted by most countries in Africa where the majority of the populace are still rural dwellers. Dr. Godfrey Justo reiterated that data out there is inaccessible and makes it hard to be harnessed and utilized. Datasets in hardcopy is proving to be a challenge to people that wants to use it. "There's still an issue of data being unclean and there is an urgent need for professionals to make it standard". He also decried the state of Data Storage by most governments noting that this continues to be a major challenge in the new age of data revolution.

A key proponent of open data, Dr. Justo warned that "having data and not using it is useless". Therefore, "if we have data and it's being harnessed and put to good use, then it offers many transformative benefits" he concluded.

As a piece of advice to the participants, Dr. Peter Misiani Mwencha noted that *"we can only appreciate the value and relevance of data if we all treated ourselves as producers and consumers of data"*.

An important message from the session was also the need for data to be kept with the highest standards of privacy and protection. Discussing this is pertinent because an immense amount of data is being generated but the question we will have to confront is: Who controls and owns this data? As noted by digital strategist JC Gaillard, the question of who owns the information collected by smart-watches, smart-thermostats, or even connected-roads is indeed far from being resolved. Understand and finding sustainable solutions to the questions of data ownership between users and providers of increasingly ubiquitous data-driven services is one of the next big challenges the hyper-connected society will be facing — with deep implications both financially, ethically, and in terms of cyber-protection of the privacy of citizens, he notes.

To address some of the key questions around data ownership and protection, the government of Uganda recently drafted a Data Protection and Privacy Bill. Joshua Akandwanaho from NITA-U disclosed that the Bill that is yet to be passed in the Ugandan Parliament. However, Alice Namuli interjected and reiterated that before the Data & Privacy Bill is passed into a law, the legislators and the general public should first fully understand it. Besides, "before these regulations are drafted, it's important that the person regulating understands what they're regulating so that we come up with meaningful regulations" Namuli emphasized.

Joshua Akandwanaho from NITA-U

On a positive note, the government is also investing in the data revolution. For instance, Akandwanaho noted that there are efforts being made at the ministry to enhance innovation through the provision of the fund for innovators and the construction of the innovation hub. While this is a good, Alice Namuli decried the systemic irregularities to access it. She added that innovators receive the money meant for them but owing to the irregularities, they have to bribe insiders.

Tech Lawyer, Alice Namuli

Some Recommendations from the Conference

After the panel deliberations, Commissioner Julius Torach requested the audience to give constructive feedback and share relevant recommendations to enable the government to improve on it digitalization promises. Participants suggested that;

• The ministry of ICT & NG should attend the other forums on ICTs and answer relevant questions while also informing the public about new developments in the ministry.

• They also asked all government institutions to be open and update information on their websites to make it available to the public.

• UCC actively participates in the next forum.

• There is need for the government to know about the information being collected and the activities being carried out.

• KAS and the MoICT&NG should continue collaborating to execute capacity building projects for government officials.