



CONSULTANCY SERVICES TO CONDUCT INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) SKILLS AND TRAINING NEEDS ASSESSMENT (STNA) AND DEVELOP ICT SKILLS AND TRAINING ACTION PLAN (STAP). PROC. REF. No. NITA-U/RCIP/CONS/18-19/00119

ICT SKILLS AND TRAINING NEEDS ASSESSMENT REPORT FOR RCIP IMPLEMENTING AGENCIES AND TARGET SECTORS

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July, 2021



FOREWORD

The Uganda Vision 2040 identifies Information and Communications Technology (ICT) among the key fundamentals to spur Uganda's transformation into a modern and prosperous country. The Third National Development Plan (NDP III, 2020/21-2024/25) also identifies ICT as a fulcrum of development; an accelerator, amplifier, and augments of change; and a sector with a huge potential to improve national productivity by making Government and business enterprises more efficient, effective and globally competitive. The National Resistance Movement (NRM) Manifesto 2021-2026 also defines ICT as strategic pillar for social and economic transformation of Uganda into a middle-income country.

Given the rapid development of the ICT sector and advancements in technologies, the Government of Uganda has taken deliberate steps to keep up with the pace of change in the sector through development and adoption of new strategies that can be leveraged to realize the country's digital agenda. In this regard, the Government has prioritized Digital Transformation Programme in NDP III, among other objectives, "to increase the ICT human resource capital" by developing a well-grounded ICT professional workforce; developing an ICT professional's quality assurance framework; providing digital literacy training; developing ICT centers of excellence and vocational institutions; reviewing and implementing ICT training curriculum at all levels of education system in line with the emerging technologies; and implementing targeted capacity building for teachers and trainers to incorporate ICT in pedagogy to acquire the relevant skills.

As part of the efforts to accelerate digital transformation, Ministry of ICT and National Guidance (MoICT &NG), with support from the World Bank, is implementing the Regional Communications Infrastructure Program (RCIP) through National Information Technology Authority-Uganda (NITA-U). Specifically, implementation of Institutional Strengthening and Development (ISD) sub-component of the RCIP Uganda Project is aimed at supporting capacity building activities in beneficiary agencies and target sectors by stimulating mindset change among public officers to utilize ICT and provide government services effectively and efficiently.

In this regard, my Ministry, through NITA-U, has undertaken ICT Skills and Training Needs Assessment to examine the AS-IS ICT skills and training needs landscape specific to MoICT & NG, NITA-U, PPDA and the target sectors of Agriculture, Health and Education and Justice, Law and Order Sector (JLOS); determine the desired TO-BE State for the beneficiary agencies and target sectors; analyze ICT Skills Gap on the beneficiary agencies and target sectors; and make recommendations for policy action.



The ICT Skills and Training Needs Assessment (ICT STNA) Report will serve as a reference document for identification of future ICT skills needed by various categories of civil servants in selected MDAs over the next 3 to 5 years; streamlining recruitment, deployment and management of ICT professionals in MDAs; alignment of ICT skill development to business goals and needs of target MDAs; enhancing ICT skills and competencies among government employees; and development of strategies for addressing current and future skill gaps, career and succession planning.

I therefore wish to urge the responsible actors to internalize this report and diligently implement the recommendations relevant to them.

Hon. Baguire Vincent Waiswa
Permanent Secretary, Ministry of ICT and National Guidance



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LIST OF ACRONYMS

4IR	:	Fourth Industrial Revolution
CEO	:	Chief Executive Officer
CID	:	Criminal Investigative Department
CISPD	:	Center for Innovation and Professional Skills Development
COCIS	:	College of Computing and Information Sciences
DPP	:	Directorate of Public Prosecution
ED	:	Executive Director
EDI	:	E-government Development Index
EMIS	:	Education Management Information System
FGD	:	Focus Group Discussion
GCIC	:	Government Citizens interaction center
ICDL	:	International Computer Driving License
ICT	:	Information Communication Technology
IDI	:	ICT Development Index
ISBAT	:	International Business, Science and Technology University
ISD	:	Institutional Strengthening and Development
IT	:	Information Technology
IFMS	:	Integrated Financial Management System
IPPS	:	Integrated Personnel and Payroll System
ITU	:	International Telecommunications Union
JLOS	:	Justice Law and Order Sector
HMIS	:	Health Management Information System
LGs	:	Local Governments
M&E	:	Monitoring and Evaluation
MAK	:	Makerere University
MCO	:	Mission Critical Occupation
MDAs	:	Ministries, Departments and Agencies
MoICT &NG	:	Ministry of ICT and National Guidance
MTN	:	Mobile Telephone Network
MUST	:	Mbarara University of Science and Technology
NDP	:	National Development Plan
NPR	:	Number Plate Recognition system
NIISP	:	ICT Initiatives Support Programme
NITA-U	:	National Information Technology Authority, Uganda
PESTLE	:	Political, Economic, Social, Technological, Legal and Ecological



PIT	: Project Implementation Team
PPDA	: Public Procurement and Disposal of Public Assets Authority
QGISAP	: Queensland Government ICT Skills Assessment Framework
RCIP	: Regional Communications Infrastructure Program
SMART	: Simple, Measurable, Attainable, Realistic and Time-bound
STAP	: Skills and Training Action Plan
STNA	: Skills and Training Needs Assessment
SWOT	: Strengths, Weaknesses, Opportunities and Threats
ToR	: Terms of Reference
TTL	: Task Team Leader
UBC	: Uganda Broadcasting Corporation
UCC	: Uganda Communications Commission
UICT	: Uganda Institute of Information and Communications Technology
UMC	: The Uganda Media Centre
UNHRO	: Uganda National Health Research Organization
UPE	: Universal Primary Education
UPL	: Uganda Posts Limited
UPOLET	: Universal Post O'Level Education and Training Program
USE	: Universal Secondary Education



DEFINITION OF TERMS

Terms	Description
ICT Professionals	Staff in target institutions who have qualifications in ICT and are classified by Ministry of Public Service as ICT professionals e.g. software engineers, ICT officers, IT officers, among others
Non-ICT professionals	These are professional staff such as: Accountants, Human Resource Officers, Auditors, Doctors, Agriculturists, CID Police officers, among others, who do not have a core background in ICT
AS-IS	The reflection of the current state of ICT skills and training needs for an institution as seen from the lens or opinion of the institutional stakeholders such as; Accounting Officers, Managers and individual staff. These are represented in form of observable skills, knowledge and behaviors
To-Be	The desired set of skills, knowledge and behaviors for staff in a given institution from the lens of members of that institution arranged according to the level of responsibility.
Demand SIDE of ICT skills	All institutions that employ ICT professional among other staff.
Supply SIDE of ICT skills	Institutions that provide ICT training and mentoring services such as universities and innovation hubs.
Digital Skills	The ability to use digital technologies to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately.
Digital literacy	Digital literacy is the ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technologies for employment, decent jobs and entrepreneurship. It includes competences that are variously referred to as computer literacy, ICT literacy, information literacy and media literacy.
Basic computing skills	The ability to use the 3 key office applications (word, excel and PowerPoint) and basic usage of email and internet browsing.
Intermediate digital skills	Advanced awareness of ICT concepts, use of more advanced features in office applications, email and internet, increased security awareness and practices, ability to self-teach more skills
Advanced/Expert digital skills	Ability to use different operating systems, use of complex features in office applications and ability to use the internet, email, data analysis apps among others. Usage of all packages on office suite, ability to learn new computer applications and systems with minimal support.
ICT skills and training needs assessment	The process of identifying, documenting and measuring available knowledge, skills and behaviors versus what is desired for various positions (lines of responsibility) in an Organisation.
ICT behaviors	The way an individual conduct himself/herself as far as the use of ICT tools and services is concerns; such as password management practices, use of online calendars and sticker notes, practicing online privacy, among others.



EXECUTIVE SUMMARY

Background to the Study:

The Government of Uganda, through development instruments like the Uganda Vision 2040, Digital Vision Uganda, the Third National Development Plan (NDP 3), The National ICT Policy, the E-government Framework, National Information Security Framework, the NITA-U Act 2010, the UCC Act 2013, among others, has earmarked ICT skills development as a critical pillar of social transformation of the country into a knowledge based middle income, globally competitive country. In NDP 3, under the Digital Transformation Programme, Government of Uganda is implementing various initiatives to accelerate the development of ICT innovation, development of ICT human capacity, expansion of the national backbone, increase access to computing devices and infrastructure, lower the barriers to ICT service access and overall promote the consumption of ICT services in the country. Furthermore, the efforts are geared towards improving government efficiency and effectiveness, more so, reduction of corruption and wastage in government.

In pursuit of the aforementioned agenda, Government of Uganda is a beneficiary of the Regional Communications Infrastructure Program (RCIP) Project that is complementing existing ICT and e-government Infrastructure initiatives by bridging the financing and technical gaps covered by other initiatives. This is being implemented by Ministry of Information and Communications Technology and National Guidance (MoICT& NG) through National Information Technology Authority- Uganda (NITA-U), focusing on addressing existing challenges of the ICT sector in government characterized by: unharmonised and disjointed deployment of ICT staff in MDAs and LGs; absence of professional and common ICT leadership guidelines/standards in MDAs and LGs; need to develop public service human resource policies and regulations to cover ICT professionals; misalignment between ICT education programmes offered by the Academia and ICT skills needs of the industry; mindset change among public officers; aligning ICT skills development and deployment with government development agenda and needs; and responding to emerging cyber security threat and global geopolitics.

Study Objectives:

The overall objective of the ICT Skills and Training Needs Assessment (STNA) was to provide a basis for systematic development of ICT capacity building and training for Government employees. The specific objectives of the study were to: Conduct an AS-IS Landscape Assessment specific to MoICT & NG, NITA-U, PPDA and the target sectors of Agriculture, Health and Education and Justice, Law and Order Sector (JLOS); engage stakeholders to determine the desired TO-BE State for MoICT & NG, NITA-U, PPDA and the target sectors of Agriculture, Health and Education and JLOS; and conduct an ICT skills



gap analysis on MoICT & NG, NITA-U, PPDA and the target sectors of Agriculture, Health and Education and JLOS.

Methodology and Approach:

In terms of general approach to STNA, the Consultant employed The Queensland Government's ICT Skills Assessment Framework (QGISAF) to conduct a situation analysis of (current ICT skills and training needs and the desired "To-Be") of the staff in RCIP implementing agencies and target sectors. Furthermore, the provisions of the International Telecommunication Union (ITU) Digital Skills Assessment Guidebook were incorporated in the methodology. The Consultant deployed mixed research methods incorporating both qualitative and quantitative methods of data collection and analysis. Data was collected using; thematic desk reviews, Key Informant Interviews (KII), Self-Assessment Questionnaire (SAQ), Institutional Questionnaires (IQ), Case Study Analyses Protocols (CSAP), Knowledge Co-creation Workshops, Stakeholder Data Validation and Cadre Profiling. The sample size for the study was estimated using the best fit approach given the nature of information desired and information sources. Accordingly, respondents to this study were selected using a Stratified Purposive Random Sampling Technique. A total of 271 stakeholders (46 key informants, 88 individual self-assessments, 36 institutional respondents and 101 from focus group discussions) were consulted against a target of 214 (45 institutional, 49 key informants and 120 individual self-assessments).

Key findings:

- i) Most organizations are not following the proposed ICT Cadre Schemes of Service as updated by Ministry of ICT & NG in the structuring and recruitment of ICT staff.
- ii) Majority of the MDAs assessed indicated that they were understaffed as far as ICT professional staff are concerned compared to their level of mandate and results framework, for example, Uganda Police Force, Uganda Prisons Service, among others.
- iii) Across board, there is insufficiency of critical ICT professionals such as Data Scientists, Cyber Security Technicians, Software Developers, Network Administrators, among others.
- iv) Most of organizations assessed are not following the proposed ICT Cadre Schemes of Service as updated by the Ministry of ICT and NG in the structuring and recruitment of ICT staff.
- v) Most ICT professionals in service of MDAs assessed have an average professional level of skills and competences in systems administration especially windows technologies, networking, user technical support, organizational enterprise systems, basic cyber security and office productivity applications but lack critical 21st century skills, such as cloud computing and virtualization, data science, cyber security, mobile and web technology, research and knowledge management, among others.



- vi) In terms of knowledge and behaviors, most ICT professionals demonstrated knowledge in core ICT concepts (such as networking technologies, information system architecture and IT systems integration, among others), organizational policies particularly those related to ICT, and key pillars of Uganda's E-Government frameworks. In terms of behavior, ICT programmes indicated greater awareness of cyber security demands and used acceptable password management practices, PC care practices (e.g. no pouring water on them), data backup and ethical consideration in service provisioning and self-learning.
- vii) In terms of ICT skills possessed by non-ICT professionals in the target MDAs, the results revealed that majority of professional staff in organizations like; accountants, doctors, auditors have basic skills in office applications and functional specific systems such as IFMS, IPPS, EMIS, HMIS, NPR, URA portal among others. Generally, most non-ICT professional staff have low awareness of cyber security, and use simple passwords across systems and platforms.
- viii) The assessment of the state of Continuous Professional Development (CPD) revealed that about 70% of the organizations sampled had not provided any specific ICT skills training to both ICT and non-ICT professionals as a means of building their ICT competences in the last 12 month or more. This is contrary to the principle of Professionalism, which requires all public sector institutions to plan, monitor and evaluate trainings, as espoused in the Uganda Public Service Training Policy (2006).
- ix) In terms of incentive structures for staff to acquire ICT skills, results revealed that majority of the institutions offer appraisal points, recognition of staff, sponsorship of the training activities, salary increment, promotion, and some do pay costs for staff to study in that order of importance.
- x) In terms of level of willingness to acquire ICT skills, majority of both ICT and non-ICT staff indicated that they very willing to invest in ICT skills development if they are sponsored or given time off, but less willing if they are required to sponsor themselves.
- xi) The most preferred means of ICT skill training design by MDAs was a combination of online and face to face, lasting not more than 5 days.
- xii) Most MDAs assessed do not publish key reports on their websites and do not update their websites regularly. The failure by MDAs to update their websites undermines government commitment on implement provisions of Access to Information Act, 2005 and the open government initiative.
- xiii) Currently, recruitment and management of ICT professionals is heavily decentralized, in most cases done with limited involvement of the MoICT &NG. Accordingly, there is lack of harmony in the management of ICT professionals in service of government as each MDA operates on its mandate. The existing approach limits sharing of vital knowledge and skills among MDAs, critical for effective operationalization of e-government services.



- xiv) The study revealed that generally there is low participation of MDAs, in ICT training activities at training institutions. Nearly 80% of organizations assessed indicated that they do not participate in curriculum development or delivery at training institutions, citing inhibiting factors, such as lack of collaboration or engagement from universities, lack of time and work overload, lack of facilitation to participate in the events, among others.
- xv) It is clear from the stakeholder consultations that ICT function as a whole and ICT skills capacity building in MDAs is not adequately funded as most of the organizations assessed did not have a dedicated budget voted for ICT skills development.
- xvi) A predominant pattern emerging from all organizations sampled indicated that IT strategic leadership is lacking in most organizations. Most senior leaders in organizations have limited awareness and appreciation of IT, hence, there is limited investment and alignment of ICT in organizational business processes.
- xvii) Majority of senior management teams in assessed MDAs do not have sufficient knowledge in IT strategic management, change management and IT leadership, decision enhancement. Majority have basic skills and knowledge in office applications, email and web browsing, social media usage. Their behaviors patterns can be characterized as less aligned to cyber security and technology leadership. The weak ICT leadership is partly to blame for the slow ICT skills development on some of these institutions.
- xviii) From the study findings, it is estimated that the country produces about 7,000 ICT professionals every year at various levels, majority of whom are at certificate level in various areas of ICT such as Cisco Networking Academy, Web development among others. However, the country still faces skills deficiency in critical areas of ICT such as; cyber security, animations, artificial intelligence, data science, complex systems development, cloud computing and virtualization, computer engineering, among others. The low supply of these critical skills is attributed to a number of factors and key among them include; being new fields of specialization and the high costs of training these professional.
- xix) The study finding indicated that innovations hubs and ICT skilling centers are making a strong contribution in the development of ICT skills.
- xx) In terms of skills new ICT graduates lack the most, the study revealed that cyber security (20%), data science and database management (16.3%), Basic ICT skills (16%), complex system design and analysis (13%), among others.
- xxi) Most ICT skills training service providers don not have capacity to deliver top end competencies ideal for 4IR due to the high capital investment needed in terms of labs like robotics, big data labs, artificial intelligence laboratories, cyber security and forensics labs, computer systems engineering labs, among others.
- xxii) With over 600 ICT skills training service providers in the country, over 50 universities, over 80 diploma awarding institutions over 20 innovation hubs and over



1000 online training service provider. It can be prudently concluded the Uganda has sufficient suppliers of basic ICT and mid-range skills.

- xxiii) In terms of MDA contribution to skills development, about 50% of the MDAs assessed indicated to provide internship options to students' most of which do not provide any facilitation and do not have a clear policy on internship training.
- xxiv) It was also reviewed that staff training budgets are often classified as wasteful expenditure by the Ministry of Finance, Planning and Economic Development hence prone to budgetary cuts from time to time. This has greatly affected the staff capacity building programmes in MDAs. This has affected the implementation of the e-government and digitalization agenda of government.
- xxv) The stakeholder consultations also revealed that all levels of responsibilities (strategic, management, ICT leadership, non-ICT professional staff and ICT technical staff) in all MDAs assessed need some form of ICT capacity building.
- xxvi) The results of the assessment also revealed that some agencies and departments did not have ICT units, despite their strategic importance to these department and the critical role played by ICT in sustaining service delivery in the current era of COVID-19 pandemic and in line with the Digital Transformation Programmes as articulated in the NDP3.

Key Recommendations:

To facilitate further growth of the Uganda's ICT sector, key recommendations have been made as discussed below:

- i) ICT professionals in government should be recruited and managed by MoICT & NG to address the unharmonised recruitment and management of ICT staff.
- ii) MoICT & NG, in collaboration with Ministry of Public Service, needs to update the ICT Professionals Scheme of Service to reflect new skills and person specifications for the different positions in line with the e-government framework.
- iii) MoICT & NG should regularize ICT establishments in MDAs in line with the ICT Cadre Schemes of Service and aspirations of the Digital Transformation Programme in NDP 3.
- iv) In line with the Uganda Public Service Training Policy (2006), all MDAs should provide an annual training plans with a dedicated budget line for ICT skills development in their annual work plans to MoICT & NG, in line with the aspirations of the Digital Transformation Programme.
- v) As part of improving digital literacy skills and increasing awareness of e-government framework, some of the e-government systems and concepts should be integrated in ICT digital literacy curriculum at all levels of education by the relevant Authorities such as National Curriculum Development Centre (NCDC).
- vi) MoICT & NG, through its agencies such as NITA-U and UICT, should set up online training sessions for various government agencies in areas where capacity gaps have been identified, especially basic digital literacy skills.



- vii) MoICT and NG should partner with academic institutions to establish centers of excellence in critical areas of ICT development which have higher capacity investment costs like robotics labs, computer systems engineering, artificial intelligence, digital forensics labs, among others.
- viii) MDAs should ringfence staff training budgets from budgetary cuts since this affects staff productivity and realization of the Digital Transformation Programme results.
- ix) MoICT & NG should ensure all communication officers in various MDAs maintain updated websites with all important information like annual reports, budgets, and strategic plans, among others.
- x) MoICT & NG, through its agencies such as NITA-U, UCC and UICT, should establish community-based knowledge and information centers to promote ICT skills development for civil servants and the general public as it is in the case of South Korea.
- xi) All employees of government must complete a minimum of 40 hours of ICT Continuing Professional Development (CPD) annually. NITA-U should set up an online tracking portal for CPD of each individual staff.
- xii) NITA-U should develop a National Digital Literacy Skills Framework which incorporates best practices from the different international frameworks, such as ICDL and the National Local Context Policy.
- xiii) The ICT education curricular at Primary and Secondary levels of education should be reviewed and aligned to the Digital Transformation Programme with a view that basic digital literacy skill stops at primary level and advanced computing skills such as computer programming, networking, gamification, animations among others are introduced at both Ordinary Level and Advanced Level in incremental manner.
- xiv) All ICT academic programmes developed by Universities and other tertiary institutions should be reviewed and approved by MoICT & NG before being accredited by National Council for Higher Education. Moreover, the ICT academic programmes should be subjected to a 3-year mandatory review to ensure continued competitiveness and compliance with accreditation requirements.
- xv) MoICT & NG and her agencies should organize regular annual training programmes for leaders in MDAs covering critical areas such as IT strategic leadership, change management, IT project management, cyber security and collaborative technologies among others. Every leader should be exposed to minimum of 40 hours of ICT training a year.
- xvi) ICT Professionals in different sectors of Government should regularly research about best practices in other countries and apply them in the Ugandan context.
- xvii) MoICT & NG should continuously establish bilateral collaborations with countries that are internationally recognized as leading in ICT development to benefit from knowledge exchange and learning.
- xviii) MoICT & NG and all MDAs should provide basic enabling ICT facilities especially computers and internet to all government employees, with special attention to those in JLCS.



- xix) The government should consider a tax waiver on ICT devices and internet purchase by government employees as a means of promoting e-government agenda.
- xx) Academic training institutions should provide a 10-20 percent academic staff time attachment to industry to enable academic staff acquire critical industrial skills and experience that are key in their delivery of ICT training.
- xxi) All academic institutions should encourage their staff to acquire industrial certification to improve their knowledge and skills of developing and delivering market demanded training content.
- xxii) Academic training institutions should adopt student centered problem-based learning to promote skills development. They should also promote practical or competence based academic progression assessment as opposed to theoretical examinations.
- xxiii) Academic training institutions should improve management and supervision of student field attachment to ensure meaningful engagement of students in their respective fields of study.
- xxiv) National Council for Higher Education (NCHE) should ensure that all training institutions of various ICT programmes have appropriate ICT infrastructure such as specialized laboratories to deliver the proposed programmes before approval. The Council should thereafter subject all training institutions to a 3-year mandatory curriculum review to ascertain the functionality of the infrastructure to support continued teaching of the approved curriculum.
- xxv) Alignment between the practical skillset needed by the employment industry and the curricula delivered in institutions of higher learning is very critical. This may require innovative approaches by academic institutions in involving the industry in curriculum design.
- xxvi) In recruiting ICT professionals, the appointing authorities in the Uganda Public Service (PSC, ESC, HSC, JSC, DSCs, Police Authority and Prisons Authority) should consider enriching the current traditional (open competition) recruitment and selection approach with competency-based procedures which facilitate selection of candidates with high level competencies for the ICT jobs. Such approaches could be computer-based assessment and practical (simulated) interviews as it is the case in Australia.
- xxvii) Recruitment of ICT professionals should adhere to the institutional strategic and annual manpower plans as opposed to the current reactionary approach based on urgent demanding situations.
- xxviii) The appointing authorities in various MDAs need to accord special emphasis on behavioral competencies, such as emotional self-awareness, teamwork, ethics and integrity and networking, in addition to the technical ICT competencies. This will inspire mindset change towards performance, accountability and innovation.
- xxix) To ensure effective operationalization of e-government, every public service entity should have a fully operational ICT Unit.



- xxx) Given the narrow scope of this study, MoICT & NG needs to expand this study beyond 5 sectors of government and 36 respondent organisations to cover the 13 remaining sectors and 147 Local government in order to provide a holistic status of the current ICT skills and training needs across government.
- xxxi) The appointing authorities in the Uganda Public Service (PSC, ESC, HSC, JSC, DSCs, Police Authority and Prisons Authority) should consider possession of basic ICT skills and competencies as evidenced by recognized certifications such as ICDL as a prerequisite for entry into public service.
- xxxii) With over 600 ICT training service providers, over 50 Universities and over 20 innovation and incubation centers, MDAs must be encouraged to use local solutions and hire local services providers given the capacity the exists in the country. For example, international consultants should only be hired where local capacity does not exist.



INTRODUCTION

The Consultant submits this ICT Skills and Training Needs Analysis (STNA) Report as the third deliverable of the assignment in line with the Terms of Reference (ToR). The report echoes the assignment background, details how STNA was conducted and provides; the “*as-is*”, the “*to-be*”, details the existing ICT skills, competencies and training needs in the RCIP implementing agencies and target sectors. Furthermore, the report presents the ICT skills supply side analysis to provide a holistic view of ICT skills and training needs assessment for the target agencies.

The report details some of the key ICT skills in short supply yet with high demand in government, and presents the current approaches to ICT skills development in the target MDAs. As means of establishing best practices to ICT skills development in government, six (6) international case studies covering Kenya, Ghana, Mauritius, Australia, South Korea and Estonia are presented. These countries were selected for analysis as they are internationally recognized as having progressive models of ICT sector development in general, and well-developed e-government frameworks, worth benchmarking. Furthermore, this report presents a summary of observations on the stakeholder engagement process, which could inform the client’s future approaches to assignments of this nature. The report also details critical areas of interventions at policy and operational levels for various stakeholders in the ICT skills development value chain. These will form the basis for the development of ICT Skills and Training Action Plan (STAP).



1.0 BACKGROUND

This section presents the context of ICT skills and training needs assessment in sub-section 2.1. Sub-section 2.2 details the thrust of the STNA. Sub-section 2.3 presents the objectives of ICT skills and training needs assessment. Sub-section 2.4 discusses the scope of the assessment, Sub-section 2.5 details the key tasks and activities executed by the consultant in line with the terms of reference. Sub-section 2.6 presents the methodology that was used to undertake the assessment. Sub-section 2.7 presents organization of the entire report.

1.1 Context of ICT Skills and Training Needs Assessment

The Government of Uganda, through various development instruments like the Uganda Vision 2040, Digital Vision Uganda, the third National Development Plan, 2020/21-2025/26, The National ICT policy, the E-government Framework, National Information Security Framework, the NITA-U Act 2010, the UCC Act 2013, among others, has earmarked ICT skills development as a critical pillar of social transformation of the country into a knowledge based middle income, globally competitive country.

In the third National Development Plan under the Digital Transformation Programme, Government of Uganda is implementing various initiatives to accelerate the development of ICT innovation, development of ICT human capacity, expansion of the national backbone, increase access to computing devices and infrastructure, lower the barriers to ICT service access and overall promote the consumption of ICT services in the country. Furthermore, the efforts are geared towards improving government efficiency and effectiveness, more so, reduction of corruption and wastage in government.

Thus, in pursuit of the aforementioned agenda, Government of Uganda is a beneficiary of the Regional Communications Infrastructure Program (RCIP). The RCIP Uganda Project is complementing existing ICT and e-government Infrastructure initiatives by bridging the financing and technical gaps that are not covered by other initiatives. The programme is being implemented by the Ministry of Information and Communications Technology and National Guidance (MoICT& NG) through National Information Technology Authority- Uganda (NITA-U). As articulated in the various programme documents and in the inception report for this assignment, the RCIP Uganda Project targets the following agencies and target sectors:

- i) MoICT & NG;
- ii) NITA-U;
- iii) Public Procurement and Disposal of Public Assets Authority (PPDA);
- iv) Ministry of Health and its agencies which, include National Drug Authority, National Medical Stores, Uganda National Research Organization, Uganda Aids Commission,



- Health Service Commission, Uganda Blood Bank Transfusion Services, Uganda Virus Research Institute and Natural Chemotherapeutics Laboratory;
- v) Justice Law and Order Sector (JLOS), which include Judiciary, Uganda Prisons Service, Directorate of Public Prosecutions (DPP) and Uganda Police Force;
 - vi) Agriculture Sector which includes Ministry of Agriculture, Animal Industry and Fisheries and its agencies, notably National Agricultural Research Organization, National Agricultural Advisory Services, Coordinating Office for Control of Trypanosomiasis in Uganda, National Animal Genetic Resources Centre and Databank, Uganda Coffee Development Authority and Cotton Development Organization; and
 - vii) Education sector which includes Ministry of Education and Sports and its agencies, notably National Council for Higher Education, National Curriculum Development Centre, Directorate of Education Standards, and Education Service Commission.

The Implementation of the Institutional Strengthening and Development (ISD), a sub-component of the RCIP Uganda Project is aimed at supporting capacity building of beneficiary and target organizations. The programme seeks to stimulate ICT integration and mindset change for Government Leaders, Officers and Information Technology Personnel in an effort to promote utilization of ICT and uptake of e-government services.

Accordingly, the ICT skills and training needs assessment is expected to contribute to the following key outcomes at sector level:

- i) Identification of future ICT skills needed by various categories of civil servants in selected MDAs over the next 3 to 5 years.
- ii) Streamlined recruitment, deployment and management of ICT professionals in MDAs.
- iii) Enhanced ICT skills and competencies among government employees.
- iv) Improved and streamlined remuneration of the ICT professionals in MDAs.
- v) Improved quality and quantity of ICT services in RCIP implementing agencies and target sectors.
- vi) Alignment of ICT skill development to business goals and needs of target MDAs.
- vii) Development of strategies for addressing current and future skill gaps, career and succession planning.

1.2 Digital Literacy Skills Frameworks Overview

The importance of digital literacy for national development has been more important than in the modern knowledge-based economy. Accordingly, there have been efforts on the development of national and global frameworks for digital literacy implementation



to bolster citizens’ digital literacy. We note that a number of the digital literacy frameworks exists and largely emphasize two broad competence areas, which include (a) Computing device operations. This relates to basic operations of the digital devices, such as turning them on and off, understanding basic concepts of hardware and software, and operations on a graphical user interface; (b) Occupation productivity competences. These refer to competences in the use of digital technologies that are important productivity tools for particular business sectors or lines of occupation. We observe that most of the modern digital literacy frameworks are built on DigComp 2.0 framework illustrated in **Table 1** below, which shows the key areas of competences desired for a digital literate citizen.

Competence area	Competences
1. Information and data literacy	1.1 Browsing, searching and filtering data, information and digital content 1.2 Evaluating data, information and digital content 1.3 Managing data, information and digital content
2. Communication and collaboration	2.1 Interacting through digital technologies 2.2 Sharing through digital technologies 2.3 Engaging in citizenship through digital technologies 2.4 Collaborating through digital technologies 2.5 Netiquette 2.6 Managing digital identity
3. Digital content creation	3.1 Developing digital content 3.2 Integrating and re-elaborating digital content 3.3 Copyright and licenses 3.4 Programming
4. Safety	4.1 Protecting devices 4.2 Protecting personal data and privacy 4.3 Protecting health and well-being 4.4 Protecting the environment
5. Problem solving	5.1 Solving technical problems 5.2 Identifying needs and technological responses 5.3 Creatively using digital technologies 5.4 Identifying digital competence gaps

Table 1: DigComp 2.0 competence areas and competences (source: UNESCO Global Digital Literacy Framework)

The study conducted by UNESCO during the development of “*A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2*”, found three dominant enterprise digital literacy frameworks adopted by countries around the world. These are:

- i) International Computer Driver’s License (ICDL) adopted in 31 countries; and
- ii) Certiport Internet and Computing Core Certification (IC) adopted in 13 countries; and
- iii) Microsoft Digital Literacy Standard Curriculum-adopted in 11 countries in decreasing order of popularity.

From the background the digital literacy frameworks, section 2.3 below presents the Thrust for ICT STNA.

1.3 Thrust for ICT STNA

Figure 1 below highlights the justification of STNA in line with the mandate of MoICT & NG and NITA-U.

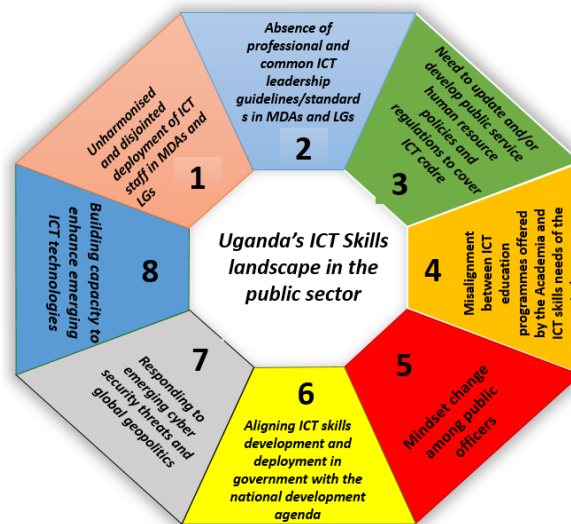


Figure 1: STNA Thrust

- i) *Unharmonised and disjointed deployment of ICT staff in MDAs and LGs:* At present, recruitments, supervision and management of ICT staff in Ministries, Departments and Agencies (MDAs) and Local Governments (LGs) is not aligned to the institutional and structural set up of the Line Ministry-Ministry of ICT and National Guidance (MoICT & NG). Hence, the efficient and effective utilization of this cadre of public officers especially in relation to furthering the role of ICT in enhancing public service delivery is not well managed.
- ii) *Absence of professional and common ICT leadership guidelines/standards in MDAs and LGs:* Due to lack of alignment between institutional and staffing structures in MoICT & NG and ICT functions in MDAs and LGs, there is lack of standardization of the quality of ICT staff in MDAs and LGs. Hence, the quality of ICT leadership and service in some MDAs and LGs is wanting. For instance, some MDAs do not have substantive ICT staff.
- iii) *Need to update and/or develop public service human resource policies and regulations to cover ICT professionals:* To fully integrate and support the ICT workforce in government, government needs to regularize and integrate ICT positions into its public service staffing structure.

- iv) *Misalignment between ICT education programmes offered by the Academia and ICT skills needs of the industry:* Although the education sector churns out a number of graduates annually, most of them do not have the technical, market-oriented expertise required by public and private sectors. In addition, local education institutions have not started offering certain programmes especially those targeting emerging fields in information technology such as artificial intelligence, block chain technologies, among others. This could be caused by lack of adequate staffing, financing or both.
- v) *Mindset change among public officers:* Even where the government has procured and instituted ICT programmes to enhance efficiency in service delivery, full uptake and utilization of such programmes (e.g. IPPS) has not been achieved. Some pockets of public officers still prefer to use analogue (paper based) approaches.

1.4 ICT Skills and Training Need Assessment Objectives

As observed from the thrust of STNA, the overall objective of the ICT Skills and Training Needs Assessment was to provide a basis for systematic development of ICT capacity building and training for all employees in service of government. The specific objectives of the entire assignment are illustrated in Figure 2 below:

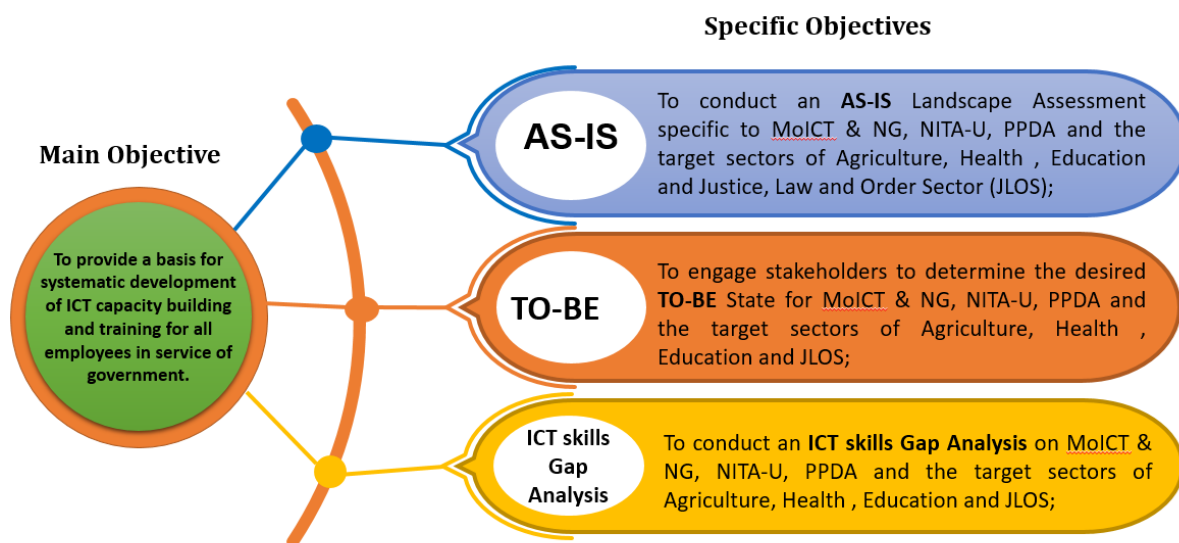


Figure 2: Objectives of STNA

1.5 Scope of the Assignment

The ICT STNA was conducted at four levels:

- i) Institutional,
- ii) occupational,
- iii) individual employee, and
- iv) International benchmarking as detailed in the following sections.



1.5.1 Institutional Assessment

In order to establish the current state of ICT skills and associated ICT skills development practices, the Consultant conducted institutional level assessment in 36 out of the initial target of 45 institutions.

The key parameters captured at institutional level included ICT Professional staffing levels, the skills that new ICT and non-ICT professional employees possessed, the kind of ICT training programmes offered, the ICT skills lacking for new ICT employees and the sources of ICT professionals, among others.

Other key parameters assessed were the preferred training delivery mode and length for ICT training programmes, and the ICT skills and knowledge needs per line position of responsibility at the levels of: Strategic leadership/Boards, Senior Organization management (EDs, Directors and Managers), non-ICT professional staff (Accountants, HR, Auditors, Doctors, Extensions Officers, etc), ICT technical staff and Senior ICT staff (Heads of ICT Units, ICT managers, etc).

1.5.2 Individual Self-Assessment

At individual level, the STNA exercise focused on capturing the officers' (both ICT and non-ICT professional staff of institutions) awareness and understanding of an enabling environment, level of proficiency in office productivity digital skills, knowledge and day today workplace behavior, level of ICT skills need, means of delivery, incentives for acquiring ICT skills, cost and affordability pertaining both ICT and non-ICT professionals, among others. A total of 271 individual respondents were achieved across all the target RCIP organizations and sectors. The categories of respondents reached included the ICT technocrats and other professional cadres, such as Human Resource Officers, Police Officers, Prison Wardens, Doctors, Accountant, State Attorneys, Judicial Officers, among others.

1.5.3 Key Informant Interviews

An assignment of this nature required the capture of inputs from Accounting Officers, sector opinion leaders and ICT skills suppliers. Accordingly, key informant interviews (KII) were conducted to aid the establishment of the current (AS-IS) and the desired (TO-BE): ICT skills, knowledge and behaviors in the areas of awareness of e-Government Systems and status of the enabling environment, current state of ICT skills and training needs for MDAs and the ICT skills supply and sector trends. From each RCIP implementing agency and target sector, responses were obtained from key sector opinion leaders, Board members, Permanent Secretaries and Executive Directors.



1.5.4 International Benchmarking

In an effort to identify appropriate models and strategies for ICT skills development in the RCIP beneficiary agencies and target sectors using the best practices approach, the Consultant conducted benchmarking studies on eight (6) countries that can be described as:

- i) Internationally recognized leading countries in e-government and ICT development. These are **Category one** i.e. highly advanced ICT countries (South Korea, Estonia and Australia); and
- ii) Sub-Sahara African countries which economically and socially are comparable to Uganda, but have been documented as well performing in ICT development. These are **Category two** i.e. Sub-Saharan Africa ICT advanced countries (Uganda, Mauritius, Kenya and Ghana).

These countries were selected based on their performance on international indices, namely: a) *E-Government Development Index (EDI)*, b) *The International Communications Union (ICU)*, c) *ICT Development Index (IDI)* and d) *Global Innovation Index (GII)*, among other parameters.

The overall goal of benchmarking was to establish best practices and experiences from these countries as far as ICT development and ICT human capacity development was concerned, with a view of identifying strategies that Uganda can adopt.

For purposes of comparison, the key areas of focus were ICT sector policies, regulations and strategies that have supported the successful establishment and development of strong and sustainable ICT functions in those Governments.

1.6 ICT STNA Methodology and Key Assessment Activities

The ICT STNA was executed in four main phases:

- Phase 1: Inception
- Phase 2: Stakeholder consultation and international benchmarking
- Phase 3: Data analysis and primary validation
- Phase 4: ICT Skills and Training Needs Assessment (STNA) reporting

In terms of general approach, the assessment was conducted in a participatory and consultative manner, involving relevant stakeholders at each phase of execution.

It is worth noting that an ICT skills and training needs assessment is the **process** of identifying, documenting and measuring available knowledge, skills and behaviors versus what is desired for various lines of responsibility in an Organisation. By clearly defining what ICT skills, knowledge, behaviors and the standard of performance required



for a specific position (now and in the future) in the target MDAs, the Consultant was able to identify skill gaps and establish associated strategies to address the identified gaps.

1.6.1 General Approach

In terms of general approach to STNA, the Consultant employed *The Queensland Government's ICT Skills Assessment Framework* (QGISAF) to conduct a situation analysis of (current ICT skills and training needs and the desired "To-Be") of the staff in RCIP beneficiary institutions. Furthermore, the provisions of the International Telecommunication Union (ITU) Digital Skills Assessment Guidebook were incorporated in the methodology¹. QGISAF recommends five steps for undertaking a holistic ICT skills assessment, notably:

- Identify core ICT skills required level of responsibility in an organization;
- Conduct employee self-assessment to establish current and future skills, knowledge, and behaviors;
- Analyze skills gaps from the perspective of demand versus supply;
- Discuss anomalies and identify learning and development actions; and
- Monitor and evaluate.

The following text details how QGISAF was applied in the execution of STNA.

- i) Identify core skills and level of responsibility:** This involved analysis, identification and documentation of the individual skills/competencies, knowledge and behaviors required for a specific role now and in the future. Initial information was obtained from stakeholder consultations, ICT professionals' scheme of service, human resource manuals and policies, ministerial policy statements, reports on various studies, among others. This information was later discussed with institutional respondents/ accounting officers to confirm the ICT skills and competences for various levels of responsibility on the target organizations.
- ii) Employee self-assessment:** This involved a selected number of employees per organization to take an ICT skills and knowledge self-assessment in order to establish their individual level of capability versus the skills/competencies, knowledge and behaviors required for a specific role.
- iii) Analyze skills gap:** The Consultant analyzed data from various sources and established both the "As-Is" and the "To-Be" ICT skills and training needs for the target organizations. The initial output of this was the stakeholder consultation report. Thus, as part of quality assurance on the findings, the Consultant shared the summaries, matrices and observations with the representatives of target agencies to confirm and validate the findings.

¹ ITU the *Digital Skills Assessment Guidebook* 978-92-61-31101-8

iv) **Identify learning and development actions:** The Consultant reviewed the emerging skills gap(s), brainstormed on anomalies and identified possible learning and ICT skills development actions.

Figure 3 below summarizes the Queensland Government’s ICT Skills Assessment Framework (QGISAF)

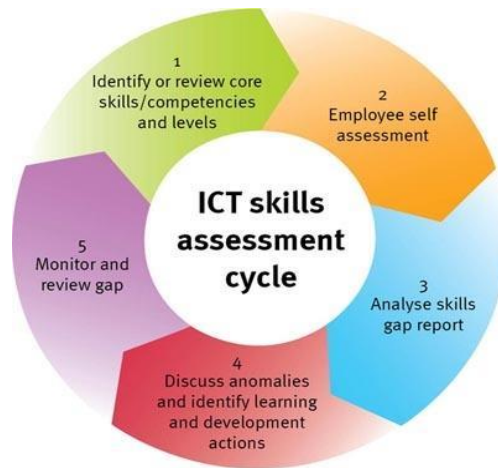


Figure 3: Queensland Government’s ICT Skills Assessment Framework (QGISAF)

1.6.2 STNA Key Tasks and Activities

The consultant undertook a number of tasks and associated activities while conducting the ICT STNA. The matrix below highlights the key activities performed by the consultant:

Key tasks	Key activities undertaken
Entry meetings with the Client’s Project Implementation Team	<p>Online entry meetings with the client PIT to:</p> <ul style="list-style-type: none"> Understand the assignment and approval of strategies. A total of 4 meetings were held.
Stakeholder identification	<p>In consultation with the Client PIT, a stakeholder mapping was conducted that was used to establish key stakeholders for consultation.</p> <ul style="list-style-type: none"> The organizations were selected based on their roles in the RICP programme. The organizations’ top-level respondents (Accounting Officers, heads of Human Resource and heads of ICT) were identified based on their critical role in the ICT human capacity development of those entities. The individual respondents (staff self-assessment) and key informants were identified by the designated Accounting Officer of the target organization.
Tool development	<ul style="list-style-type: none"> Involved the design of data collection tools, tool testing and validation, and data collection tool digitalization.



Key tasks	Key activities undertaken
	<ul style="list-style-type: none"> To design appropriate tools, guiding research questions were defined and discussed with the client PIT; with drafting and discussion of the initial tools for completeness and clarity. A total of 5 tools were developed i.e. i) Key informant interview protocol (Annex 7.1a), ii) Institutional assessment (Annex 7.1b), iii) individual self-assessment (Annex 7.1c), iv) Focus group discussion guide (Annex 7.1d) and v) Stakeholder document review guide (Annex 7.1e). The tools were then reviewed by experienced researchers who did not participate in the design exercise for clarity, consistency and validity. The tools were pilot tested using selected Makerere University staff and two other target agencies.
Tool testing and validation	<ul style="list-style-type: none"> Pilot Testing of tools Revision of tools (final drafting) Digitization of tools to ensure standardized data capture and reporting
Data collection team orientation	<ul style="list-style-type: none"> An orientation workshop of the data collection team involving experts and research assistants on; the research tools and methods, processes and observance of COVID19 Standard Operating Procedures as key items of the agenda, was conducted. This was done at Empower Consult offices, Ntinda, Kampala
Data capture	<ul style="list-style-type: none"> Institutional assessment and self-assessment tools were digitally administered to selected respondents and The Key Informant Interviews were facilitated by enumerators. Regular monitoring of the data dash board to determine the levels of response and quality was done Data mining of thematic issues from the stakeholder consultation report
International bench marking	<ul style="list-style-type: none"> Document review of target countries to elicit relevant information to the STNA (Canada, Australia, South Korea, Estonia, Mauritius, Kenya and Ghana) Areas reviewed were: ICT sector policies, regulations and strategies that have supported the successful establishment and development of strong and sustainable ICT Functions in those Governments.
Data cleaning and completeness	<ul style="list-style-type: none"> Evaluation of data Cleaning of data Summarizing of data
Data validation	<ul style="list-style-type: none"> Primary data collected from respondents was analyzed and shared with the respondents to confirm validity of opinions
Data analysis	<ul style="list-style-type: none"> Qualitative data was analyzed using thematic content analysis, while quantitative data was analyzed using descriptive statistics.



Key tasks	Key activities undertaken
Report writing	<ul style="list-style-type: none"> Using Delphi Techniques, the 1st Knowledge creation workshop to conceptualize the STNA and create acceptable template was conducted Consultative and engagement meeting (via zoom) with the PIT for purposes of appreciating and approving the STNA reporting template (structure). 2nd Knowledge creation meeting to draft the STNA was conducted Extended in-depth data mining of thematic issues from the responses, The STNA draft report was put in place
Regular updates	<ul style="list-style-type: none"> The Consultant had an internal coordination structure, in which every team member provided daily updates on their actions on the assignment. On regular intervals the Consultant provided updates to the client PIT, through the WhatsApp group, emails, phone calls and progress reports.
STNA report	<ul style="list-style-type: none"> Systematic aggregation and incorporation of key observations into the draft STNA report (this document). Consultative and engagement meeting (via zoom) with PIT for purposes of appreciating and approving the STNA report. Incorporation of PIT observations Submission and approval of the final STNA Report

Table 2: STNA Key Tasks

1.7 Methodology for ICT STNA

In line with the *Queensland Government's ICT Skills Assessment Framework (QGISAF)* and the STNA tasks, the Consultant deployed mixed research methods approach incorporating both qualitative and quantitative methods of data collection and analysis. The team employed both primary and secondary information collection mechanism such as desk reviews, key informant interviews, self-assessment questionnaire, institutional questionnaires, case study analyses, knowledge co-creation workshops, stakeholder data validation and cadre profiling. The sample size for the study was estimated using the best fit approach given the nature of information desired and information sources.

1.7.1 Target Respondents and Respondent Selection Criteria

Given the nature of the study, respondents to this study were selected using a Stratified Purposive Random Sampling Technique. A purposive random sampling technique is the selection of respondents to a study based on their unique qualities enabling them to provide the desired opinions and experiences about a given phenomenon under investigation (Mirembe, 2015). Guided by the QGISAF, respondents' categories, the number of respondents was defined and estimated in consultation with the Client's Project Implementation Team.



271 stakeholders (46 key informants, 88 individual self-assessments, 36 institutional respondents and 101 from focus group discussions) were consulted against a target of 214 (45 institutional, 49 key informants and 120 individual self-assessments).

1.7.2 Data collection

Table 3 below highlights the data collection methods were used:

Method	Number of reports/ respondents	Description
Desk review	Documents reviewed included Ministerial Policy Statements, Institutional Strategic Plans, Annual Performance Reports and Approved Staff establishment. Over 50 documents were reviewed	Documents provided by the stakeholders were reviewed to enhance the Consultant's situation analysis of the organizations.
Key informant interviews	46 key informant interviews were conducted	Interviews were conducted with key informants via physical meetings, Zoom or phone interviews using the key informant interview protocol.
Focus group discussion	7 focus groups involving 101 participants were conducted	Used as a qualitative approach to gain an in-depth understanding of social issues. This was used to draw up respondents' attitudes, feelings, beliefs, experiences and reactions.
Self-assessment questionnaires	88 responses were obtained	The tool was imposed to seek opinions of individual staff within target MDAs at the levels of ICT technical support staff, Heads of ICT Departments/Divisions, Functional Line Managers, and non-ICT professional staff in Finance and Administration Departments, Policy and Planning Departments/Units.
Institutional assessment questionnaire	36 responses were obtained	This questionnaire was imposed to the target institutions in order to conduct ICT Skills and Training Needs Assessment (STNA) for various Ministries, Agencies and Department (MDAs) and to provide platform for development of an ICT Skills and Training Action Plan (STAP) for RCIP implementing agencies and beneficiary sectors.
Knowledge co-creation workshop	8 knowledge core-creation workshops were held	The workshops were conducted through structured discussions, brainstorming, and ideation to draw out ideas, risks, approaches, and



		clarity that can lead to better partnership designs and better outcomes during implementation.
Stakeholder data validation		Validating the accuracy, clarity, and details of stakeholder data was made in order to mitigate any project defects.
ICT professionals staff profiling	All the core positions from 36 organizations were profiled.	This conducted in order to depict the core positions in the organizations, the ICT skills possessed in comparison to the desired ICT skills.

Table 3: Data Collection Methods

To ensure that valid and quality data was collected, the data collection tools were digitized on a mobile app for efficient data collection, and then tested for content validity. According to Mirembe, 2015² validating the content of a research instrument increases the reliability of results and the response rate of the tool. The instrument validity focused on clarity of statements and relevancy to the research objectives.

The study instruments were piloted using five experts who did not participate in the final study to assess the validity of the statements. Questions that were poorly phrased or found irrelevant for the study were corrected or deleted during this exercise, hence delivering a valid tool.

1.7.3 Data Analysis

After the data was collected, it was cleaned, coded and analyzed. Quantitative data was analyzed using SPSS and a spread sheet software and presented using graphs, pie charts, tables and info graphics while the qualitative data was analyzed using content thematic analysis.

² <http://www.drakemirembe.org/publication/the-threat-nets-approach-to-information-systems-security-risk-analysis-2/>



1.8 Report Organization

Figure 4 below summarizes organization of the report

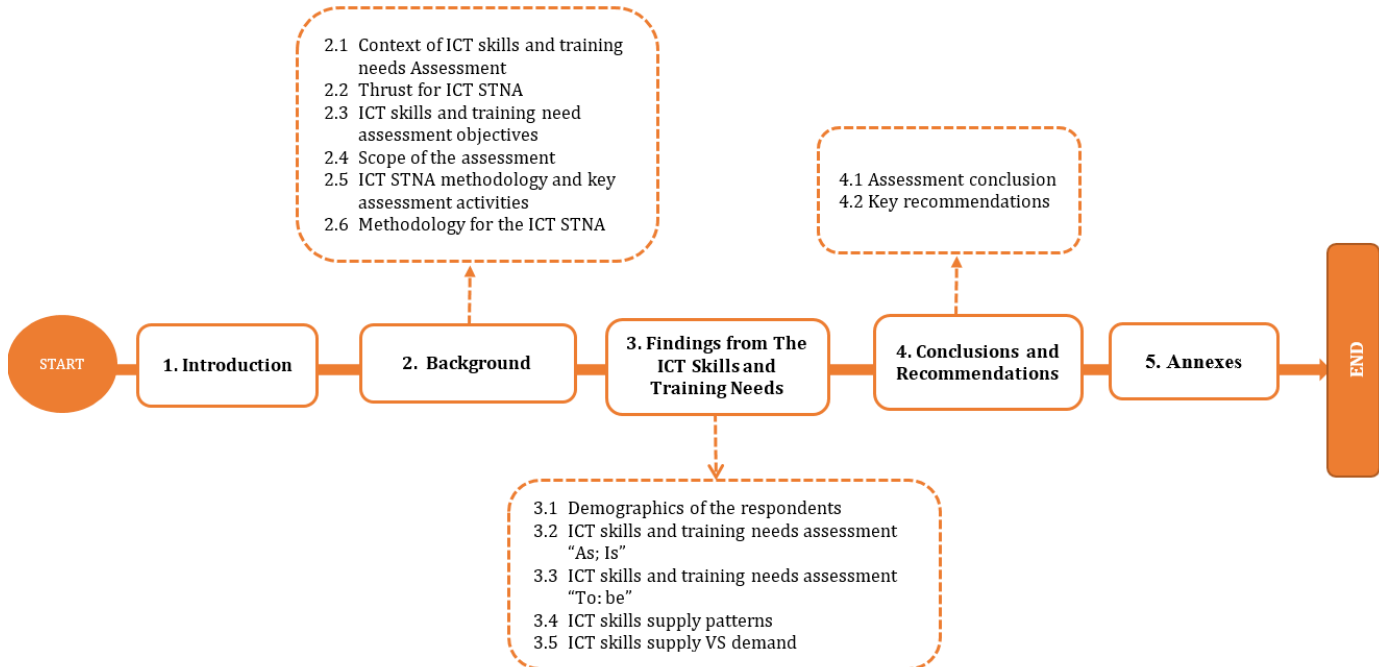


Figure 4: Report Organization



2.0 FINDINGS FROM THE ICT SKILLS AND TRAINING NEEDS ASSESSMENT

This section presents and discusses the findings of the ICT Skills and Training Assessment conducted among the target RCIP implementing agencies and sectors as highlighted in section 2.1. The section presents a holistic picture of the ICT skills demand from the target MDAs and supply characteristics from two broader categories of stakeholders who were consulted (**Demand** and **Supply** side of ICT skills). The RCIP implementing organizations and target sectors constituted the **demand side** while the private sector and academia who provide ICT training services constituted the **supply side**.

Section 3.1 presents the current situation of ICT skills and training needs, section 3.2 presents the desired “To-Be” ICT skills and training needs from the lens of stakeholders, literature review and international benchmarking. Section 3.3 presents the current state of ICT skills supply from academia and industry. Section 3.4 details the ICT Skills and Training Needs gaps identified from the study.

2.1 Demographics of the respondents

A total of 271 stakeholders (46 key informants, 88 individual self-assessments, 36 institutional respondents and 101 from focus group discussions) were consulted for this study. The results obtained from the demographics of the respondents indicated that among the individual respondents, majority 75% of them were male and only 25% were female between the age group of 26-45 years, 62.1% were ICT professionals with 6-10 years’ experience. These findings have been highlighted in table 4 below:

Variable name	Group	Number	Percentage (%)
Gender	Female	22	25
	Male	66	75
	Total	88	100
Age	Less than 25	4	4.5
	26 -35	35	39.8
	36-45	30	34.1
	46 - 55	17	19.3
	Above 56	2	2.3
	Total	88	100
Professional Category	ICT	54	62.1
	Non-ICT	33	37.9
	Total	88	100
Years of Professional Experience	0-2	7	8
	3-5	21	23.9
	6-10	30	34.1
	10-20	23	26.1
	Greater than 20	7	8
	Total	88	100
	none	29	36.3

Variable name	Group	Number	Percentage (%)
Years of Experience at senior management level in MDA	1-2	12	15
	3-5	21	26.2
	6-10	10	12.5
	10-20	8	10
	Total	88	100
Education background	Certificate	0	0.0
	Diploma	3	3.4
	Bachelors	45	51.1
	Postgraduate diploma	3	3.4
	Masters	32	36.4
	Doctorate	5	5.7
	Total	88	100
Attended ICT training in the last 12 months	Yes	20	22.7
	No	68	77.3
	Total	88	100

Table 4: Demographics of Individual Employee Respondents

As shown in Table 3, most of the respondents were male (75%), ICT professionals (62%), had over 6 years of professional experience (38%), had a bachelor's degree (51%) and had not attended any ICT training programme in the last 12 months (78%).

Table 5 below summarizes demographics of the key informants.

Variable name	Group	Number	Percentage (%)
Gender	Female	6	16.6
	Male	30	83.3
	Total	36	100
ICT skills Proficiency ranking	0 (very low)	1	2.9
	4	1	2.9
	5	3	8.6
	6	2	5.7
	7	3	8.6
	8	9	25.7
	9	12	34.3
	10 (Very Proficient)	5	14.3
	Total	36	100
Highest Academic Qualification	Bachelors	4	11.1
	Masters	23	63.9
	Doctorate	9	25
	Total	36	100
Length of training of ICT graduates to a level of productivity by the MDA	2 Months	6	17.1
	3 months	12	31.4
	6 months	9	25.7
	1 year	9	25.7
	Total	36	100

Table 5: Demographics of Institutional Respondents

As highlighted in **Table 5** above, majority of the key informants were male (83%), had a master's degree (64%) and possessed above average ICT skills proficiency. Figure 5 below highlights the age and gender distribution of respondents to the study.

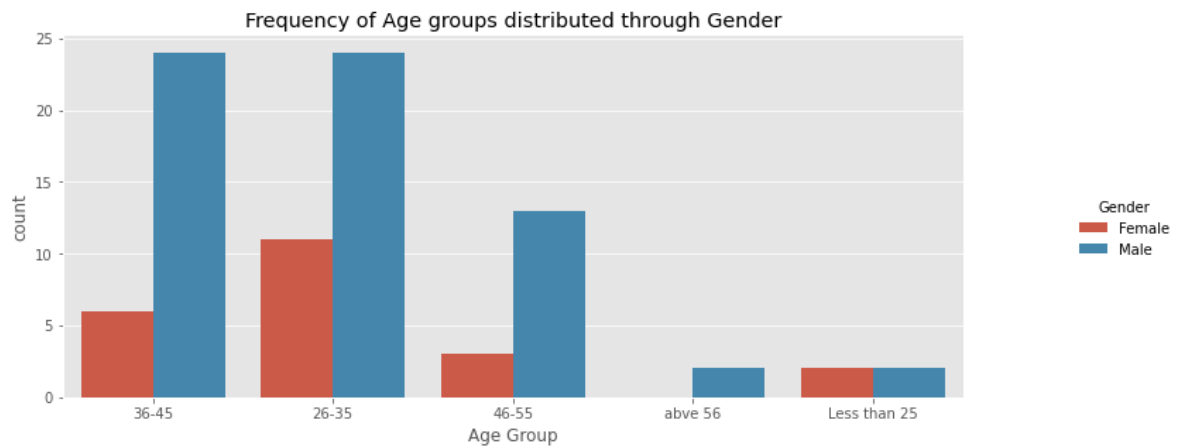


Figure 5: Respondents age and gender

In terms of the level of education attained, the highest percentage of respondents possessed bachelor's degree as illustrated in figure 6 below.

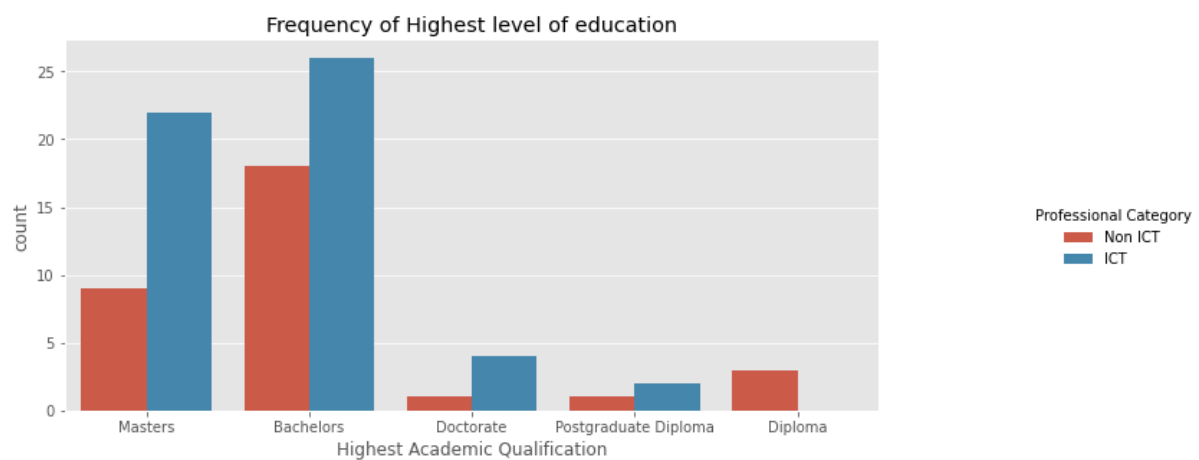


Figure 6: Respondents highest Academic qualification

These findings show that respondents had the appropriate background to provide the necessary information to address the research questions.

2.2 ICT Skills and Training Needs Assessment “As-Is”

This section presents the state of ICT skills Continuing Professional Development (CDP) in 3.2.1, ICT staffing structures and capacities in 3.2.2, the current stake of ICT skills, knowledge and behaviors in the target RCIP MDAs in 3.2.3, adequacy of ICT professionals in key MDAs in section 3.2.4.

2.2.1 State of Continuing Professional Development (CPD)

a) Availability of Annual ICT Training programs

According to the Uganda Public Service Training Policy (2006), staff training is a core strategy of building and maintaining an efficient, effective and professionally competent the Public Service as administrative machinery of Government, capable of originating and implementing Government Programmes. Countries such as South Korea and Estonia have human capacity development as the first priority on their digitalization agenda and have invested heavily in ICT training as anchor for e-service delivery machinery. In this context, all MDAs ought to view training in ICT as a core investment for government efficiency and returns.

Thus, the assessment though to establish the extent to which staff in target MDAs have accesses to annual ICT skills programmes. The results of this assessment established that majority (81%) of the institutions had not provided any ICT training to staff in the last 12 months which further attributed to a large number of the individuals (77.3%) not having attended any ICT training in the past 12 months. This is well illustrated in the figure 7 below:

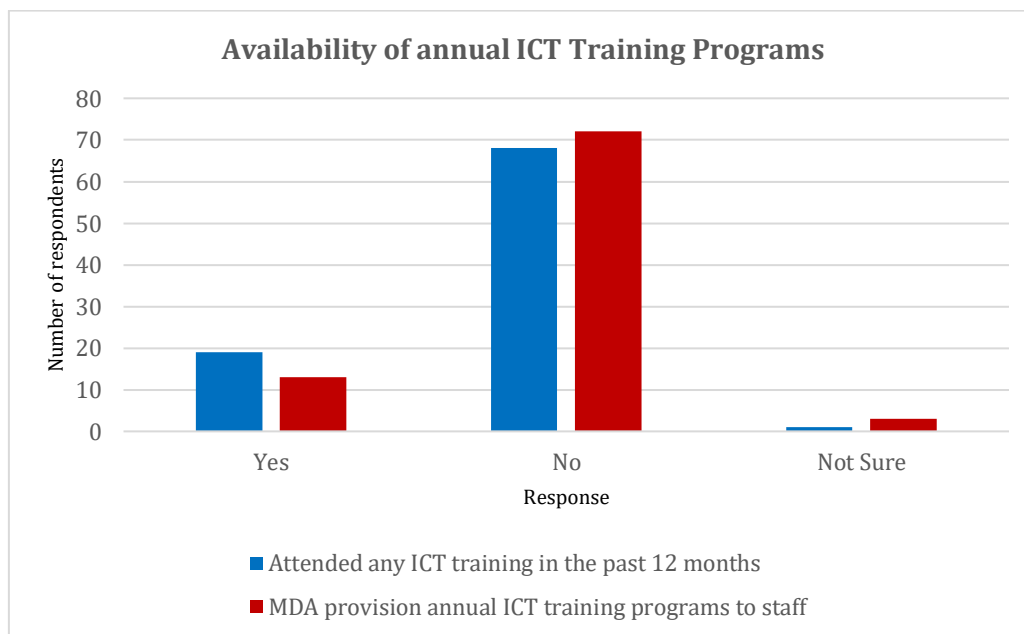


Figure 7: Provided or attended ICT Training in the last 12 Months

b) Availability of a dedicated budget vote for ICT Skills development

The results of the study revealed that most organizations assessed did not have a dedicated budget vote as only 28% of the Accounting Officers indicated that their institution had a dedicated budget vote for ICT Skills development, while 33% were not sure if their institutions had a dedicated budget vote as highlighted in Figure 8 below:

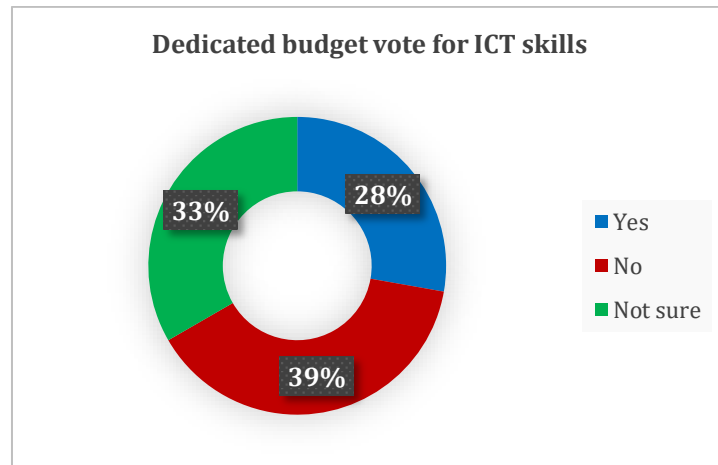


Figure 8: Availability of dedicated ICT skills development budget vote

c) Types of ICT training programmes offered by RCIP implementing agencies and target sectors in the last 12 months

Given the fact that some institutions indicated to have offered ICT skills development programmes to their staff, the study sought to establish the type of ICT skills development programmes offered to both ICT and non-ICT staff. The results indicated that 33.3% of the non-ICT staff did not receive any training and the rest trained in basic computing skills and other fields (**Figure 9**).

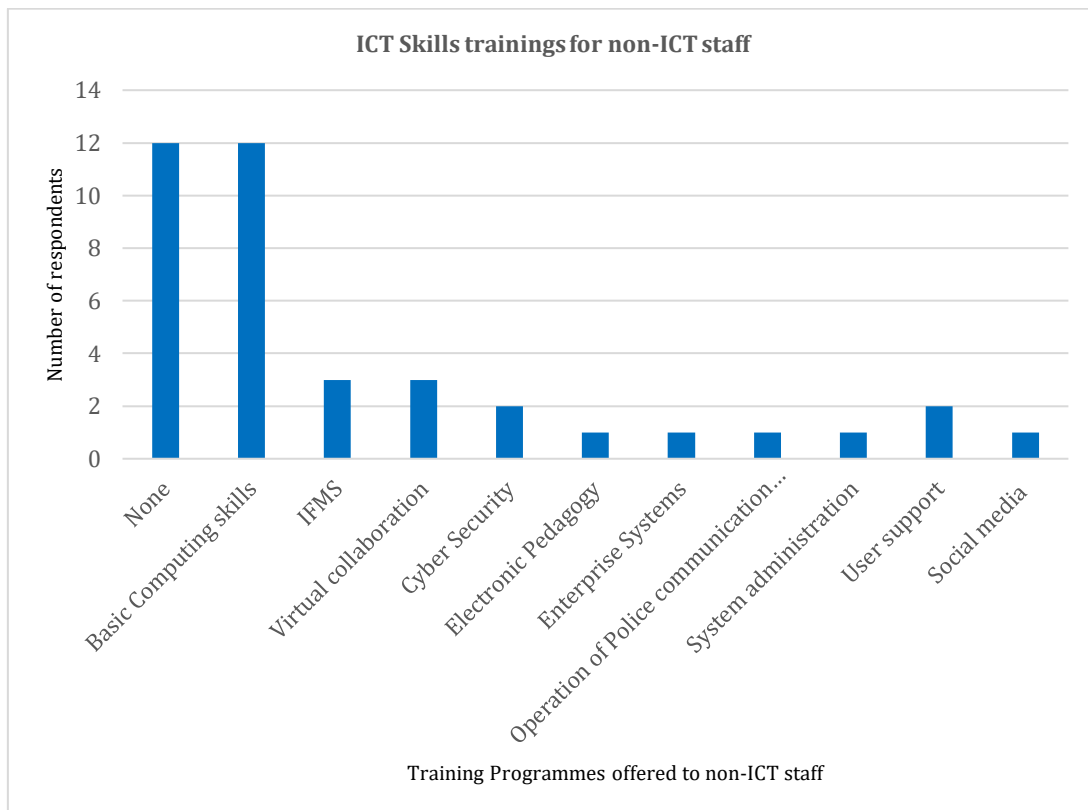


Figure 9: Types of ICT training programmes offered to non-ICT staff in last 12 months

Figure 10 below shows the type of training programmes offered to ICT professional staff in the targeted MDAs. Majority (72.2%) indicated not having offered any ICT training to their staff in the last 12 months and the rest indicated several short course trainings were offered as illustrated:

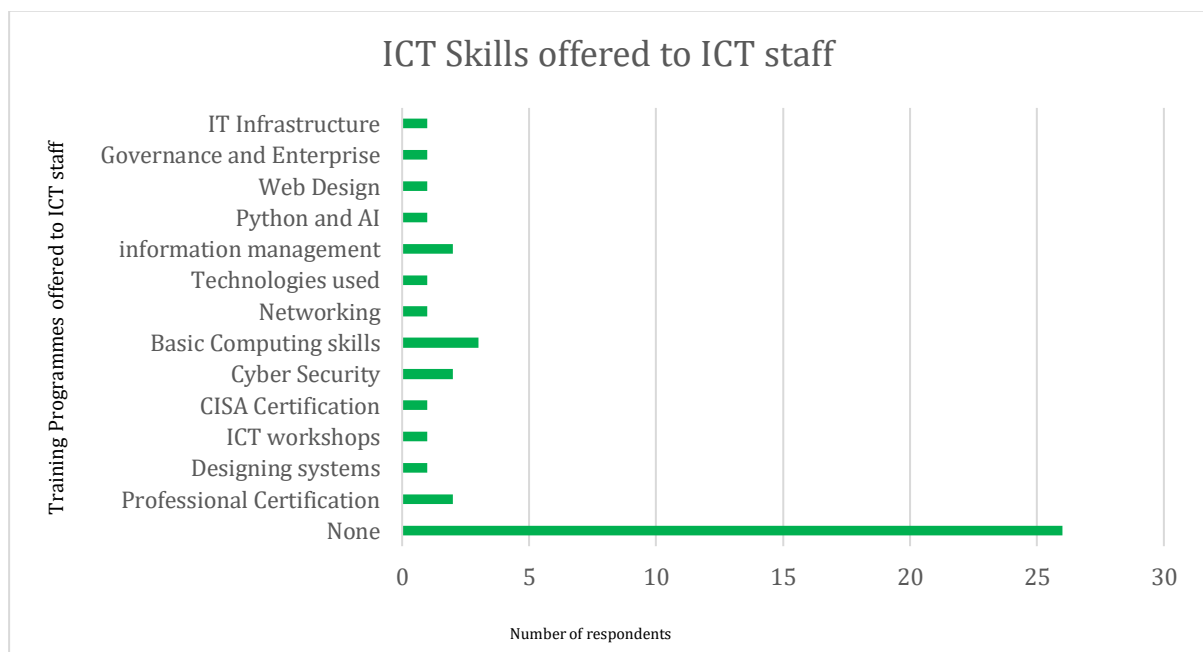


Figure 10: Types of ICT training programmes offered to ICT staff in last 12 months

d) Incentives and drives for staff to develop ICT skills in target MDAs

The assessment sought to establish the incentive mechanisms put in place to promote ICT skills development in the target MDAs. The results as shown in Figure 11 indicated that; majority of the institutions offer appraisal points, recognition of staff, sponsorship to attend training programmes, salary increment, promotions and some do pay costs for staff to study in the order of importance as illustrated below:

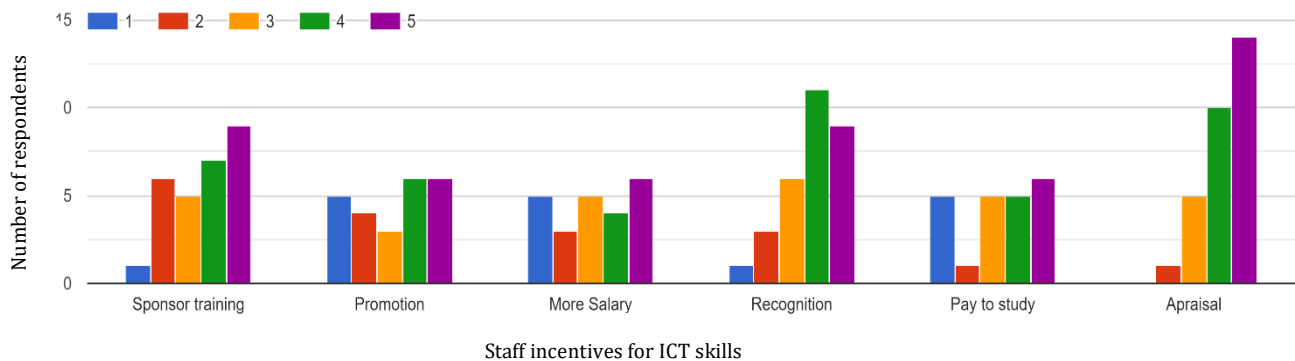


Figure 11: Incentives for ICT skills Development to MDA staff

Incentive structures are in conformity with the standing public service policies and systems and can be strengthened through budget allocation to promote ICT skills development in the targeted MDAs.

2.2.2 ICT Staffing Levels, Structures and Capacities in RCIP Target Agencies

ICT staff are the fulcrum of ICT growth and development in any organization more so government institutions. Their skills, knowledge and work behaviors are the accelerators, amplifiers, and augmenters of the desired enterprise change. On the backdrop of the COVID-19 pandemic, ICT has taken center stage as the enabling platform for effective service delivery in all sectors of government.

Thus, establishment of ICT Unit in every agency of government with adequate staffing, with the right quantity and quality of personnel at the right time, has potential to improve national productivity by making Government and business enterprises more efficient, effective and globally competitive. The assessment of ICT structures and systems in various target MDAs revealed that, some key government agencies and departments such as the Directorate of Education Standards Agency and the Department of Business Technical Vocational Education, with all their large and strategic mandates are still dependent on the weakly resourced ICT Unit of Ministry of Education and Sports (MoES).

On the other hand, the Natural Chemotherapeutics Research Laboratory (NCRL) depends on the ICT Unit of UNHRO to run its ICT mandate, again another under resourced unit were the role of ICT can accelerate the development of vaccines and therapeutics in this



pandemic season. In general, the ICT staffing in most MDA is below required capacity for effective implementation of the national digital agenda as summarized in table 6 below:

RCIP implementing agencies				
S/N	Institution	No. Established	No. Filled	No. Vacant
1	Ministry of ICT and National Guidance	18	13	5
2	NITA-U	112	46	66
3	Public Procurement and Disposal of Public Assets Authority	8	7	1
TOTAL		138	66 (48%)	72 (52%)
RCIP Target sectors				
S/N	Institution	No. Established	No. Filled	No. Vacant
Health Sector				
1	Ministry of Health	5	5	0
2	National Drug Authority	15	8	7
3	Uganda AIDS Commission	4	2	2
4	Uganda Blood Transfusion Services	7	3	4
5	National Medical Stores	11	5	6
6	Uganda National Health Research Organization (UNHRO)	2	2	0
7	Health Service Commission	4	2	2
9	Natural Chemotherapeutics Research Laboratory			Manned by ICT of UNHRO
9	Mulago National Referral Hospital	9	3	6
TOTAL		57	30 (53%)	27 (47%)
Agriculture Sector				
S/N	Institution	No. Established	No. Filled	No. Vacant
1	Ministry of Agriculture	5	5	0
2	National Agricultural Research Organization	18	18	
3	National Agricultural Advisory Services	5	1	4
4	National Animal Genetic Research Centre & Data Bank	5	3	2
5	Cotton Development Organisation	5	1	4
TOTAL		38	28 (74%)	10 (26%)
Justice, Law and Order Sector (JLOS)				
S/N	Institution	No. Established	No. Filled	No. Vacant
1	Judiciary	15	3	12
2	Uganda Prisons Service	100	35	65
3	Directorate of Public Prosecutions	35	8	27
4	Uganda Police Force	130	58 (45%)	72 (55%)

TOTAL				
Education Sector				
S/N	Institution	No. Established	No. Filled	No. Vacant
1	Ministry of Education and Sports	7	5	2
2	National Council for Higher Education	9	3	6
3	National Curriculum Development Centre	10	2	8
4	Directorate of Education Standards			Manned by ICT at MoES
5	Education Service Commission	3	3	0
6	Department of Business Technical Vocational Education and Training			Manned by ICT at MoES
TOTAL		29	13 (45%)	16 (55%)

Table 6: ICT Cadre Staffing levels in RCIP target organizations

These findings are comparable to the 2017/2018 National IT survey results by NITA-U which shows that most of the ICT employees in MDAs are holders of Bachelor’s degrees, which implies they’re at entry levels of their careers and thus possess entry level grade of ICT skills.

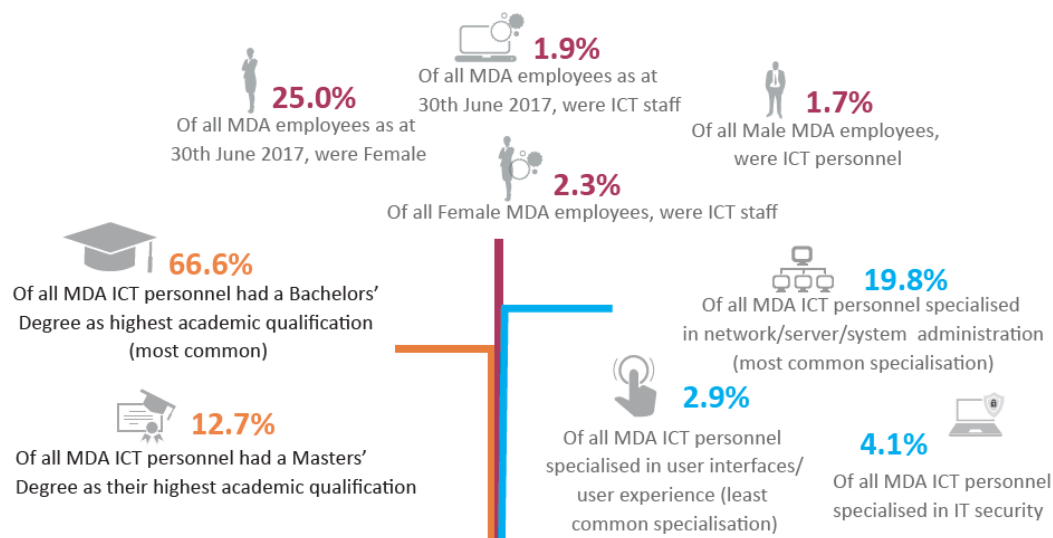


Figure 12: ICT workforce in MDAs at a glance (source: National IT Survey 2017/2018)



2.2.3 Current Skills, Knowledge and Behaviors

a) Current ICT skills possessed by employees at different levels of responsibility in target MDAs

In terms of the current skills for non-ICT and ICT professionals, respondents from the target institutions revealed that most non-ICT professionals currently possessed basic computing skills while ICT professionals were more proficient in; networking and web designing. However, it was observed that other emerging industry skills such as; content authority, data analysis, communication, cyber security, cloud computing, digital forensics, Internet of Things and data science were a requirement for the 21st Century and the Fourth Industrial Revolution (4IR) as illustrated in the table 7 below:

Category	Cadre	Variable	Frequency	Percentage (%)
Policy level	Permanent secretaries, Commissioner and boards	Basci ICT skills	22	61
		High policy awareness	3	8
		Strategic IT management	4	11
		Cyber security	2	6
		E-government	3	8
		Data management	1	3
		Trouble shooting	1	3
		Total	36	100
MDA Top management	Executive Directors, Directors and Commissioners, Functional Line Managers	Basci ICT skills	20	56
		High policy awareness	7	19
		Strategic IT management	4	11
		Cyber security	2	6
		E-government	1	3
		Data management	1	3
		Trouble shooting	1	3
		Total	36	100
ICT Technical	Systems administrators, Networks engineers, Software developers, IT end user support staff	Basic ICT skills	10	17
		High policy awareness	3	5
		Strategic IT management	3	5
		Cyber security	3	5
		E-government	2	3
		Data management	1	2
		System Administration	17	30
		Mobile and Web technologies	11	19
		Software development	4	7
		IT Suport	2	3
		Software development	2	4
Total	58	100		
Senior ICT Staff	Head of ICT, ICT section heads	Basic ICT skills	10	17
		High policy awareness	3	5

Category	Cadre	Variable	Frequency	Percentage (%)
		Strategic IT management	3	5
		Cyber security	3	5
		E-government	2	3
		Data management	1	2
		System Administration	17	30
		Mobile and Web technologies	11	19
		Software development	4	7
		IT Support	2	3
		Software development	2	4
		Total	58	100

Table 7: Current ICT skills possessed at different levels of responsibility

These results are comparable with those of the 2018 National IT survey in terms of ICT specialization in government as shown in **Figure 13** below:

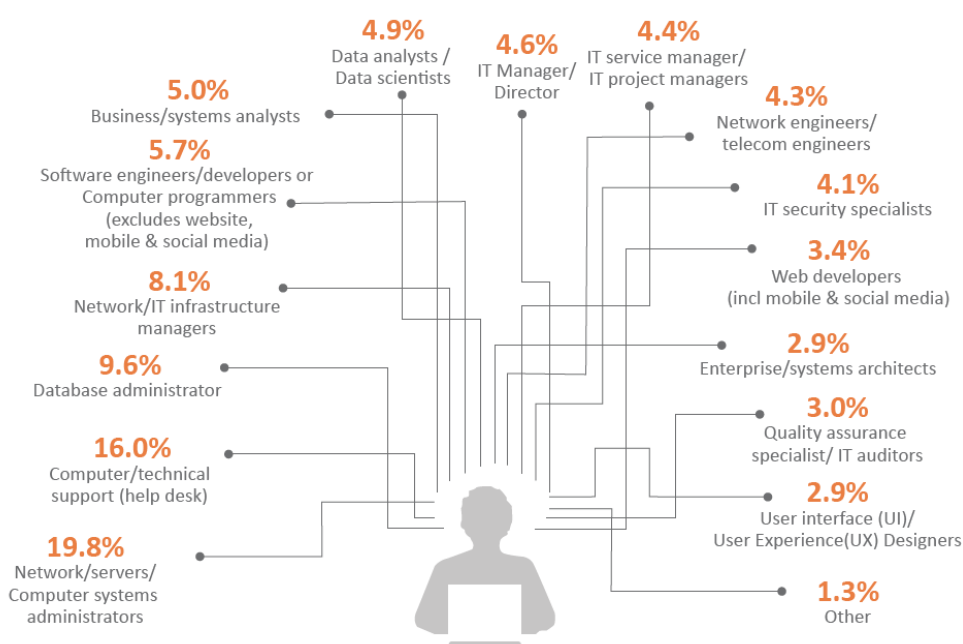


Figure 13: Specializations of ICT employees across MDAs (Source: National IT survey 2017/2018- NITA-U)

It is very clear that the most domain skills and professionals in government are technical support, systems administration and networking.

b) Skills that new ICT professionals lack the most

In terms of the skill-set identified that new ICT employees lack the most, the results of the study revealed that cyber security, basic ICT skills, data science and database

management, computer systems design and analysis in that order of choice are in short supply from new employees.

Other key skills that were identified to be lacking include: Project management, digital forensics, Internet of Things, report writing skills, E-government framework infrastructure, ICDL, MCSA, MCSD, MCSE, CISA, ITIL, CGEIT, PMP, PRINCE2 as illustrated in the figure 14 below:

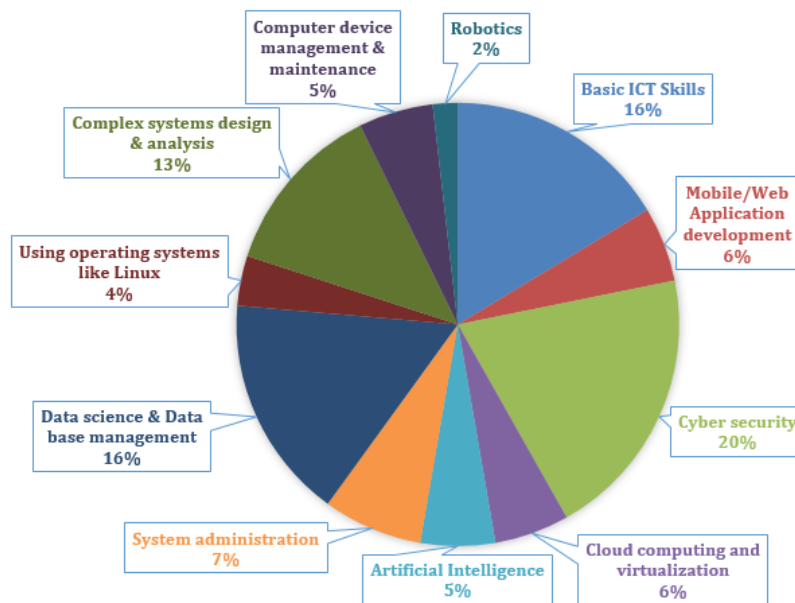


Figure 14: Skills new ICT professionals lack the most

What is surprising is that ICT professional lacking basic ICT skills especially office applications. A key informant that:

“Some of the ICT graduates cannot prepare a decent document like a CV’, simple things like formatting a document or making a PowerPoint presentation is a big challenge. How to you expect such a graduate to support other non-ICT professionals acquire basic ICT skills? Universities must focus on practical skills development especially for the basic computing skills, it is an embarrassment sometimes.”

c) Awareness of the enabling environment

Understanding of e-Government is key in promoting the use of ICT for efficient and effective government, it facilitates accessibility to government services and makes the government more accountable to citizens. E-Government involves delivering services via the Internet, telephone, electronic media, community centers (self-service or facilitated

by others), wireless devices or other communications systems. Thus, the assessment sought to establish the level of awareness of e-Government systems and the state of the enabling environment among Accounting Officers or their delegates in various organizations. The results show that 50% were aware of the e-Government framework and a further 50% were not aware or not sure as shown in table 8 below:

Variable	Frequency	Percentage (%)
Yes	18	50%
No	8	22.2%
Not sure	10	27.8%
Total	36	100%

Table 8: Level of awareness of E-Government framework

According to the National e-Government Framework for Uganda, the Key Pillars earmarked for the successful implementation of the e-Government programme in Uganda include:

- i) Institutional Framework which stipulates the core ministries, departments and agencies, private sector, academia and NGOs specifying roles and responsibilities for each.
- ii) A legal and regulatory framework meant to provide the requisite environment for the e-Government service delivery between government, citizens, business and non-citizens.
- iii) Identified priority e-Government applications and services.
- iv) Common ICT infrastructure and shared services.
- v) A deliberate e-Government skills development programme for civil servants and other key actors.
- vi) A deliberate communication and advocacy programme will need to be developed to popularize the benefits of the e-Government programme across the country.

According to the institutional respondents that were asked to state the key pillars of e-Government framework they knew, table 9 below highlights the results of thematic content analysis:

E-government pillars	Frequency	Percentage (%)
Institutional framework	5	13.9
Common ICT Infrastructure and shared Services	7	19.4
Legal and regulatory framework	6	16.7
Identified priority e-government applications and services	3	8.3
E-government skills development	10	27.8
Communication and advocacy	5	13.9
Total	36	100

Table 9: Knowledge of e-Government pillars

d) Enabling infrastructure

Availability and access to an enabling infrastructure is key on promoting development of ICT skills. The Study conducted on 2019 by NITA-U entitled “National IT survey 2019” summarized the state of enabling infrastructure in MDAs in Figure 15 below:

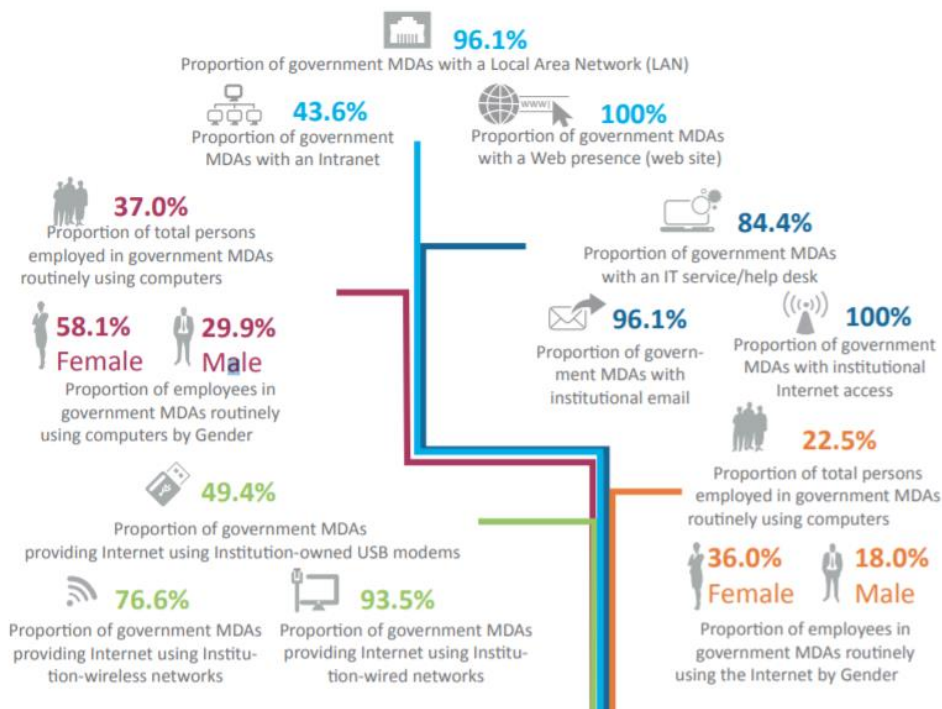


Figure 15: Government MDA IT indicators (Source: National IT Survey 2017/2018- NITA-U)

Thus, the study also sought to establish the availability of enabling ICT infrastructure in the RCIP target sectors of ICT, Education, Health, Agriculture and Justice, Law and Order, from the lens of institutional representatives and selected staff.

ICT infrastructure has been defined as a set of IT components such as physical components i.e. hardware, Local Area Networks, Software and Internet Connectivity among others.

The results as shown in figure 16 below show that about 35.2% most likely agreed to have enabling ICT infrastructure. This was followed by 25% that agreed, 19.3% less likely and 10.2% who were not sure and 10.2% who strongly disagreed to have enabling infrastructure. This is an indication that there is need for more support in regards to ICT infrastructure development.

In this study, the Likert scale was adopted as: (1= none, 2= Less likely, 3 =Most likely, 4 =Agree, 5 = Strongly Agree)

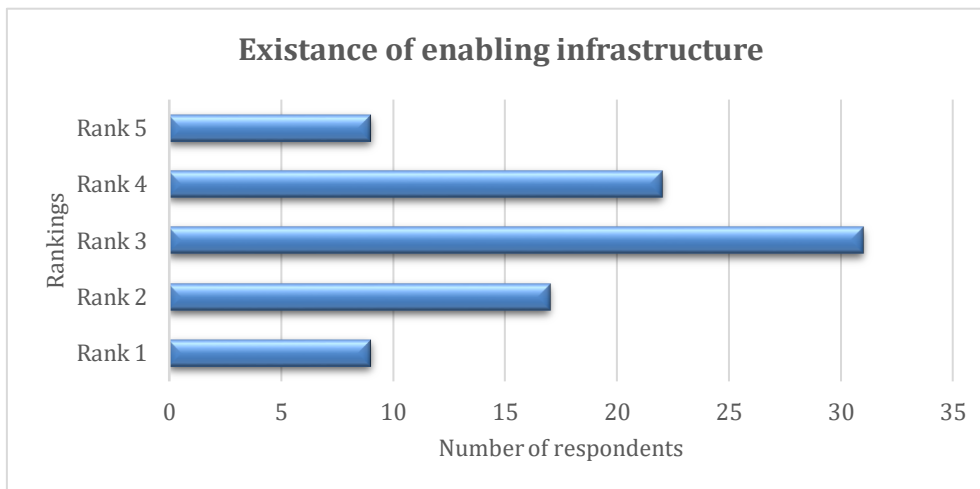


Figure 16: Existence of Enabling Infrastructure

The challenge of lack of enabling infrastructure was well captured by a respondent from JLOS:

“Most of our offices do not have even basic tools such as computers and internet connectivity, clearly how would you expect such a community to develop ICT skills and apply them at work, yet they lack basic tools. NITA-U and MoICT & NG should provide computers and internet to all civil servants especially those in JLOS to enable them fully embrace ICT systems”

e) Proficiency in key computer applications

Figure 17 below highlights the different proficiencies in key computer applications for ICT and non-ICT staff in the RCIP implementing agencies and target sectors.

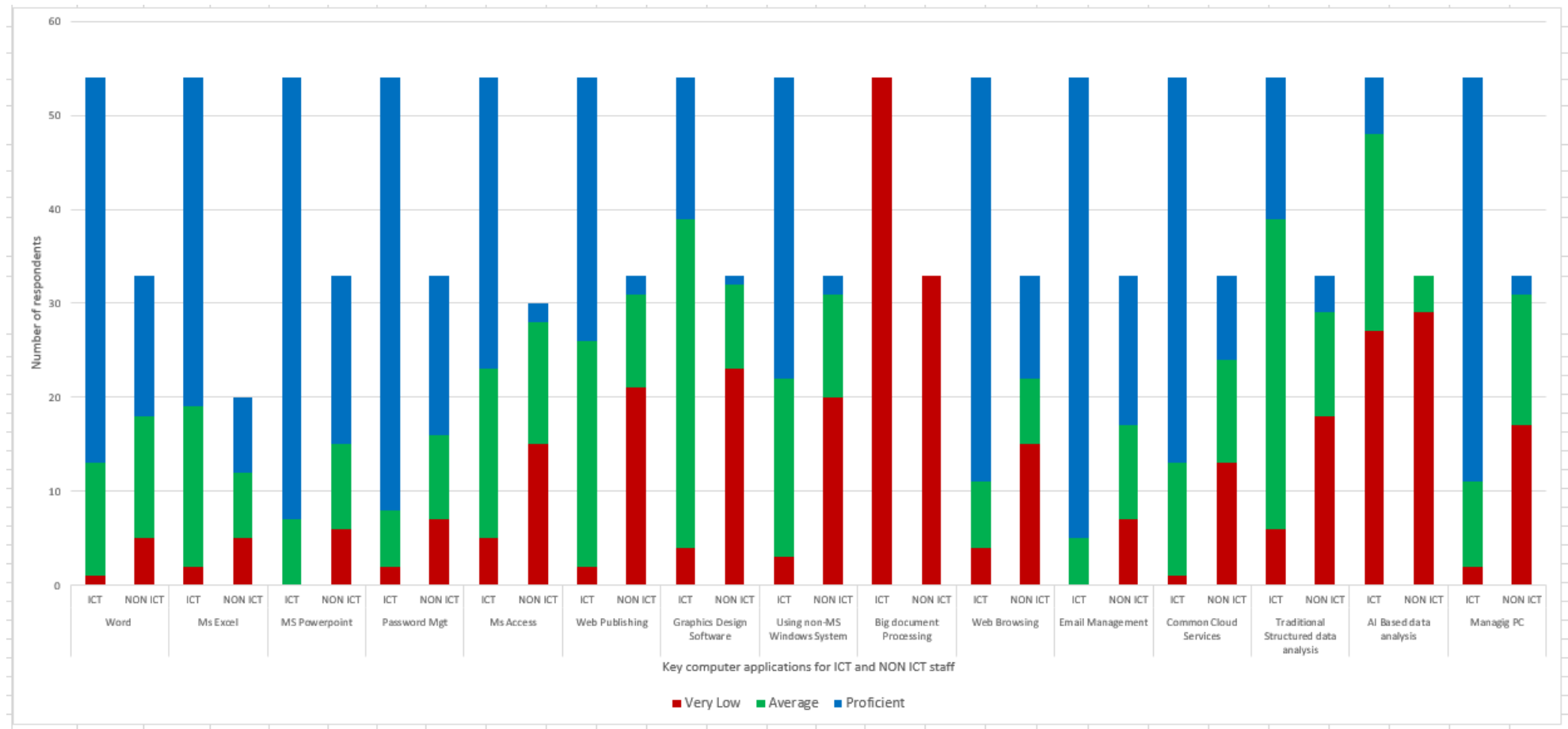


Figure 17: Proficiency in key computer applications by staff in RCIP MDAs



f) Knowledge on key ICT concepts

From the study, it was revealed that majority of the ICT professionals were knowledgeable in the key ICT concepts i.e. **social media, online privacy protection, Information system requirement definition, network based attacks to computer systems and IT project management**, and in that order of preference, while the non ICT professionals were likely knowledgeable in social media, online privacy protection, network based attacks on computer systems and operation of antivirus software. It is worth noting that the majority of the non-ICT professionals were not knowledgeable in **business process modeling, IT project management, IT service performance monitoring, e-Government trends, system integration and cloud computing** as illustrated in the Figure 18 below:

NB: The ranking can be described as 0= Not Knowledgeable, Rank 1=unlikely Knowledgeable, Rank 2= Less likely Knowledgeable Rank 3= Likely Knowledgeable Rank 4= Knowledgeable Rank 5=Very Knowledgeable

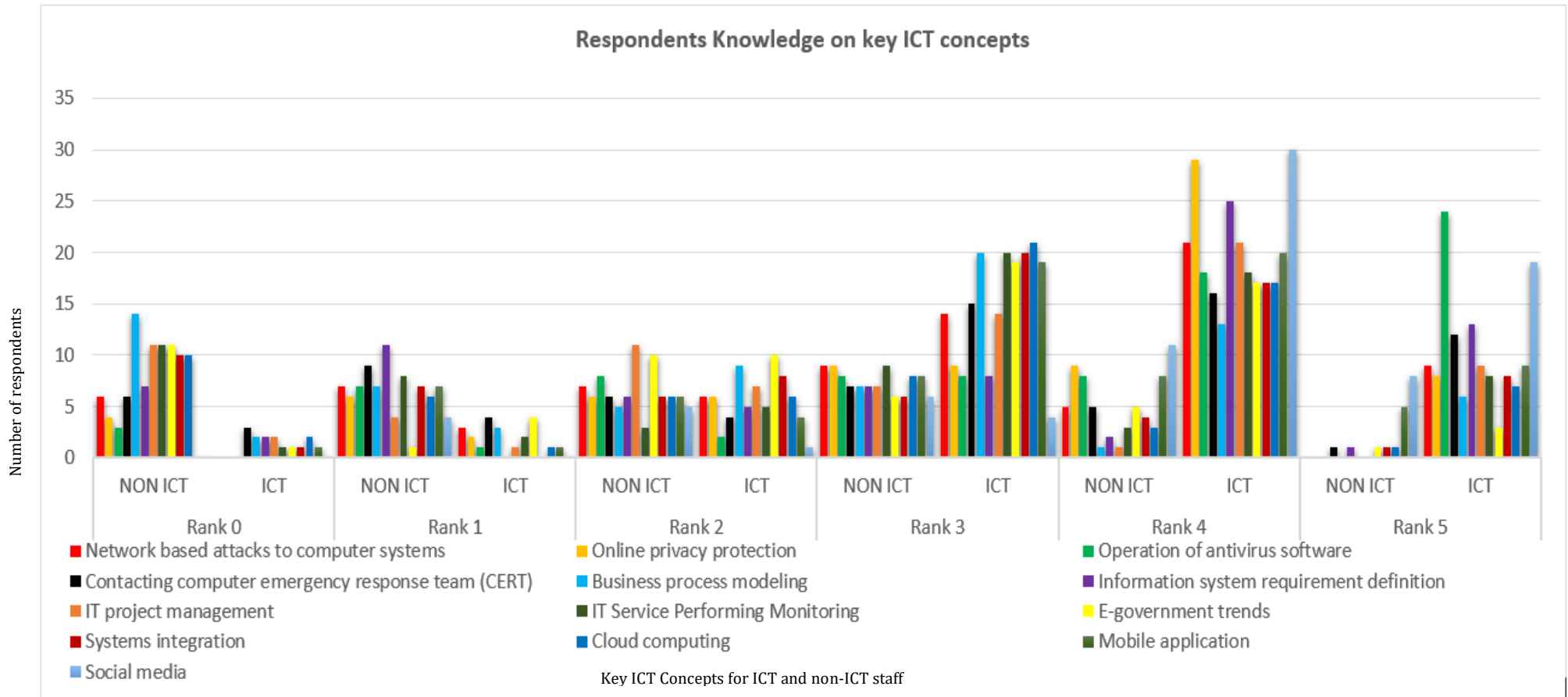


Figure 18: Staff knowledge in key ICT Concepts

g) Work place behavior

This research further sought to establish the day-today employee work place behavior in terms of ICT and internet use and the responses were as: majority (79.5%) positively agreed to backing up office data which was mainly done on the local server 30.1%, personal computer 23.3%, cloud 21.9% and remote servers 12.3% in that order of preference. On the other hand, 38.6% agreed to maintain an online dairy, 25% indicated to use the same password multiple times and only 2.3% share passwords with colleagues as illustrated in Figure 19 below:



Figure 19: Key ICT workplace behaviors among staff of target MDAs

2.3 ICT Skills and Training Needs Assessment “To-Be”

This section presents the desired state of ICT skills and Training needs. In sub-section 3.3.1, results of the international best practices and skills mapping are presented and discussed. Sub-section 3.3.2 presents the desired ICT skills and knowledge in the target MDA from the lens of stakeholders and international best practices. Sub-section 3.3.3 discusses the desired employee behaviors as far as use of ICT’s is concerned. Sub-section 3.3.4 presents the desired/ideal practices of recruitment and management of ICT professionals. Sub-section 3.3.5 presents and discusses supply side analysis.

2.3.1 International Best Practices and Skills Mapping

In order to provide a wider context and appreciate the trends in e-government and ICT skills development, an explorative desk research was conducted in six (6) selected countries of, Australia, South Korea, Estonia Ghana, Mauritius and Kenya. By criteria, category one countries of Australia, South Korea and Estonia were selected as the internationally recognized leading countries in e-government and ICT development. Category two countries of Ghana, Mauritius and Kenya are sub-Saharan countries that are



economically and socially comparable to Uganda, but have been documented as performing well on ICT development. The countries were discussed along the following key parameters:

- i) Per capital income
- ii) Data protection and privacy
- iii) Global ICT Development Index (IDI)
- iv) Access to internet (Internet penetration level)
- v) Percentage of population using the top 5 social media platforms
- vi) Global Innovation Index (GII) rank
- vii) E-government Development Index (EDI) rank
- viii) Political stability rank
- ix) Level of literacy
- x) Recruitment and management of ICT professionals in Government
- xi) Legal and regulatory environment
- xii) Maturity of the fourth estate (literacy levels, Media, Diversity, and Content Manipulation)
- xiii) Approach to digital skilling in government
- xiv) ICT Skills supply side
- xv) Stakeholder participation in curriculum development
- xvi) Pedagogical approaches used
- xvii) Status of eLearning
- xviii) Funding for ICT skills development

Below are the findings for the benchmarking studies on the six (6) countries:

- 1) **Category one:** Internationally recognized leading countries in e-government and ICT development have been highlighted and discussed as shown in Tables 10 – 13 below:

a) South Korea

Elements	Status	Observations and Remarks
Per capital income	South Korea's per capita income reached 31,494,900 USD in Dec 2020 compared with 31,838. USD in Dec 2019. There was a 1% decrease from the previous year. In 2013, the ICT growth rate was 5.5% following a GDP growth of 9.9%.	The higher per capita means, people can invest in skills development and access technologies.
Data protection and privacy (Helps with enforcement of key ICT security behaviors)	South Korea is known to have one of the strictest sets of data protection laws in the world. The laws provide specific prescriptive requirements of prior notification and opt-in consent. The data protection laws consist of one general law and several specific	Assurance of privacy and data protection, enhances uptake for ICT services by the citizens



Elements	Status	Observations and Remarks
	<p>laws pertaining to specific industry sectors.</p> <p>i) The general data protection Law: the collection and processing of personal data is governed by the Personal Information Protection Act 2011 (<i>that has just recently been amended and effected on 5th May 2020</i>)</p> <p>ii) Most notably for special laws in the Use and Protection of Credit Information Act 2009; regulating handling of personal data</p> <p>Data protection and regulatory authorities have also issued various guidelines related to the protection of personal data.</p>	
Global ICT Development Index (IDI)	As of 2017, South Korea ranked 2 nd on the global front with an IDI value of 8.85; with Iceland in the lead at 8.98	A high score relates to very high developments in the country in the select key ICT indicators and high access, use of ICT by population, indicated an above average digital literacy in the country
Access to internet (Internet penetration level)	To overcome digital divide between urban and rural communities, South Korea's government launched the Broadband Convergence network (BCN) in 2004 that even connects the remotest areas.	The higher access to internet is directly linked to ICT skills development
Percentage of population using the top 5 social media platforms	91.8% of South Koreans use the internet. It is highly explained by the availability of high-speed internet and one of the fastest internet networks.	The ICT infrastructure and regulations are a high priority in numerous governmental regulations that have led its rapid growth and expansion.
Global Innovation Index (GII) rank	The republic of South Korea ranked 2 nd among the 17 economies in South East Asia, East Asia and Oceania and ranked 10 th among the 49 high-income group economies. Most significant gains have been with innovation outcomes related to new technologies and knowledge. The republic also performed well in research and development.	<p>Innovation and a robust support towards research and development have boosted ICT in South Korea.</p> <p>Its ranking in the top 100 science and technology clusters gives the country an upper hand in ensuring the bigger part of the population easily and readily has access to ICT services</p>
E-government Development Index (EDI) rank	South Korea has the most effective e-governance in Asia and ranked 2 nd out of the 193 UN member states; at a e-	The ability to provide government services through the internet presents a



Elements	Status	Observations and Remarks
	governance development index of 0.956 (right after Denmark that ranked 1 st with an index of 0.976)	platform for effectiveness and equity.
Political stability rank	This defines political stability and absence of violence/terrorism. On the stability index scale of -2.5 weak to 2.5 strong, South Korea was rated at 0.37 from 1996 to 2019; with a minimum of 0.11 points in 2014 and a maximum of 0.6 points in 2018. The latest value from 2019 is 0.48 points. This is higher than the global average (based on 194 countries) at -0.06 points.	South Korea can therefore be ranked as politically stable which creates a suitable environment for digital skills development and for the stable growth of the ICT industry.
Level of literacy	South Korea has a literacy rate of 97.9%; (99.2% males and 96.6% females).	This means great percentage of the population have the ability to utilize ICT products
Recruitment and management of ICT professionals in Government	Development of human resources for ICT is one of the key objectives of the Ministry of Science and ICT. This sector is expected to contribute to the creation of about 410,000 jobs (<i>including 90,000 jobs in business start-ups</i>) in different ICT themes and innovations and will also drive the national informatization project that is introducing technology in a variety of sectors (agriculture, traditional markets and in small and medium sized businesses ³).	This is a priority in the ICT sector planning and adequate resources have been allocated to this; a key push to its success.
Legal and regulatory environment (key laws and regulator reputation)	The main ICT regulatory bodies in South Korea are: The Ministry of Science, ICT and Future Planning and the Korea Communications Commission	The Ministry is very actively engaged and well-funded to implement plans to foster the fourth industrial revolution
Maturity of the fourth estate, literacy levels (Media, Diversity, and Content Manipulation)	South Korea is considered to have freedom of press but subject to several pressures. This freedom declined slightly in the 2010s. South Korea declined from free to partly free to reflect an increase in official censorship particularly of online content as well as the government's attempt to influence media outlets' news and information ⁴ . Broadcasters have to promote public interest. The "media law" consists of	There is freedom for expression by the Fourth Estate but strict laws about how content is relayed to the public

³ "Science & ICT Ministry strives to create jobs, new industries" Archive 2014-02-18 at the Wayback Machine *Korea IT Times* April 22, 2013. Retrieved on June 28, 2013

⁴ "South Korea | Country report | Freedom of the Press | 2011". *freedomhouse.org*. Retrieved 2017-01-04.



Elements	Status	Observations and Remarks
	two structures: Business regulation and content related regulation. They emphasized fairness among the broadcasters and freedom of expression for each.	
Approach to digital skilling in government	Schools have integrated ICT at all levels of the school system to foster “21 st Century Learners”. Digital literacy training started in the late 90s as part of South Korea’s readiness for the upswing of the internet. This was a key aspect of the Korea Agency for Digital Opportunity and Promotion (KADO). The nation’s high prioritization of education (even during planning and budgeting) and it’s having one of the best IT infrastructures in the world make digital skilling a lot easier.	The government has placed its people skills and education at the top of the agenda and hence makes it conducive to ensuring digital skills are enhanced. This is coupled with the fact that the country is among the top 5 IT leaders in the world
ICT Skills supply side		
Higher education system status in South Korea		
Element	Status	Observations and Remarks
Stakeholder participation in curriculum development	Generally, curriculum development on South Korea is a collaborative process that involves are critical stakeholders including; Academia, private sector and government. The programmes are aligned to industry demands and government development agenda.	Each of the stakeholders engaged in curriculum development are working towards ensuring Korea’s education system (including ICT) are top notch and will take Estonia to the greater 4IR prospects.
Pedagogical approaches used	Since 1996, South Korea has integrated ICTs within the educational system under three national master plans: i) The first master plan (1996-2000); focused on establishment of a world class ICT infrastructure in elementary and secondary schools ii) The second master plan (2001-2005); to enhance the quality of education by allowing open access to education content and providing teacher training for integration of ICT in teacher classroom practices. iii) The third and most recent master plan (2006-2010) has been focused on the creation of	The South Korean government has been ICT savvy over the years compared to other developed countries and ensured to establish these in the education system.



Elements	Status	Observations and Remarks
	sustainable learning environments with U-learning and future education through more flexible and secure educational services such as the development of digital text books ⁵	
Status of eLearning	As a result of policy change and increased resource outputs, the first stage towards <i>Developing ICT use in Education</i> was implemented by the end of 2000 with all of the nation's 10,064 schools having completed LAN installations and had internet connections. A total of 431,981 PCs had been installed in computer labs. Multimedia equipment and PCs were allocated to all of 222,146 classrooms (around 23 students per classroom), and PCs were distributed to all teachers (340,854 teachers). Going forward, this infrastructure has enabled execution of nationwide e-learning projects, such as EBSi or Cyber Home Learning System (CHLS) – hence a sound environment for effective e-learning implementation ⁶	South Korea's e-learning environment was established many years ago and has been thriving and growing since. There is continuous support from the government in terms of resources and planning to ensure continuity and growth of this e-learning environment.
Funding for ICT skills development	The primary source of funding is the Government of Korea through its Ministry of Economy and Finance (MoEF). There is a Korea-World Bank Partnership Facility (KWPF) established in May 2013; an initiative between the Korea Government and the World Bank. This partnership largely focuses on IT innovation. South Korea is a recipient and giver of funding for ICT with recent emphasis on gender involvement for ICT. The Ministry of Small and Medium Sized Enterprises (SMEs) and start-ups (MSS) plans and budgets for innovations and skills development in SMEs and Start-ups.	Commitment by the government is enhanced and well showcased through the budget and planning cycles where innovations in ICT take high precedence.

Table 10: International benchmarking findings for South Korea

⁵ E-Learning in the Republic of South Korea – UNESCO IITE by Dae Joon Hwang, Hye-Kyung Yang and Hyeonjin Kim

⁶ Teo, Thompson & Kim, Sojung & Jiang, Li. (2020). E-Learning Implementation in South Korea: Integrating Effectiveness and Legitimacy Perspectives. *Information Systems Frontiers*. 22. 10.1007/s10796-018-9874-3.



Conclusion: The synthesis of South Korea ICT development revealed that the country's development puts human capacity development, especially in the areas of technology and agriculture first. The country has invested heavily in the ICT infrastructure development especially the delivery of broad internet to homes, manufacturing of ICT devices so as to lower the cost of device access among other strategic interventions. The country promoted village community resource centers which among other act as ICT capacity development centers for communities. Curriculum development of ICT training and other fields are demand driven and aligned to national development agenda. The processing is collaborative involving all key stakeholders such as; academia, private sector and government. E-Learning is well developed and has become a culture in South Korea, one of the reasons of the light digital literacy levels. Furthermore, Korea has integrated ICT skills development into her education systems right from kindergarten to universities. In the area of data protection and privacy.

South Korea is known to have one of the strictest sets of data protection laws in the world. The laws provide specific prescriptive requirements of prior notification and opt-in consent.

b) Estonia

Elements	Status	Observations and Remarks
Per capital income	As of 2020, Estonia is considered a high-income country by the World Bank, and it is a member of the EU and the Eurozone. Estonia is ranked among the top countries in terms of economic freedom. It has per capital income of 23,755.007 USD in Dec 2019	The high per capital income means citizens have more to spend of ICT services.
Data protection and privacy (Helps with enforcement of key ICT security behaviors)	Estonia has strong privacy protection for its citizens. The Personal Data Protection Act (PDPA), has been in force since January 2008. Personal information that is considered sensitive - such as political opinions, religious or philosophical beliefs, ethnic or racial origin, sexual behavior, health, or criminal convictions – cannot be processed without the consent of the individual. The Data Protection Inspectorate (DPI) is the supervisory authority for the PDPA. As a member of EU, the EU data protection and regulations do apply	Estonian citizens are protected against exploitation of their personal information being processed without permission
Global ICT Development Index (IDI)	ICT development index (IDI) - rank of Estonia increased from 6.7 scale, 1-10 in 2010 to 8.14 scale, 1-10 in 2017 growing at an average annual rate of 3.38%.	Estonia's position in the world's leading indices of the information and communication technologies (ICT) is surprisingly low, if



Elements	Status	Observations and Remarks
		taking account, the diversity and level of the ICT solutions.
Access to internet (Internet penetration level)	In 2020, Estonia have about 76.58% internet penetration. This project to hit 85.30% of the total population by 2025. Estonia has almost the most developed telecom markets in Europe with high internet usage. They use internet banking and high broad band penetration.	Estonia has become a model for free and open internet access
Percentage of population using the top 5 social media platforms	The most popular social media websites in Estonia are Facebook, YouTube, Twitter, MySpace, Orkut, Hot.ee and Rate.ee	
Global Innovation Index (GII) rank	Estonia's strengths lie in the fields of creativity, knowledge and technology. Estonia's GII is at 25 in 2020 from 24 in 2018 and 2019.	Estonia performs better in innovation outputs than innovation inputs in 2020.
E-government Development Index (EDI) rank	"The 2020 ranking of the 193 UN Member States in terms of digital government – capturing the scope and quality of online services, status of telecommunication infrastructure and existing human capacity – is led by Denmark, the Republic of Korea, and Estonia" ⁷	Estonia understands the advantages that go hand in hand with a truly digital society but is also building up the groundwork to actually getting there one day
Political stability rank	The latest value from 2019 is 0.64 points. For comparison, the world average in 2019 based on 195 countries is -0.05 points.	Estonia is considered one of the most politically stable countries in the world. Hence providing a bedrock for digital investment and transformation
Level of literacy	From 2011, the literacy rate was at 99.89%	The high levels of general literacy translate into high level of digital literacy through self-paced learning
Recruitment and management of ICT professionals in Government	Emphasis of IT skills development in the Estonia National Reform program that has an action plan and the ICT sector as the responsible entity Recruitment of foreign ICT specialists when there was a gap of unavailability of enough Estonian ICT specialists. These foreign specialists would still pay taxes to the Estonian government and bump up ICT to improve the economy	Recruitment of foreign ICT specialists boosts the country's revenue through taxation.
Legal and	The main regulatory bodies for the ICT	Estonian law today is

⁷ <https://www.un.org/development/desa/publications/publication/2020-united-nations-e-government-survey>



Elements	Status	Observations and Remarks
regulatory environment (key laws and regulator reputation)	sector are the Technical Regulatory Authority (TRA) and the Competition Authority.	increasingly influenced by European Union as member of EU
Maturity of the fourth estate, literacy levels (Media, Diversity, and Content Manipulation)	Estonians have access to a wide array of content online, and there are few economic or political barriers to posting diverse types of content, including different types of news and opinions.	The availability and accessibility of content is key in development of digital skills and literacy
Approach to digital skilling in government	The Estonian Civil Service is designed as an open system; with positions filled through open competitive calls – with high encouragement of applicants from the private sector (known to be more and better skilled) Legislation was passed in 2015 to launch a system for labour market monitoring and forecasting skill demands. The government also launched a lifelong learning strategy (<i>The Estonian Lifelong Learning Strategy 2020</i>) to “provide all Estonian people with learning opportunities that are tailored to their needs and capabilities throughout their whole lifespan” ⁸ .	
ICT Skills supply side	Admission to appropriate specialties in universities has been extended to decrease the labour shortage in the ICT sector. Programs for development of advance ICT skills (e.g. enhancing of IT skills of the population with poor or outdated qualifications, updating vocational and high education curricula, quality ICT education; theoretical and practically etc.) Digital literacy and personal welfare aimed at teaching people how to use the internet and improve the quality of their lives.	The Ministry of Economic Affairs and Communications has prioritised these strategies in their plans hence the prediction of its success.
Higher education system status in Estonia		
Elements	Status	Observations and Remarks
Stakeholder participation in curriculum development	The State (Parliament) sets national standards and establishes principles of education funding, state supervision and quality assessment. While most pre-	Each of the stakeholders engaged in curriculum development are working towards ensuring Estonia’s

⁸ OECD Skills Strategy 2019; Skills to Shape A Better Future, 2019 - Estonia



Elements	Status	Observations and Remarks
	primary and general schools are owned and run by municipalities, most vocational schools are state-owned. The key stakeholders in the process of curriculum development that includes ICT programs are the Ministry of Education, Local Government, European Union funding agencies (e.g. EU PHARE Program), higher institutions of learning e.g. The Center of Curriculum development in the University of Tartu, research and development entities for vocational studies etc.	education system (including ICT) are top notch and will take Estonia to the greater 4IR prospects.
Pedagogical approaches used	The Estonian Lifelong Learning Strategy 2020, which is the current national educational strategy, highlights digital focus on education as one of the five key areas. In 2001, Estonia was one of the first countries to classify internet access as a human right.	Having a Government managed lifelong strategy ensures ICT is constantly being integrated in the education system; with a high affinity for innovation
Status of eLearning	Estonian Schools routinely use digital study materials including a platform of digital books called <i>Opiq</i> and electronic school management systems such as <i>eKool</i> , which connect pupils, parents and teachers. These systems have been in existence for years now. Nearly every child in Estonia has access to a laptop or tablet but for those that do not, schools, local authorities and voluntary organizations step in to provide these. Also, teams of “university trained educational technologists” are based in schools and work with teachers to ensure the best use of digital resources.	With internet use being largely considered a human right, the Estonia government therefore considers investments in ICT and e-learning very paramount.
Funding for ICT skills development	Estonia’s government instituted Life Long Learning (LLL) Strategy guides the most important developments in the area of education. It encourages learning, development ideas and innovations. The issuing body is the Ministry of Education and research that ensures adequate funding of this strategy.	Commitment by government to fund the ICT skills development ensures sustainability of the ICT programmes in institutions of higher learning.

Table 11: International benchmarking findings for Estonia

Conclusion: In the ICTs, Estonia’s strengths lie in the fields of creativity, knowledge and technology. Currently Estonia is fully operating e-Government. The 1980s and 1990s have been the era of rapid developments, elevating ICT as techno-economic paradigm



leader and key role of Estonia as a state.

The Estonian Lifelong Learning Strategy 2020, which is the current national educational strategy, highlights digital focus on education as one of the five key areas. The strategy provides all Estonian people with learning opportunities that are tailored to their needs and capabilities throughout their whole lifespan⁹. This made Estonia in 2001 to be one of the first countries to classify internet access as a human right.

In terms of ICT professionals' recruitment, the Estonian civil service is designed as an open system, with positions filled through open competitive calls-with high encouragement of applicants from the private sector (known to be more and better skilled). This competency-based recruitment approach has made government attract highly competent ICT professionals into the Estonian civil service. Uganda certainly has a lot to learn from Estonian ICT journey.

c) Australia

Elements	Status	Observations and Remarks
Per capital income	Australia (as of 2021) has been ranked the 12 th largest national economy by GDP ¹⁰ and the 18 th by purchasing power parity (PPP) adjusted GDP. It's GDP per capita is at 54,891 USD per year. Australia has taken record before for the longest run of uninterrupted GDP growth in the world within the March 2017 financial quarter.	Has a strong investment on digital skilling
Data protection and privacy (Helps with enforcement of key ICT security behaviors)	The key legislation affecting private-sector organizations and Federal Government agencies is the Privacy Act /and its Australian Privacy Principles (APPs). Data protection is generally known as "privacy". The Privacy Act/APPs regulate the collection, use, holding and disclosure of personal information of living individuals by APP entities.	Australians spend a lot of time online and therefore, protecting their personal information is very important. This is emphasized a lot by the government with even Privacy awareness campaigns existing. Breach of the laws is penalized in the court of law This kind of environment ensures digital rights are fully and dully protected
Global ICT Development	On the global connectivity index, Australia stands at position 14 of the top	

⁹ OECD Skills Strategy 2019; Skills to Shape A Better Future, 2019 - Estonia

¹⁰ "GDP ranking". *World Bank Open Data*. [World Bank](https://data.worldbank.org/). 25 April 2019. Retrieved 13 May 2019.



Elements	Status	Observations and Remarks
Index (IDI)	30 countries as ranked by the ICT Development Index in 2017 ¹¹ with a value of 8.24	
Access to internet (Internet penetration level)	<p>As of January 2021, there were 22.31 million internet users in Australia – this numbers increased by 265,000 between 2019 and 2021. Also, internet penetration stands at 88%. Australians spend nearly 40 hours per week online.</p> <p>The number of internet subscribers is slowing down from recent years suggesting the market is close to saturation. However, the amount of data current users are consuming continues to outgrow the number of subscribers¹².</p>	<p>It is evident that the current internet subscribers are actively using the internet and the government is playing their role to ensure their needs are met.</p> <p>However, plans need to be put in place to attract more subscribers for the internet.</p>
Percentage of population using the top 5 social media platforms	<p>As of January 2021, there were over 18 million social media users (70% of the Australian population). This number registered an increase by 735,000 between 2019 and 2021.</p> <p>Social media penetration is at 71%. For each Australian social media user, 1 in every 3 minutes is spent on social media pages.</p> <p>Every month (as of Jan 2021) social media pages are visited by the populace in the order of: Facebook (62%), YouTube (58.4%), Instagram (35%), WhatsApp (27.24%) and Snapchat (25%)</p>	Australians are active users of social media with almost half the population having a Facebook account.
Global Innovation Index (GII) rank	<p>Australia ranked 23rd among the 131 economies featured in the GII and 6th among the 17 economies in South East Asia, East Asia and Oceania.</p> <p>Out of the seven GII areas, Australia performs best in Market Sophistication and its weakest performance is in Knowledge and technology outputs. Australia also registers weaknesses in human capital, research and infrastructure.</p>	<p>Australia's political and regulatory environment is strong and readily willing to work on the existing shortcomings.</p> <p>Strategies for Development of ICT exist that are well funded (to support navigation and position infrastructure, to fund high performance research in infrastructure and enable smart cities).</p>

¹¹ "Measuring the Information Society Report 2017" (PDF). Geneva, Switzerland: [International Telecommunication Union \(ITU\)](#). 2017. p. 31. Retrieved 2017-11-16

¹² Australian Internet Statistics, 2021; Prosperity Media [Australian Internet Statistics \[Updated 2021\] - Prosperity Media](#)



Elements	Status	Observations and Remarks
E-government Development Index (EDI) rank	In 2020, Australia has the highest EGI in Oceania with a score of 0.94. Of the three components that constitute the EGI score, Human Capacity Index scored highest with 1, online service index (0.95) and Telecommunication Infrastructure Index (0.88) ¹³ .	The willingness and capacity of the Australia government to utilize e-government services is commendable and high with human capacity at the helm of systems. The existence of e-governance strategies and plans with capacity to implement them makes it easier for the Australian government to provide services
Political stability rank	On the stability index scale of -2.5 weak to 2.5 strong, Australia was rated 1.01 (during the period of 2016-2019) with a minimum of 0.86 in 2009 and maximum of 1.4 points in 1996. The latest value from 2019 is 1.09 points ¹⁴ . Australia has been ranked no. 7 for its perceived political stability, ranks highly for agility and ranked at no. 2 and does well for adaptability and being family friendly ¹⁵ .	Australia is one of the ten safest places to live in the world. Safety of ICT users, directly correlates with access to ICT, hence development of ICT skills
Level of literacy	The adult literacy rate has been at 99% since 2014. According to a survey on adult skills, adults (16-65 years) in Australia show above-average proficiency in literacy, and problem solving in technology-rich environments compared to adults in the other countries that participated in the survey ¹⁶ .	2 in 3 adults in Australia is able to use the internet and navigate it for their advantage
Recruitment and management of ICT professionals in Government	Australian government works with digitally ambitious companies from founder-led to corporates, which head hunt exceptionally talented change makers at the cutting edge of increasingly complex business operations in the country.	The competency-based recruitment approaches facilitate selection of the best and practical ICT professionals
Legal and regulatory environment (key laws and regulator)	The Privacy Commissioner is the relevant regulator under the Privacy Act/APPs. The Privacy Commissioner sits within and is overseen by the Australian Information Commissioner (who is	The mandate of OAIC is very clear with penalties in place should there be any breach of parts of the Privacy Act. The oversight role of the

¹³ www.statista.com/statistics

¹⁴ www.theglobaleconomy.com/Australia/wb_political_stability/

¹⁵ 10 Most Politically Stable Countries Ranked by Perception by Kaia Hubbar; April 13th 2021

¹⁶ The Survey of Adult Skills "Education GPS, OECD, 02/06/2021, 12:19:37 <http://gpseducation.oecd.org>"



Elements	Status	Observations and Remarks
reputation)	currently the same person as the privacy commissioner) and both are in the Office of the Australian Information Commissioner (OAIC).	Privacy Commissioner in ensuring keeping of what is stated in the Act goes a long way in ensuring digital rights of Australians are well maintained.
Maturity of the fourth estate, literacy levels (Media, Diversity, and Content Manipulation)	The media (press) is strongly being recognized as a key medium of communication. The relationship between the media and parliament has been accepted as key in ensuring economic development of Australia and even for policy reformation ¹⁷ . The media are a key element in showcasing parliamentary debates and proceedings and have the mandate to do this.	The media plays a critical roles in production and distribution of content which is key in stimulating digital literacy and skills development.
Approach to digital skilling in government	Developing the appropriate digital skills in the workforce is an important component in Australia's effort to compete in the rapidly emerging global digital economy. - Research has been conducted and recommendations made on skills gaps and targeted training programs ¹⁸ The Australia Government has a 585 Million USD "Delivering Skills for Today and Tomorrow" package – an up-skilling package preparing one for employment and this is being capitalized on by entities to make digital training accessible	Digital skilling over the years has been appreciated by the Australian government and steps to address skills gaps (that include funding) taken to ensure the workforce is efficiently and effectively skilled towards the countries' economic growth. Also, with a high literacy rate, skilling of the Australia population comes easily.
ICT Skills supply side	The Australian Industry and Skills Committee (AISC) is in the process of establishing an "Industry Reference Committee" to help ensure vocational education and training gives students the future-focused skills they will need, as work places become radically transformed by increased automation and digitalization. Cross-sector projects ¹⁹ have focused on the impact of technological advances on the workforce and have sought to address common skills needs, minimize duplication and consolidate and utilize existing training units.	There is a general appreciation of the need to have a well skilled workforces as Australia's digitalization is fast growing.

¹⁷ Two Cultures: Parliament and Media by Julianne Schultz, December 2002

¹⁸ Victor Gekara et. al, 2019: Skilling the Australian Workforce for the Digital Economy, NCVER, Adelaide

¹⁹ [Cross sector projects | Australian Industry Skills Committee \(aisc.net.au\)](https://www.aisc.net.au/cross-sector-projects)



Elements	Status	Observations and Remarks
	Technology use and application skills have been ranked 4 th (out of 12 generic skill categories) in the Australia Comprehensive 2019 Skills Forecasts for industry skills needs. This has well informed the AISC for planning going forward	
Higher education system status in Australia		
Elements	Status	Observations and Remarks
Stakeholder participation in curriculum development	<p>The Australian Curriculum is developed by Australian government (Education Council) through the Australian Curriculum, Assessment and Reporting Authority (ACARA). Reviews of the curriculum involve extensive consultation and engagement with key stakeholders (subject matter experts including teachers, school leaders, curriculum officers, education authorities, parent bodies, professional education associations, business, industry and community groups; and academics). Research and development are also key stakeholders in curriculum reviews.</p> <p>Curriculum and teacher reference groups are formed during curriculum reviews and tasked with providing feedback.</p>	Stakeholders in various themes are well represented in the processes of planning and budgeting and implementation of ICT curriculums.
Pedagogical approaches used	<p>In 2005, the government of Australia (through the Ministerial Council on Education, Employment, Training and Youth Affairs MCEETYA) in collaboration with the Curriculum Corporation developed a Pedagogy Strategy to encourage learning in an online world. It highlights issues to consider when planning for integration of ICT in the learning environment.</p> <p>Pedagogies currently being used by most teachers in Australia are based on a long tradition of learner-centered theories of education that require a learning to be:</p> <ul style="list-style-type: none"> - Individualized and collaborative - Experiential, building on prior learning - Self-managed and cumulative - Authentic - Directed to higher-order problem solving 	Australia's pedagogical approaches are well enlisted in a strategy – something other countries that are looking to advance ICT can integrate.



Elements	Status	Observations and Remarks
Status of eLearning	<p>More institutions in Australia are offering online courses with an increase in the number of intakes.</p> <p>Statistics from the Australian Government Department of Education and Training (DET, 2018) show that this number is rising faster than those studying on campus. This growth is entirely changing the dynamics in which institutions plan, develop and deliver education. However, one key challenge is the completion rate of such students.</p> <p>Both traditional and e-learning methods are being used side by side as viable learning approaches.</p> <p>The Australia government has developed strategies and policies that back-up and support e-learning²⁰.</p>	<p>The relative ease with which learning content can be put online and its reduced costs (printing and face to face dynamics) has resulted in an increase in online offerings across the higher education sector. Access to ICT Skills is thus enhanced</p>
Funding for ICT skills development	<p>Funding and grants are managed under the Department of Education Skills and Employment.</p> <p>The Australian budget 2020/21, has laid out; <i>the commitment to fund skills development in schools and higher institutions of learning and ensuring the Australian workforce is well equipped for ICT development.</i></p>	<p>Commitment by government to fund the ICT skills development ensures sustainability of the ICT programmes in institutions of higher learning.</p>

Table 12: International benchmarking findings for Australia

Conclusion: Accelerated and exponential growths are constants of the ICT sector in Australia. Commitment by government to fund the ICT skills development ensures sustainability of the ICT programmes in institutions of higher learning. Australia's pedagogical approaches are well enlisted in a strategy and applied across all institutions of higher learning; something Uganda, with intent to advance ICT can integrate. This has resulted into Australia having a highly skilled workforce across the board, making her digitalization very fast growing.

In the area of ICT professionals' recruitment and management, the use of competency-based recruitment approaches through ICT Professional Firms, head hunting and other professional bodies; facilitate selection of the best and practical ICT professionals in the Australian system. This presents a learning opportunity for Uganda, which predominantly relies open competition recruitment approach.

²⁰ Josie Misko et. al, 2004: E-Learning in Australia and Korea; Learning from Practise



- 2) **Category two:** Tables 13 – 15 highlight findings from sub-Saharan countries that are economically and socially comparable to Uganda, but have been documented as performing well on ICT development.



d) Mauritius

Elements	Status	Observations and Remarks
Per capita income	The economy of Mauritius is a mixed developing economy based on agriculture, exports, financial services, and tourism. According to World Bank (2019), Mauritius has a GDP per capita of \$26,840 by end of 2019	The growing economy is a critical catalyst of the rapidly expanding ICT sector in Mauritius
Data protection and privacy	The right to privacy is expressly provided for in the Constitution of Mauritius and in the Mauritian Civil Code. The Data Protection Act (DPA) aims to strengthen the personal autonomy of data subjects and the control they have over their personal data. In view of the major changes brought by the GDPR, with an extra-territorial reach, the data protection laws in Mauritius were amended to be in line with the GDPR, by virtue of the Data Protection Act 2017 (DPA), effective on the 15th January 2018.	The existence of the DPA is an enabler to the rapid growth in the ICT sector in Mauritius
Global ICT Development Index (IDI)	Mauritius has an IDI 2017 Rank of 72 and IDI 2016 Value of 5.51.	Mauritius is considered to have one of the fastest growing ICT sectors in Africa, and this has attracted a number of multinational corporates including Microsoft, Google, HP, Cisco etc. to set up region headquarters in Nairobi.
Access to internet (Internet penetration level)	Between 2018 and 2019, ICT access in the Mauritius was as follows: <ul style="list-style-type: none"> - Number of mobile cellular phone subscriptions per 100 inhabitants decreased from 151.6 to 147.5 - Number of internet subscriptions per 100 inhabitants went up from 107.1 to 118.2; and - Number of fixed telephone lines per 100 inhabitants improved from 34.3 to 36.2. 	The rapid rise in internet penetration in Mauritius facilitates the growth of the entire ICT Sector in the country.
Percentage of population using the top 5 social media platforms	Social media usage in Mauritius by population: Facebook (70.77%), Pinterest (11.62%), Twitter (8.11%), YouTube (4.63%) and Instagram	There is a clear enjoyment of digital rights



Elements	Status	Observations and Remarks
	(2.36%)	
Global Innovation Index (GII) rank	Mauritius ranks 3rd among the 26 economies in Sub-Saharan Africa. Besides Mauritius and South Africa, the other top innovators are Kenya, Tanzania, Botswana, Rwanda and Cape Verde.	Mauritius is known as one of the fast innovating countries in the world. ICT innovation thrives, where there is freedom and appreciation of human rights.
E-government Development Index (EDI) rank	Mauritius's 2020 EGDI is 0.7196 with a ranking of 63 out of 109	At African regional level, Mauritius embraces eLearning and e-governance, which inherently promotes open government and digital rights
Political stability rank	According to the World Bank collection of development indicators, compiled from officially recognized sources, the Political Stability and Absence of Violence/Terrorism (Percentile Rank) in Mauritius was reported at 74.29 % in 2019	Political Stability and Absence of Violence/Terrorism provides an enabling environment for development in a country. The growth in ICT too in Mauritius is attributable to this.
Level of literacy	According to UNESCO, Mauritius has an adult literacy rate of 91.33%. While the male literacy rate is 93.36%, for females it is 89.37%.	Mauritius growth in literacy rates facilitates uptake, use and support for ICT based services in that country. The higher the literacy rates are, the higher the uptake, use and consumption of ICT related service
Recruitment and management of ICT professionals in Government	Mauritius uses open competition recruitment approaches that emphasize competency-based selection procedures that subject candidates to intense practical (simulated) exercises rather than relying on oral interaction.	Competency based recruitment pays off as competent employees are the real agents for the growth of ICT
Legal and regulatory environment (key laws and regulator reputation)	Mauritius has put in place Information and Communication Authority (ICA) Mauritius has put in place a web of enabling laws to govern the ICT Sector; such as; The Data Protection Act 2017, Computer Misuse and Cyber-Crime Act 2003, Postal Services Act 2002 (as amended),The Information and Communication Technologies Act 2001 (as amended), The Electronic Transaction Act 2000 (as amended), Independent Broadcasting Authority Act 2000 (as amended),Copyright Act 2014 and Child Protection Act	Reputable laws governing the ICT sector in Mauritius have facilitated its growth
Maturity of the fourth estate, literacy levels (Media, Diversity,	Under Mauritian Law, press freedom gives journalists a right to obtain information from private sources on a voluntary basis only.	Media freedom in Mauritius, experiences some levels of restrictions. Freedom of expression is governed by a law



Elements	Status	Observations and Remarks
and Content Manipulation)	The press cannot compel citizens to release information about themselves which they are unwilling to disclose. The <i>Mauritius</i> Broadcasting Corporation (MBC) is the national public broadcaster that provides 17 <i>television channels</i> in <i>Mauritius</i> , 4 in <i>Rodrigues</i> and 2 in <i>Agaléga</i> and 7 <i>radios</i>	which requires the citizens to provide information to the press freely, without coercion. This healthy for the growth of ICT especially digital skills.
Approach to digital skilling in government	Mauritius emphasizes online learning, distance learning, formal (face to face) training and blended learning approaches to digital skilling.	By employing a multiplicity of skilling approaches, the interests of the majority of the citizens are taken care of and the scope of digitally skilled people is widened
ICT Skills supply side	The higher education system of Mauritius is represented by 31 universities with 261 study programs. In addition, 192 Bachelor programs at 31 universities, 65 Master programs at 18 universities and 4 PhD programs at 3 universities. There are also 44 private higher education institutions These supply the Mauritian industry with ICT skilled manpower	The growing number of institutions of higher learning in Mauritius, help to meet the increasing demand for ICT professionals in Mauritius and in the region
Higher education system status in Mauritius		
Elements	Status	Observations and Remarks
Stakeholder participation in curriculum development	In Mauritius, policy provides for representation of the various stake holders (from industry, government and community), in the governing boards of institutions of higher learning (universities). This promotes stakeholder participation in the curriculum development process for universities tertiary institutions	Wider participation of stake holders helps enrich and make the curriculum relevant. It also enhances employability of graduates after school.
Pedagogical approaches used	- Commonly applied Pedagogical approaches in Mauritian Universities are Collaborative, Technology Integrative, Reflective and Inquiry Based Learning. These put emphasis on thinking skills and application, yielding practical and competent ICT professionals	The type of pedagogical approaches used, determine the competency of graduates
Status of eLearning	With the growth in PC ownership and connection to a broadband internet facility, e-learning is slowly carving a niche in mainstream education of Mauritius. In the wake of being a digital island, Mauritius regroups all the necessary ingredients in fostering e-	Mauritius's growth of e-learning is by far and large supported by the gradually increasing access to internet opportunities for all citizens, and the presence of a functional ICT infrastructure in the



Elements	Status	Observations and Remarks
	learning as an alternative mode to traditional method of teaching. All signs are there that the revolution of e-learning has started in Mauritius but it is currently in its nurture stage	country.
Funding for ICT skills development	The government of Mauritius is establishing a Universal Service Fund (USF) that aims to give citizens in poor regions of the country better access to ICT Like any other African country, Mauritius benefits from grants from donors like such as USAID, DFID, GSMA, and Gates Foundation. These form part of the supplementary funding in addition to the direct funding by the government of Kenya form the consolidated fund and the private sponsorship by the beneficiary students.	Commitment by government to fund the ICT skills development ensures sustainability of the ICT programmes in institutions of higher learning. Meanwhile parents are willing to pay for ICT courses on demand in the market.

Table 13: International benchmarking findings for Mauritius

Conclusion: Politics in Mauritius are fundamentally stable, characterized by shifting coalitions and peaceful transfers of power, despite the ethnical background of the parties. Mauritius is also one of the most socially developed countries in Africa.

Information and Communications Technology is the fifth pillar of Mauritius's economy along with sugar production and export processing.

The level of literacy is slightly higher than that of Uganda and media has significant freedoms compared to majority of African countries. The above average per capital income means Mauritanians can spend more in internet and e-services. The rapid penetration of Internet and the rise of fake news threaten the existing harmony of the state and citizens and is rising call for more regulation of social media.

e) Kenya

Elements	Status	Observations and Remarks
Per capita income	According to Trading Economics global macro models, Kenya GDP per capita is expected to reach 1090.00 USD by the end of 2020	The growing economy is critical catalyst of the rapidly expanding ICT sector.
Data protection and privacy	Kenya's data protection policy prohibits data transfer outside Kenya unless there is proof of adequate data protection safeguards or consent from the data subject. Other	The existence of the Kenyan Data Protection Bill permits effective application of ways to protect data



Elements	Status	Observations and Remarks
	duties are to keep the data anonymous and to exercise privacy by design in their data processing systems.	
Global ICT Development Index (IDI)	Kenya achieved an improvement in its IDI score by 0.21 up from 2.78 in 2015 to 2.99 in 2016	Kenya is considered to have one of the fastest growing ICT sectors in East Africa, and this has attracted a number of multinational corporates including Microsoft, Google, HP, Cisco etc. to set up region headquarters in Nairobi.
Access to internet (Internet penetration level)	Internet penetration in Kenya has rapidly grown and was reported to have reached 87.9% in 2020. The rapid expansion was aided by the arrival of a number of sea cables at the coastline of the country	While the internet coverage has grown, the cost of access still remains relatively high.
Percentage of population using the top 5 social media platforms	Kenyan almost equally use WhatsApp (88.6%) and Facebook (88.5%). The third most used social media apps are YouTube (51.2%) followed by Google+ (41.3%). Both LinkedIn and SnapChat are the least popular in Kenya at 9.3% and 9.0% respectively.	There is enjoyment of digital rights
Global Innovation Index (GII) rank	Kenya has been ranked 86 global, and is considered one of the countries having exceptional performance on ICD development	Kenya is known as one of the most innovative countries in the world. ICT innovation thrive, where there is freedom and appreciation of human rights.
E-government Development Index (EDI) rank	Kenya's GEI is 0.5326 with a ranking of 116 of 193	At regional level, Kenya embraces eLearning and e-governance, which inherently promotes open government and digital rights
Political stability rank	Kenya has remained relatively stable ever since President Uhuru Kenyatta faced charges against crimes against humanity at the International Criminal Court (ICC), The ensuing political stalemate was characterized by the spread of hate speech and fake news online. The government reacted by enacting the controversial Computer Misuse and Cybercrimes Act, 2018, deemed as a weapon for targeting its critics including journalists and bloggers.	Kenya has relatively given freedom of expression and allowed some form of stability in relation to people enjoying digital rights.
Level of literacy	According to UNESCO (2018), Kenya has adult literacy rate of 81.53%. While the male literacy rate is 84.99%, it is	Kenya's gradual growth in literacy rates facilitates uptake, use and support for ICT based



Elements	Status	Observations and Remarks
	78.19% for females. In comparison with other countries Kenya is number 106 ^o in the ranking of literacy rate . Kenya's literacy rate has increased in recent years.	services in that country. The higher the literacy rates are, the higher the uptake, use and consumption of ICT related service
Recruitment and management of ICT professionals in Government	Employers in Kenya emphasize the need for critical life skills (teamwork, work ethic, and integrity) over technical skills, though many also seek candidates with strong computer skills.	Flexible governing policy HRM frameworks make it easy to cater for emerging developments, commonly realized in the fast-developing ICT sector world over.
Legal and regulatory environment (key laws and regulator reputation)	The absence or poor implementation of laws such as on cyber security, data protection and privacy, slows down the momentum of Kenya's digital economic growth. Kenya has used the need to control "fake news" as an excuse to introduce restrictive laws	The need to review and update existing regulatory frameworks to deal with emerging issues and new technologies
Maturity of the fourth estate, literacy levels (Media, Diversity, and Content Manipulation)	Kenya has over 91 FM radio stations, over 64 free to view TV stations, and numerous number of print newspapers and magazines. Kenyans have access to a wide array of content online, and there are few economic or political barriers to posting diverse types of content, including different types of news and opinions.	Media houses have a diversified range of options to media diversity. The media is relatively mature with professional journalist, strength ethical code of conduct and self-censorship. This is key in the development and distribution of content idea of ICT skills development
Approach to digital skilling in government	According to tests carried out by CENFRI (may 26, 2020), digital skills test results in Kenya averaged 55%, well below the normative benchmark <ul style="list-style-type: none"> - Youth performed better on content creation and worst on digital security - Overall, men performed better than women, regardless of the socio-economic background Youth showed a strong preference for using smartphones over laptops for the test	The higher the digital skills are among the citizens, the easier it is to adopt and utilize e-government services
ICT Skills supply side	Kenya has 30 public universities, 30 chartered private universities and 30 universities with Letter of Interim Authority (LIA). All these churn out ICT professionals on an annual basis to match the ICT demands from the public and private sector services.	The growing number of institutions of higher learning in Kenya, help to meet the demand for ICT professionals in Kenya
Higher education system status in Kenya		
Elements	Status	Observations and Remarks
Stakeholder	In Kenya, policy provides for	Wider participation of stake



Elements	Status	Observations and Remarks
participation in curriculum development	representation of the various stake holders (from industry, government and community), in the governing boards of institutions of higher learning (universities). This promotes stakeholder participation in the curriculum development process for universities tertiary institutions	holders helps enrich and make the curriculum relevant. It also enhances employability of graduates after school.
Pedagogical approaches used	- Commonly applied Pedagogical approaches in Kenyan Universities are Collaborative, Technology Integrative, Reflective and Inquiry Based Learning. These put emphasis on thinking skills and application, yielding practical and competent ICT professionals	The type of pedagogical approaches used, determine the competency of graduates
Status of eLearning	By 2019, internet users in Kenya were 22.6% of the Kenyan population Successful implementation of the e-Learning is dependent on the level of internet use and accompanying supporting policies.	Kenya's growth of e-learning is by far and large supported by the gradually increasing access to internet opportunities for all citizens, and the presence of a functional ICT infrastructure in the country.
Funding for ICT skills development	Like any other African country, Kenya benefits from grants from donors like such as USAID, DFID, GSMA, and Gates Foundation. These form part of the supplementary funding in addition to the direct funding by the government of Kenya form the consolidated fund and the private sponsorship by the beneficiary students.	Commitment by government to fund the ICT skills development ensures sustainability of the ICT programmes in institutions of higher learning. Meanwhile parents are willing to pay for ICT courses on demand in the market.

Table 14: International benchmarking findings for Kenya

Conclusion: The political stability in Kenya with regular change of government through popular vote, coupled with the favorable policy landscape, has a bearing on the growth and efficiency of the ICT sector in the country.

Kenya's growth of e-learning is by far and large supported by the gradually increasing access to internet opportunities for all citizens, and the presence of a functional ICT infrastructure in the country.

The level of literacy is generally comparable to Uganda and media has significant freedoms compared to majority of African countries. The average per capital income means Kenyans can spend more in internet and e-services.



f) Ghana

Elements	Status	Observations and Remarks
Per capital income	Stands at 2,188.00 USD by Nov, 2020	Above average of most of African countries. Meaning citizen could spend more on internet and ICT services
Data protection and privacy Helps with enforcement of key ICT security behaviors	Through the Constitution of the Republic of Ghana the Data Protection Act of 2012 protects data privacy and establishes a Data Protection Commission ('DPC'), to protect individuals' privacy and personal data by regulating the processing of personal information, outlining the process for obtaining, holding, using or disclosing personal information, and related matters. The Act gives the Ministry for Communications prerogative powers in the entire process of Data protection and privacy. The Act also allows the creation of a register of data controllers to keep and maintain the Register.	The Data Protection Act provides for the use of subsidiary legislation to further deepen the effective application of the principles and objects of Data privacy and protection.
Global ICT Development Index (IDI),	Ghana's IDI rank in 2017 was 116 globally with a value of 4.05. Its mobile cellular subscriptions per 100 inhabitants was 139.13 as compared to the rest of Africa at 74.60.	Having the highest international internet bandwidth per internet user at 9850.94 bit/s, Ghana seems to have an increase in active mobile broadband subscriptions.
Access to internet (Internet penetration level)	As of January 2021, the internet penetration rate in Ghana reached 50 percent, up from 48 percent in the same month in the preceding year. The indicator expresses the percentage of the total population that uses the internet. In the last years, the number of registered internet users has been increasing rapidly in the West African country.	Access to internet in Ghana has over the years improved as compared to countries in Africa. Resulting to increase consumption of ICT services
Percentage of population using the top 5 social media platforms	Ghana's 49.2% of the population use Facebook, 25.96% twitter, 17.15% Pinterest, 5.8% YouTube, 1.27% Instagram and 0.19% Tumblr	This is an indication that the use of various social media platforms is an indicator that there is enjoyment of digital rights.
Global Innovation Index (GII) rank	Ghana is among the top 120 countries in world with high levels of innovations in the areas of business growth.	This is an indicator of expanding ICT services and hence, digital rights
E-government Development Index (EDI) rank	Ghana has performed well on the e-Government Development Index (EGDI) for 2016. Ghana improved on her ranking from 123 in 2014 to 120 in 2016 (UN, 2016)	Ghana has embraced e-governance through citizen involvement with government activities.



Elements	Status	Observations and Remarks
	Ghana's government has come to realize the benefits of e-government and how its utilization could improve service delivery to its citizens whose requirements are satisfied and bringing businesses closer to their governments as an important feature of e-government.	
Political stability rank	Ghana's Political stability index for the 1996 to 2019 had an average value of -0.02 points with a minimum of -0.36 points in 2000 and a maximum of 0.17 points in 2005. The latest value from 2019 is 0.1 points. For comparison, the world average in 2019 based on 194 countries is -0.06 points.	Ghana has been referenced as a model democracy for Africa, with regular change of government and stable systems of structures of governance. The absence of violence in government transitions and improved access to e-service means citizens of Ghana enjoy digital rights, more than majority of African countries
Level of literacy	Ghana's literacy rate for 2018 was 79.04%, a 7.54% increase from 2010. The literacy for 2010 was 71.50%, a 13.6% increase from 2000.	Literacy rates in a country are critical for determining the uptake, use and support for ICT based services in a country. The lower the literacy rates are, the lower the uptake, use and consumption of ICT related service
Recruitment and management of ICT professionals in Government	As of April 30, 2015, the Human resource management policy framework and manual for the Ghana public services (under PSC) applied to the public services of Ghana as defined by Article 190 of the 1992 Constitution of the Republic of Ghana. The framework outlines the principles that guide the approach to human resource management, governance and the development of human resource management policy in the public service. Policies, systems, structures and programmes of HRM practice are still evolving. Much needs to be done in order for Ghana to benefit the full complement of HRM practice.	Flexible governing policy HRM frameworks make it easy to cater for emerging developments, commonly realized in the fast-developing ICT sector world over.
Legal and regulatory environment (key laws and	The main regulatory bodies for the ICT sector are the Technical Regulatory Authority (TRA) and the Competition Authority.	The more the ICT regulating policies promote the role of ICT in development, the more



Elements	Status	Observations and Remarks
regulator reputation)	The Government of Ghana has placed a strong emphasis on the role of ICT in contributing to the country's economy. The country's medium-term development plan captured in the Ghana Poverty Reduction Strategy Paper (GPRS I&II) and the Education Strategic Plan 2003-2015 all suggest the use of ICT as a means of reaching out to the poor in Ghana.	opportunities are provided to citizens to participate in ICT.
Maturity of the fourth estate, literacy levels (Media, Diversity, and Content Manipulation)	As at the third quarter of 2017, the total number of TV operators authorised by the National Communications Authority (NCA) to operate in Ghana was 128. Out of the 128 TV stations, 21 Analogue Terrestrial Television. 428 FM Radio stations are currently operational and 40 newspapers as at June, 2020. The media has excellent relationship with the state and it is one of the pillars of the Morden Ghana. The archaic laws however still exist in the statute books; and huge court fines which cripples media outlets.	The phasing out of government monopolies ushered in a new era of free expression. Providing citizen with diversity of content and context. While archaic laws remain on the statute books, the government does not enforce them.
Approach to digital skilling in government	Ghana emphasizes online learning, distance learning, formal (face to face) training and blended learning approaches to digital skilling.	By employing a multiplicity of skilling approaches, the interests of the majority of the citizens are taken care of and the scope of digitally skilled people is widened
ICT Skills supply side	Higher education institutions in Ghana include 10 public universities, eight technical universities, and seven university-level professional training institutions. In 2018, a total of 109,874 students graduated from these institutions in various fields including ICT related academic programmes.	All ICT academic programmes in Ghana institutions of higher learning are aligned to the development needs of Ghana as a country. This is strength.
Higher education system status in Ghana		
Elements	Status	Observations and Remarks
Stakeholder participation in curriculum development	The Ghana Curriculum is developed by Ghana government (Education Council). Reviews of the curriculum involve extensive consultation and engagement with key stakeholders (subject matter experts including teachers, school leaders, curriculum officers, education authorities, parent bodies, professional education associations, business, industry and community groups; and	Stakeholders in various themes are well represented in the processes of planning and budgeting and implementation of ICT curriculums.



Elements	Status	Observations and Remarks
	academics). Research and development are also key stakeholders in curriculum reviews. Curriculum and teacher reference groups are formed during curriculum reviews and tasked with providing feedback.	
Pedagogical approaches used	Pedagogies currently being used by most teachers in Ghana are based on a long tradition of learner-centered theories of education that require a learning to be: <ul style="list-style-type: none"> - Individualized and collaborative - Experiential, building on prior learning - Self-managed and cumulative - Authentic - Directed to higher-order problem solving 	Ghana's pedagogical approaches are well enlisted in a strategy – something other countries that are looking to advance ICT can integrate.
Status of eLearning	The relative ease with which learning content can be put online and its reduced costs (printing and face to face dynamics) has resulted in an increase in online offerings across the higher education sector. More institutions are offering online courses with an increase in the number of intakes. Statistics from the Ghana Government Department of Education show that this number is rising faster than those studying on campus. This growth is entirely changing the dynamics in which institutions plan, develop and deliver education. However, one key challenge is the completion rate of such students. Both traditional and e-learning methods are being used side by side as viable learning approaches. The Ghana government has developed strategies and policies that back-up and support e-learning ²¹ .	Growth in e-learning has a direct bearing on the growth and development of e-government and ICT. The more literate the society becomes (as a result of e-learning in part), the more the uptake for ICT and e-government services.
Funding for ICT skills development	Funding and grants are managed under the Department of Education Skills and Employment. The Ghana Government has <i>committed to funding skills development in schools and higher institutions of learning and ensuring the Ghana workforce is well equipped for ICT development.</i>	Commitment by the government of Ghana to fund the ICT skills development ensures sustainability of the ICT programmes in institutions of higher learning.

Table 15: International benchmarking findings for Ghana

²¹ Josie Misko et. al, 2004: E-Learning in Australia and Korea; Learning from Practise



Conclusion: Ghana is relatively politically stable nation characterized by growing democracy with regular change of government through popular vote. The political stability of Ghana has attracted global attention and has made Ghana one of the top destinations for large multinational technology companies like Google, Microsoft and others to establish operational offices in the country.

The level of literacy is generally comparable to Uganda and media has significant freedoms compared to majority of African countries. The above average per capital income means Ghanaian can spend more in internet and e-services.

Conclusions from International benchmarking findings:

- i) ICT skill development:** Category one countries highlighted above from the findings above integrated ICT into their government structures as far back as the late 80's and early 90's. These governments predicted where ICT was heading for the future and aligned themselves to be part of this growth. This was through integrating ICT in planning, strategies for the different sectors. This even included strategies for ensuring the populations possesses the rightful skillsets for this positioning.
- ii) Enabling policy environment:** From the findings, it can be conclusively highlighted that the more policies that exist that support integration of ICT programmes and building of skillsets of the population, the more ICT savvy the country is. All the countries bench-marked have policies but the category one countries seem to have more ICT specific policies (plans, strategies etc) hence creating the suitable environment that is not as clear-cut as for the category two countries. This can further be extrapolated to Uganda.
- iii) Adequate funding for ICT Workforce skilling:** With the existence of ICT tailor-made policies, comes the ability to properly plan and budget for ICT skilling for workforces. Category one countries have even included ICT structures in their national budgets with adequate budget lines allocated and key focus towards skilling the populations. Category two countries, more so Uganda, have not been seen to adequately budget for ICT growth.

g) Uganda

To facilitate easy comparison and lessons learnt, content on the similar parameters used for the countries above has also been relayed for the Ugandan context as presented in the matrix below:

Elements	Status	Observations and Remarks
Per capital income	Stands at 860.00 USD by Nov, 2020 with one of top ten fastest growing	Having one of the fastest growing economies presents a promising



Elements	Status	Observations and Remarks
	<p>economies in Africa at an average annual rate of 6.3%</p>	<p>future where Ugandan citizens will be able to spend more in internet and ICT services.</p> <p>Already this scenario partly explains the rapid growth of ICT sector and Internet penetration which stands at 49% as of December 2020 according to Uganda Communications Commission (UCC)</p>
<p>Data protection and privacy (Helps with enforcement of key ICT security behaviors)</p>	<p>Through the Constitution of the Republic of Uganda and through a number of regulatory instruments such as; NITA-U 2009 Act, the Data Privacy and Protection Act, 2019, Computer Misuse Act 2011.</p>	<p>The Data Protection Act provides for the use of subsidiary legislation to further deepen the effective application of the principles and objects of Privacy and Data protection.</p> <p>Ensured data privacy, lays a foundation for cyber security and thus elicits confidence of the citizens in ICTS.</p> <p>The ICT Sector needs to tap into this advantage</p>
<p>Global ICT Development Index (IDI),</p>	<p>As of September 2020, nationwide telephone penetration of 64 lines for every 100 Ugandans, while still growing, it is well below the average in Africa of 74.60 per 100 inhabitants.</p> <p>On the global connectivity index, Uganda stands at 77 position of the 79 countries profiles, behind Kenya at 70 and Ghana at position 72.</p>	<p>Uganda has one of the fastest expanding ICT sectors, signaling the increasing access to the internet and associated services.</p> <p>For MoICT & NG and NITA-U expansion of the ICT services to meet this rapid growth is paramount to avoid being overtaken by events.</p>
<p>Access to internet (Internet penetration level)</p>	<p>Uganda's internet penetration rate of between 37-49%, is below that of Estonia, 76.58%, Ghana 48% and that of Kenya at 87.9%. The indicator expresses the percentage of the total population that uses the internet.</p> <p>In the last years, the number of registered internet users has been rapidly increased in Uganda to 20 million in September 2020, steered by COVID-19 demands for online services and expansion of access to sea cables, growing ICT services and lowering costs of</p>	<p>It is evident that access to internet in Uganda has over the years improved as compared to countries in Africa. Uptake of ICT services is equally on the rise.</p> <p>There is need for the ICT sector to keep up to its task to avoid the risk of being overtaken by events</p>



Elements	Status	Observations and Remarks
	international bandwidth	
Percentage of population using the top 5 social media platforms	Social media penetration in Uganda is estimated at 5.6% of the population. The most popular social media is Facebook and WhatsApp. Access and use of social media in Uganda continues to rise with gradual penetration ongoing in rural areas.	Exposure and use of the bigger part of the population to social media use, entails faster circulation of information. There is a growing trend by the government of Uganda through its MDAs (MOICT&NG, UCC, NITA ETC) to streamline use of social media for socio-economic development.
Global Innovation Index (GII) rank	Uganda ranked 114 in the world, behind Kenya, Tanzania and Rwanda. It is also ranked among the 10 ten in the category of least developed countries, performing above expectation in the areas of ICT innovations.	This is an indicator of expanding ICT services (development and consumption). Experiences from neighboring countries such as Kenya, Tanzania and Rwanda present peer learning opportunities for the ICT sector in Uganda.
E-government Development Index (EDI) rank	Uganda's government is increasingly realizing the benefits of an e-government and how its utilization could improve service delivery to its citizens. The citizens' requirements are satisfied and businesses are being brought closer to their governments as an important feature of e-government. EGI as of 2018 was 41% an improvement from 36%.	Uganda has embraced e-governance to improve service delivery to the citizens and enable citizen involvement with state actors. A number of e-services have been rolled out including; e-procurement portal, e-passport system, e-receipting, IFMS, IPPS among others.
Political stability rank	Political Stability and absence of Violence/Terrorism. On the stability index scale of -2.5 weak to 2.5 strong, Uganda is rated -0.57 from -1.9 over 15 years ago. This indicates that stability in Uganda has improved over the years.	The current existing political environment in Uganda supports e-government and ICT skills development, as evidenced by the rapid development of the ICT sector in the last 10 years.
Level of literacy	Uganda's adult literacy rate (according to UNESCO, 2018) was at 76.53% with the male literacy rate at 82.66% and females at 70.48%.	The disparity in literacy rates presents a critical challenge requiring multi-sectorial intervention. If not attended it has a potential to negatively impact on the consumption and use of ICT and e-government services.
ICT professionals recruitment and management in Government	Uganda predominantly uses open competition. Approaches for recruiting ICT professionals into the service. All public service ministries, follow the mainstream Public Service Recruitment and Management procedures as	Enriching the current recruitment approaches and making it competency based is paramount. It is crucial for MoICT & NG and/or NITA-U to actively participate in providing technical support to the



Elements	Status	Observations and Remarks
	<p>espoused in the various appointing authorities i.e the Public Service Commission, the Education Service Commission, the Health Service Commission, the Judicial Service Commission, district service commissions, the Police Authority and the Prisons Authority.</p> <p>Management of the ICT professionals is housed in the MoICT & NG</p>	<p>recruitment processes to ensure uniform standards across the board.</p>
Legal and regulatory environment	<p>The main regulatory bodies for the ICT sector are the Uganda Communication Commission and NITA-U.</p>	<p>The legal regulatory framework is well articulated. The responsible entities (UCC and NITA-U) need to strengthen the enforcement muscle</p>
Maturity of the fourth estate, literacy levels (Media, Diversity, and Content Manipulation)	<p>Uganda has one of the most liberalized media in Africa with over 200 radio stations, 40 local televisions and a host of print media. The professionalism in the fourth estate is however still lower.</p>	<p>Government through its agencies responsible for ICT need to ensure streamlined professionalism in media agencies through legislation e.g. By law, private schools in Uganda, must employ professionally trained teachers</p>
Approach to digital skilling in government	<p>The Ugandan Higher Educational institutions are at the helm of digital skilling through various approaches as enabled by the existing policy by government. Emphasis is put on; online learning, distance learning, formal (face to face) training and blended learning approaches to digital skilling.</p>	<p>By employing a multiplicity of skilling approaches, the interests of the majority of the citizens are taken care of and the scope of digitally skilled people is widened</p>
ICT Skills supply side	<p>From one public university that started in 1922, Uganda today has 53 universities; nine of them public and 44 private. In addition, Uganda has; 53 public tertiary institutions and 106 private tertiary institutions. All these institutions of higher learning, offer ICT training programmes in various specialties to feed the employment industry which demands the ICT skills. Approximately 7,000 ICT professionals graduate annually from these institutions.</p>	<p>The supply industry for ICT professionals is steadily growing in Uganda. The challenging gap is the misalignment between the much-needed skill set by the employing industry and the skill sets possessed by the graduates from institutions of higher learning. There is need for convergence at curriculum design.</p>
Higher education system status in Uganda		
Elements	Status	Observations and Remarks
Stakeholder participation in curriculum	<p>The National Curriculum Development Center (NCDC) under the Ministry of Education and Sports</p>	<p>ICT requires a multi-stakeholder governance framework and not only to be left to the Ministry of</p>



Elements	Status	Observations and Remarks
development	<p>oversee development of curricula and instructional materials for equitable and quality education through research, innovation and stakeholder involvement. Other stakeholders engaged at the Local Government level are the district education officers, teachers / head-teachers, parents and the civil society.</p> <p>The Uganda National Examinations Board (UNEB) is responsible for the assessment and evaluation for achievements of learning institutions.</p>	<p>Education to manage.</p> <p>There is need for the employing industry to play a pivotal role in curriculum development process for higher institutions of learning.</p>
Pedagogical approaches used	<p>The use of ICT has been taking place in higher institutions of learning and secondary schools so far.</p> <p>Equipping Ugandans with technological skills is considered as a basic need in Education by the current government.</p> <p>The Ministry of Sports and Education (MoES) saw the need of providing technological tools to select urban primary schools as a way to benchmark for other learners across the country using ICT in learning drive²²</p> <p>- Also, digital competency; especially for Teacher Educators (TE) is being developed through formal approaches such as continuous professional development and pre-service training and informal approaches such as collaboration, self-teaching and repetition²³.</p>	<p>MoES and MoICT & NG in Uganda are working collaboratively to ensure integration of ICT into the education system amidst third world country challenges that Uganda faces.</p>
Status of eLearning	<p>The Uganda government approved a policy that integrates ICT into the education curriculum for primary and secondary schools.</p> <p>From a national point of view, current e-learning developments are in their infancy stages due to limited ICT infrastructure and lack</p>	<p>It is recommended that the Government of Uganda through the relevant sectors institute suitable approaches and strategies (or build on existing ones) for effective adoption and utilization of e-learning to support teaching and learning.</p>

²² The Republic of Uganda, 2012

²³ Wycliff Tusiime et. al; 2019: Developing teachers' digital competence: approaches for Art and Design teacher educators in Uganda



Elements	Status	Observations and Remarks
	of resources that have an impact on e-learning ²⁴ .	
Funding for ICT skills development	Funding for ICT projects is managed and monitored by the Ministry of ICT and NG. One such project that is focused on managing of education services to Uganda is the <i>National Education Management Information System (NEMIS)</i> project Funds are largely donations and the projects usually expire after a certain life cycle. NITA-U also plays a key role in monitoring and ensuring objectives of these funds are met.	Uganda is well placed because of availability of funding for development of ICT skilling and it is conclusive to mention that Uganda is on the right track to joining other countries in being lauded as ICT savvy.

Table 16: International benchmarking findings for Uganda

Conclusion: Uganda has certainly made some strides in ICT growth and its development. This is mainly observed in the areas of policy provision, which has created a relatively enabling environment. This coupled with the government’s effort to raise the literacy rates through UPE, USE, UPOLET and privatization of higher education, have given rise to encouraging indices such as; Uganda’s internet penetration rate of between 37-49%, Social media penetration at 5.6% of the population and adult literacy rate at 76.53%. Uganda therefore has one of the fastest expanding ICT sectors, signaling the increasing access to the internet and associated services, critical to the full operationalization of e-government and enjoyment of digital rights.

A few challenges, however, hinder Uganda’s ICT sector:

i) Recruitment of ICT professionals:

- Heavy reliance on eloquence, qualifications and experience of the candidate as the key parameters for determining suitable candidates is a disadvantage to a practical sector such as ICT
- Across the board, there is a trend of insufficiency of some specific ICT professionals such as (Data Scientists, Cyber Security Technicians, Software Developers, Network Engineers, System analysts and Software Developers). This stands out as a leadership issue and has a direct negative effect on the capacity of institutions to advance their mandates. There is need for institutional leaders to cultivate strategic eagerness to embrace e-government and thus prioritize ICT in their leadership.

²⁴ Kahiigi, Evelyn & Ekenberg, Love & Hanson, Henrik & Danielson, Mats & Tsubira, Francis. (2008). Explorative Study of E-Learning in Developing Countries: A Case of The Uganda Education System. MCCSIS’08 - IADIS Multi Conference on Computer Science and Information Systems; Proceedings of e-Learning 2008. 2. 195-199.



- ii) **Policy implementation:** Having good laws and policies in place with weak enforcement
- iii) **Ethics and integrity:** Corruption has corroded all sectors of the economy, ICT inclusive. Deliberate effort to enhance integrity and ethical levels among the ICT service providers is key for MoICT & NG.
- iv) **Low funding for ICT:** Funding for ICT is largely from donations through projects which usually expire after their life cycle. Government’s direct funding for ICT, which could insure sustainability is very low.
- v) **Curriculum Design:** Misalignment between the ICT Curricular in institutions of higher learning and the hands-on practical needs of the employment industry, amidst the ever fast changing ICT landscape.

A summary of International Best Practices and Lessons Learnt for Uganda

Table 16 below provides a summary of the best practices gained from select countries for comparison and learning for Uganda:

Country	Good Practice	Lessons Learned
South Korea	Puts first priority in human capacity development, especially in the areas of technology and agriculture	Strengthening the practice of planning and budgeting for ICT training in all MDAs as provided for in the Uganda Public Service Training Policy (2006) will greatly facilitate ICT sector growth and expedite effective operationalization of e-government.
	Invests heavily in the ICT infrastructure development especially the delivery of broad internet to homes and manufacturing of ICT devices so as to enhance device access	MoICT & NG should advocate for increased budget allocation for extension of broadband internet connectivity to remote parts of the country
	Promotes community-based ICT capacity development centers, supported by academia, private sector and government.	-Effective participation of the community and the private sector in ICT curriculum development of all academic institutions is paramount -Enhance participation of the academia in ICT Policy making process -MoICT & NG should establish community-based training centers to promote ICT skills development for civil servants and general public
	Integrates ICT skills development into her education systems right from kindergarten to universities. E-Learning promoted as a culture	-Given the experience of COVID-19 and the role so far played by ICT in sustaining education service delivery, government through MoICT & NG (in partnership with MoES), should review ICT curricula at all levels of education to cater for at least 60% of the learning processes in institutions



Country	Good Practice	Lessons Learned
Estonia	Full operationalization of e-Government in all sectors of the economy	-Given the experience of COVID-19 and the role so far played by ICT in sustaining service delivery, the policy on full operationalization of e-government should be rethought and expedited (brought forward). MOICT & NG and her agencies have a critical advocacy role to play
	Heavily invests in creativity, knowledge and technology as her strengths	-Academic Institutions should promote effective participation of the community and the private sector in ICT curriculum development across board.
	Employs competency-based recruitment approach to attract highly competent ICT professionals	Recruiting authorities (PSC, ESC, HSC, JSC, Police Authority and Prisons Authority and other agency-based recruiting authorities should review their guidelines to promote competency-based recruitment as opposed to only competition -based approach, which prioritizes eloquence and academic qualifications
	Total promotion of internet access as a human right (enforced)	-MoICT & NG should advocate for lowering of taxes on internet and all related services to enhance access to the citizenry -Academic institutions and the Media be streamlined to promote use of the various internet-based ICTs among the population.
Kenya	Enhanced level of literacy promotes uptake of ICTs	-MoES should strengthen implementation of literacy promotional programmes such as UPE, USE, UPOLET etc. -Government through MoES, should consider aiding Nursery Education
	Media has significant freedom	There is a considerable level media freedom in Uganda. MOICT & NG should consider tasking the fourth Estate (media) to promote use of the various ICTs among the population
	Presence of a functional ICT infrastructure	-MoICT & NG and NITA-U should expedite extension of the Broadband to all corners of the country (remote corners) -Effectively operationalize (enforce) all related ICT Development policies, such as NITA-U 2009 Act, the Data Privacy and Protection Act, 2019, Computer Misuse Act 2011.



Country	Good Practice	Lessons Learned
Ghana	The sustained political stability of Ghana has attracted global attention and has made Ghana one of the top destinations for large multinational technology companies like Google, Microsoft to establish operational offices in the country.	Government should heavily utilize ICT to aggressively promote and popularize the current political stability by way National Public Relations with the international community. In the overall the ICT growth and development is enhanced.
	High levels of literacy among the population enables ICT skills penetration and uptake	-MoES should strengthen implementation of literacy promotional programmes such as UPE, USE, UPOLET etc.
	Ghana's per capita income is above average. This means Ghanaians can spend more on internet and e-services	Government should ensure effective implementation of government wealth creation programmes such as Operation Wealth Creation (OWC), Emyoga etc.
Australia	Commitment by government to fund the ICT skills development ensures sustainability of the ICT programmes in institutions of higher learning	MoICT & NG to advocate for increase of budget allocation for the development of ICT and operationalization of e-government in Uganda. More so for institutions of higher learning, which are the epicenter of ICT skill dispersal
	Australia's pedagogical approaches are well enlisted in a strategy and applied across all institutions of higher learning	-MoICT & NG in conjunction with NCHE develop and approve harmonized ICT Curricular to be implemented in all academic institutions. -NCHE to assert its mandate to ensure harmonized implementation of ICT Curricular across all academic institutions
	Use of competency-based recruitment approaches through ICT Professional Firms, head hunting and other professional bodies; facilitate selection of the best and practical ICT professionals in the Australian system	Recruiting authorities (PSC, ESC, HSC, JSC, Police Authority and Prisons Authority and other agency-based recruiting authorities, should review their guidelines to promote competency-based recruitment as opposed to only competition -based approach, which prioritizes eloquence and academic qualifications

Table 17: A summary of International best practices and lessons learnt for Uganda

2.3.2 Desired ICT Skills and Knowledge

a) Desired skills by ICT and non-ICT professionals

One of the key objectives of the study was to establish the kind of ICT skills desired by both ICT and non-ICT professionals in order to execute their mandate effectively. The results from stakeholder consultation revealed that: **online collaboration and cloud services, cyber security, graphics and content authoring, basic digital literacy, internet and social media, basic computer maintenance and trouble shooting and**

data science (in that order) are the preferred key digital skills desired by non-ICT professionals in target MDAs.

An interesting observation was that **e-Government systems** were least desired, which could be due to the fact that all staff who interface with relevant e-Government systems had adequate training during the rollout of these systems (Figure 20 below).

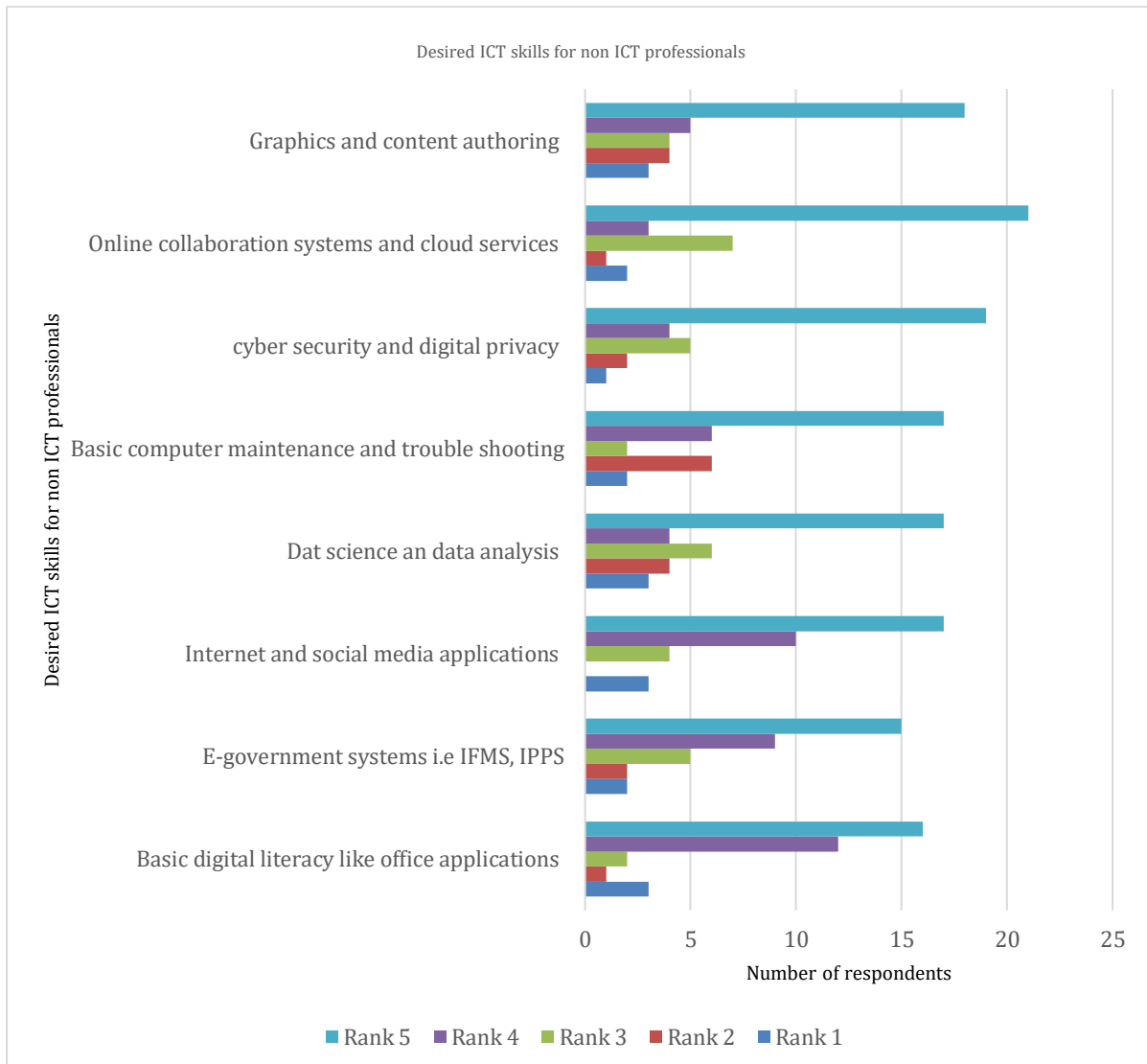


Figure 20: Desired ICT skills for non-ICT professionals

For ICT professionals, the most desired top three skills were: **cyber security, data science and data analysis, and online collaboration systems and cloud services** as illustrated in **Figure 21** below. The observation was well captured by one respondent who emphasized that;

“The future of computing is in the cloud and using algorithms to manipulate the data (Artificial intelligence), therefore all government agencies must improve the utilization of data to inform key decisions at the highest level of government”

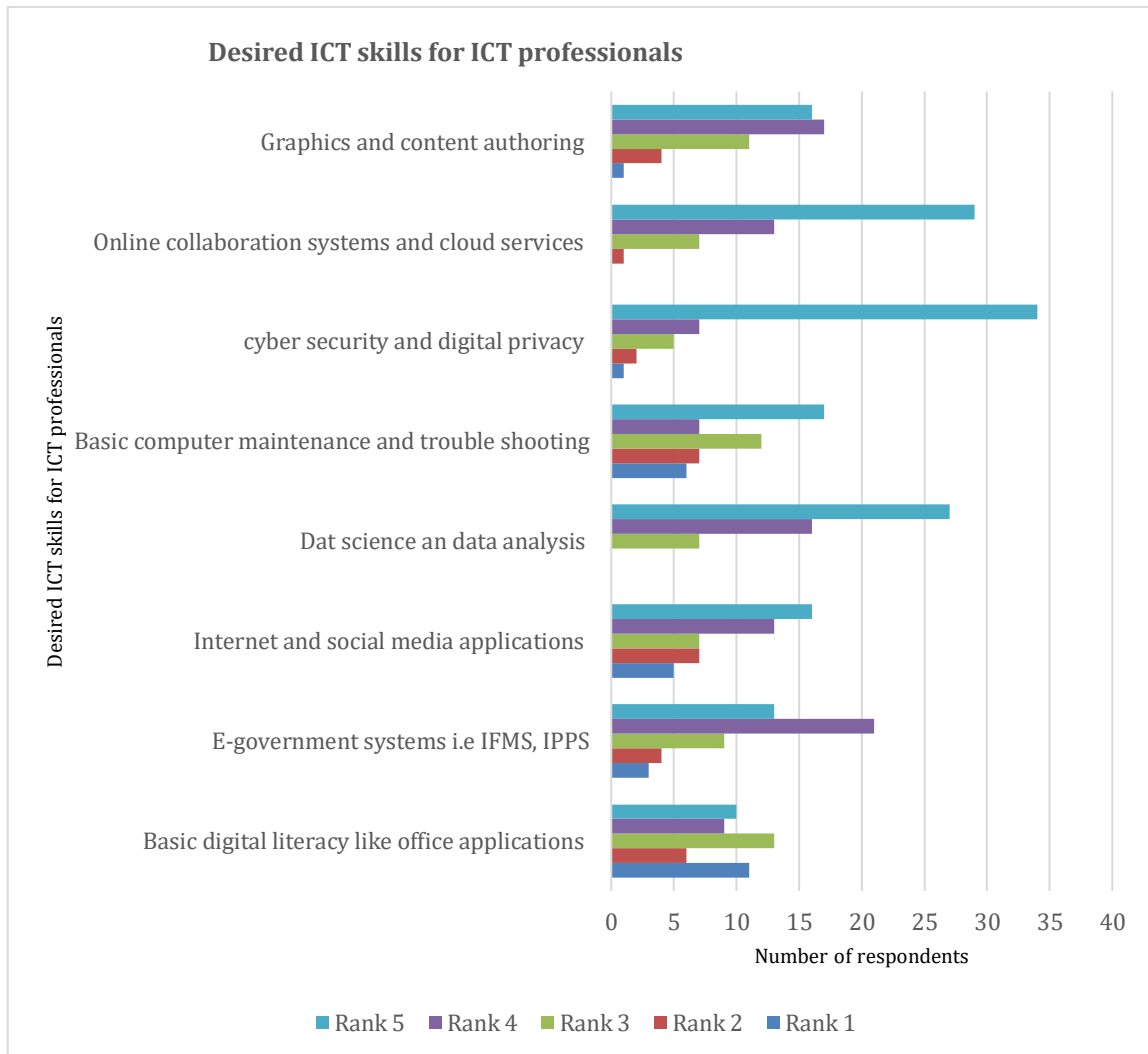


Figure 21: Desired ICT skills for ICT professionals

b) Motivation for acquiring digital skills

In line with this study’s objectives, it was important to establish the key incentives that would motivate staff (both ICT and non-ICT professionals) to acquire the desired digital skills as per their level of responsibility. It is well acknowledged in human capacity development modes that the biggest challenges employers do face is to motivate employees to find time to acquire new skills. Two types of motivation exist; the intrinsic and extrinsic. Learning is an intrinsic part of human nature to be curious, active, to initiate thought and behavior, to make meaning from experience, and to be effective in doing the

things we value. These are the primary sources of motivation, and it is therefore crucial that training programs are designed around both extrinsic and intrinsic factors that motivate employees.

This research further sought to establish factors that motivate employees to attend trainings and the results revealed that majority of the staff are motivated **to acquire skills**, acquire **award** given for that training, **network** with other individuals from other organizations and fields, **job promotion**, **job security** and **increased pay** in that order of preference as illustrated in the figure 22 below.

(Rank 1=less likely, Rank 2=likely, Rank 3=moderate, Rank 4=High Rank 5= highly)

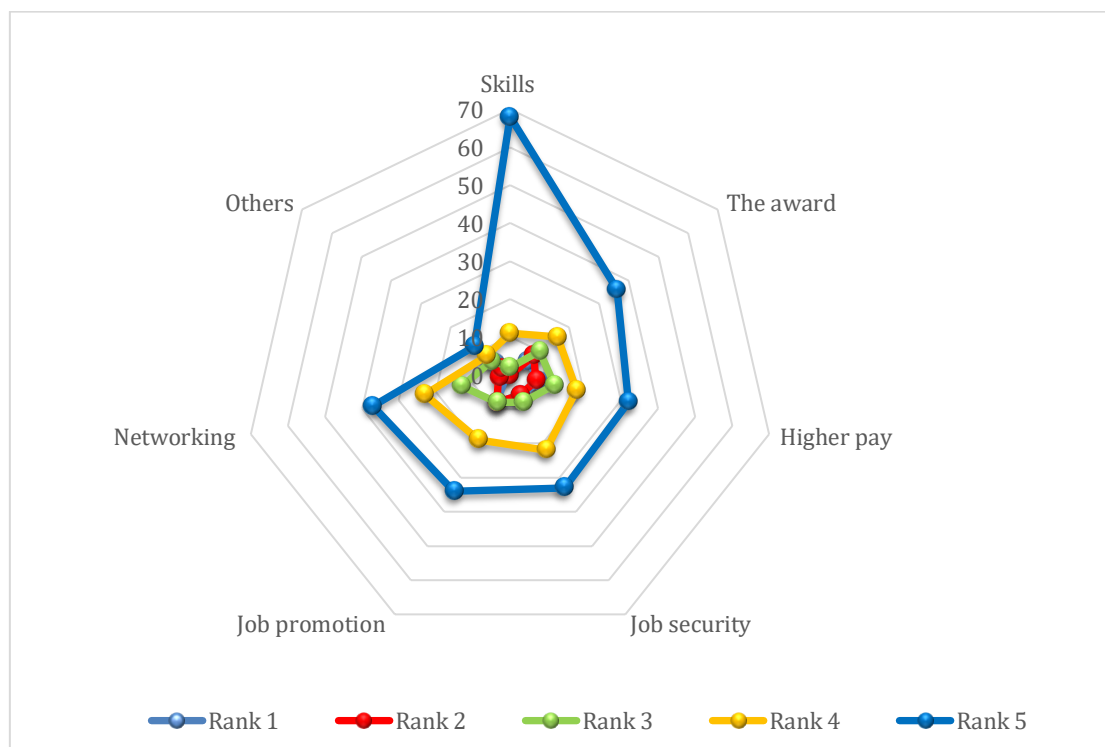


Figure 22: Factors that motivate employees to acquire digital skills

c) Preferred mode of delivery, duration and location

Now that it was established that a significant number of staff in target MDAs desire to acquire different digital skills, the study further sought to establish the desired mode of delivery for digital skills development programmes. The analysis of data revealed that: the most preferred model of delivery is a **blended mode** (combination of face-to-face and online) followed by **face to face**. More ICT professionals preferred the blended mode compared to non-ICT professionals, while more non-ICT professionals preferred face-to-face compared to ICT professionals (Figure 20).

Both non-ICT professionals and ICT professionals preferred ICT skills to be delivered in a combination of both online and face to face. However, non-ICT professionals generally do not want online delivery. This implies that professionals with a non-ICT background possess less knowledge of online collaboration and this is a skill that every employee at every level in the organization should possess (*even in light of the COVID-19 pandemic*).

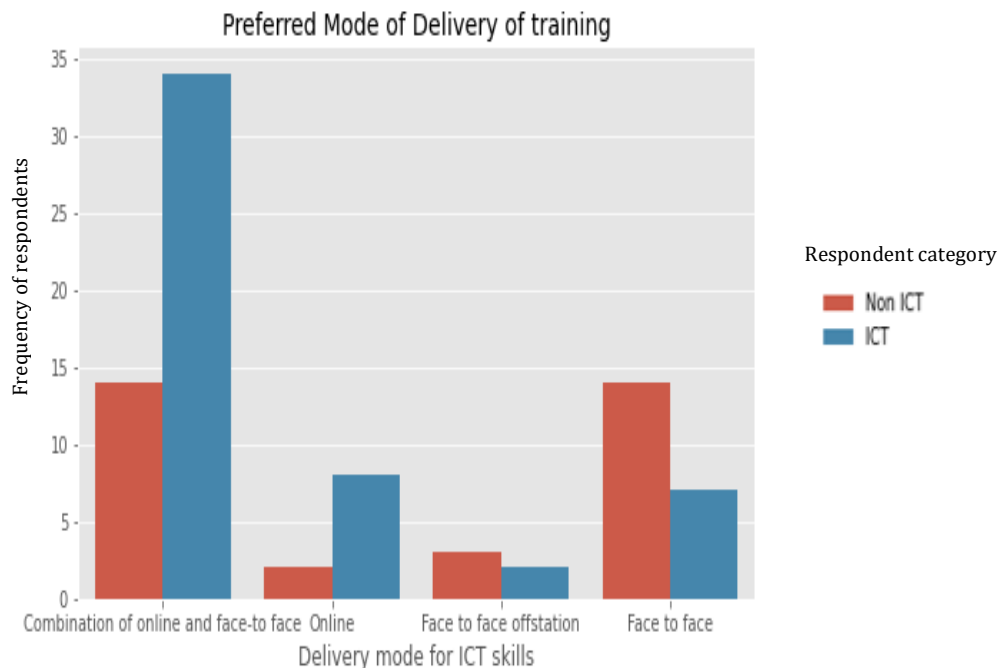


Figure 23: Preferred mode of delivery of digital skills training by staff in MDAs

A well thought out training programme must have clear learner outcomes and a well-defined pedagogy, which determines the course load and associated duration. Different training delivery modes require different durations to ensure the trainees satisfaction and skills acquisition.

Results revealed that majority of the respondents (52.4%) preferred less time for the face to face training sessions (*not more than 5days*) compared to the (35%) online sessions that preferred (*less than 4weeks*) as illustrated the **Figure 24** below

Preferred duration of the desired trainings

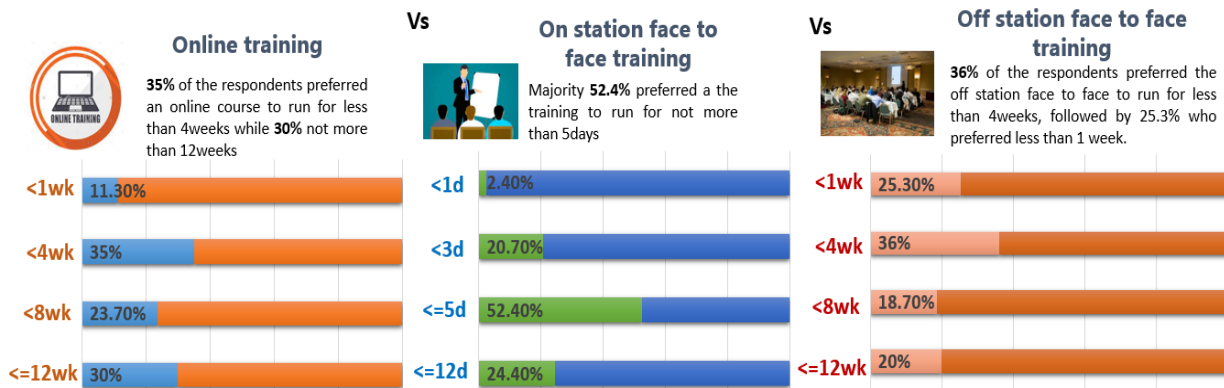


Figure 24: Preferred duration of digital skills training programmes by staff in MDAs

d) Willingness to invest in digital skills development by staff of MDAs

One of the key research questions of the study was to establish the extent to which staff are willing to investment into their careers. In regards to the payment terms for the desired ICT training course, 79 of the 86 respondents were willing to take on ICT certification courses if they were offered sponsorship; 40 respondents were willing to take on courses if given time off and only 8 respondents were willing if self-sponsored. This implies that majority of the respondents would only attend a course when fully sponsored as illustrated in figure 25 below:

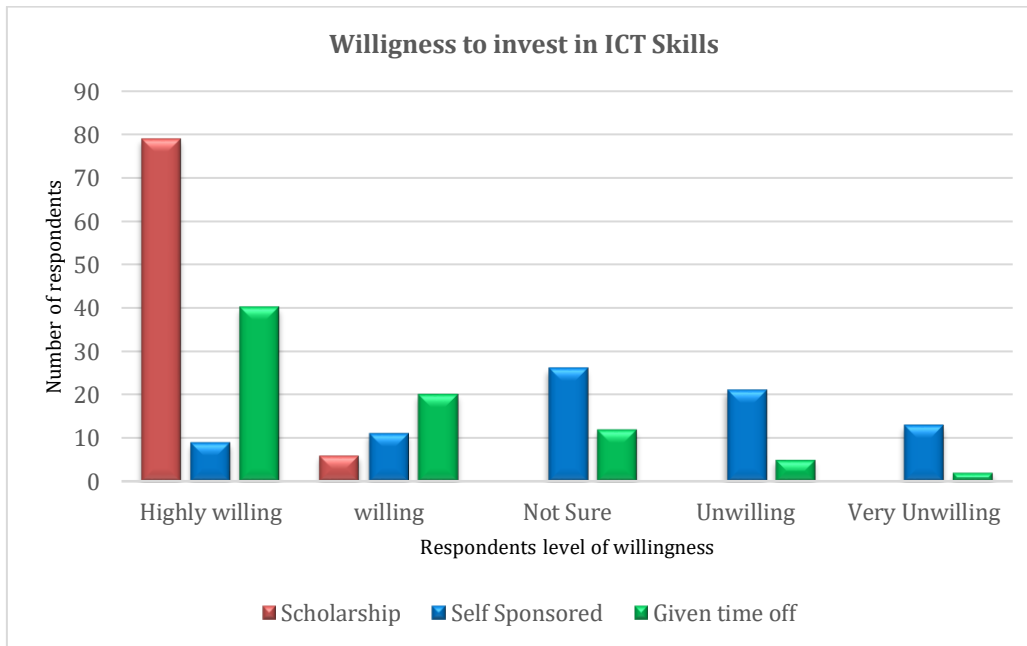


Figure 25: Willingness to invest in digital skills development by staff of MDAs

2.3.3 Desired Employee Behavior

Regarding individual employee traits considered for successful implementation of e-Government structures, it was revealed that; **integrity (22%)** was more significant, followed by **flexibility** and **self-driven** which both scored 19%. **Teamwork and communication skills** received the same score of 17%, meaning they were rated equally important. **Agility** and **Good listener** scored the same (14%), **Ambitious and Intelligence** received equal scores as well (8%) and the least was **efficient** (6%).

It can therefore be concluded that for Individual employee's traits; **integrity, self-driven, flexibility, good communication skills and Teamwork** should be considered in the implementation of e-Government programmes as illustrated in figure 26 below:

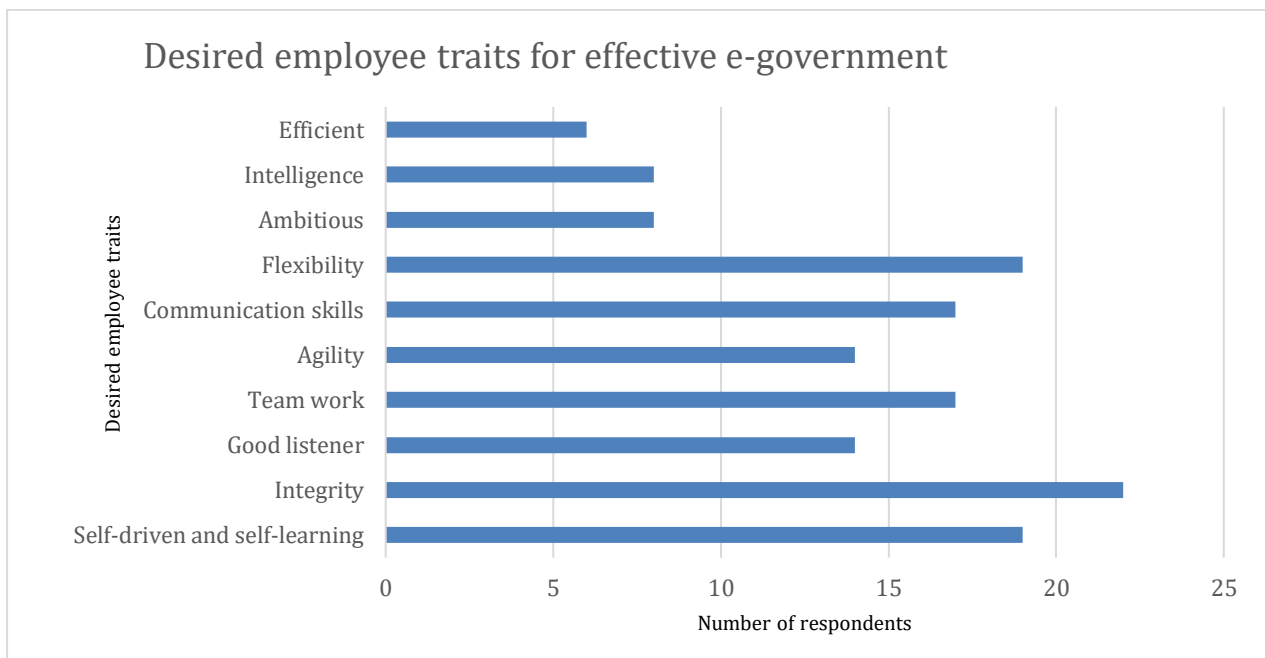


Figure 26: Desired Employee traits for effective E-government

The word cloud below summarizes all the above responses (**Figure 27**) and showcases a visual representation of word frequency. The more commonly the term appears within the text being analyzed, the larger the word appears in the image generated.



Figure 27: Word Cloud of Responses

2.3.4 ICT professionals Recruitment and Management

The existing process of identifying, attracting, interviewing, selecting, hiring and onboarding ICT professionals is highly dependent on individual institutions and the surrounding policy landscape. Predominantly, all the government ministries follow the mainstream public service recruitment and management procedures as espoused in the various appointing authorities i.e., the Public Service Commission, the Education Service Commission, the Health Service Commission, the Judicial Service Commission, the Police Authority and the Prisons Authority. An anomaly however exists where generic structures for ICT staffing have been created and implemented without considering the unique industry mandates of each institution and the skillsets expected of employees therein.

The autonomous agencies on the other hand are deemed to be governed by their internal Human Resource Policies (Manuals) that are deemed to be more responsive to their unique industry mandates. However, for some of these institutions, such as the Natural Chemotherapeutics Research Laboratory (NCRL), such policies were non-existent, leaving NCRL to rely on the ICT services of Uganda National Health Research Organization (UNHRO). Even where policies existed, there are challenges of inadequate funding and weak commitment by the leadership to have the ICT staffing filled to 100% as expected.

In practice therefore, the current recruitment practices are confirmed as unharmonised and disjointed and not aligned to the institutional and structural set up of the line sector; MoICT & NG. The recent change in policy of having all ICT professionals being housed and

managed at MoICT & NG, is still in its infancy stage and hasn't yet had effect on the ICT professionals Recruitment and Management.

Due to the observed lack of alignment between institutional and staffing structures in MoICT & NG and ICT functions in MDAs, there is lack of standardization of the quality of ICT staff in MDAs. There is need for full integration and regularization of ICT positions into the public service staffing structures, while taking into cognizance the unique industry mandates expected of each institution.

The study further sought to establish opinions of staff in the target MDAs on how ICT professionals should be recruited into their organizations. It was revealed that **open competition** was most appropriate (58%) followed by **head hunting** (19%), use of **professional ICT Associations** (14%) and use of **recommendations** (3%). This is highlighted in figure 28 below.

It can there be concluded that open competition which involved advertisement for vacant posts was the best way of sourcing for ICT professionals. However, in regards to how ICT professionals should be managed a big number (44%) of respondents preferred that each MDA manage their own staff with guidance from the Ministry of ICT and Public service, followed by Ministry of ICT and NG (36%) and lastly Ministry of Public service (19%) (Figure 29).

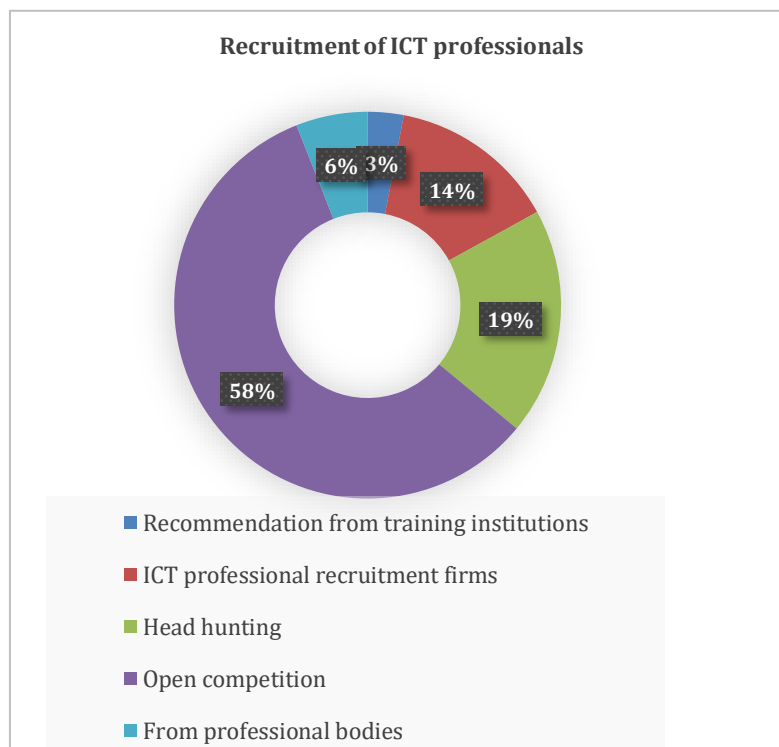


Figure 28: How ICT professionals in MDAs should be recruited

The **Figure 29** below shows the results of respondents for ICT professional management:

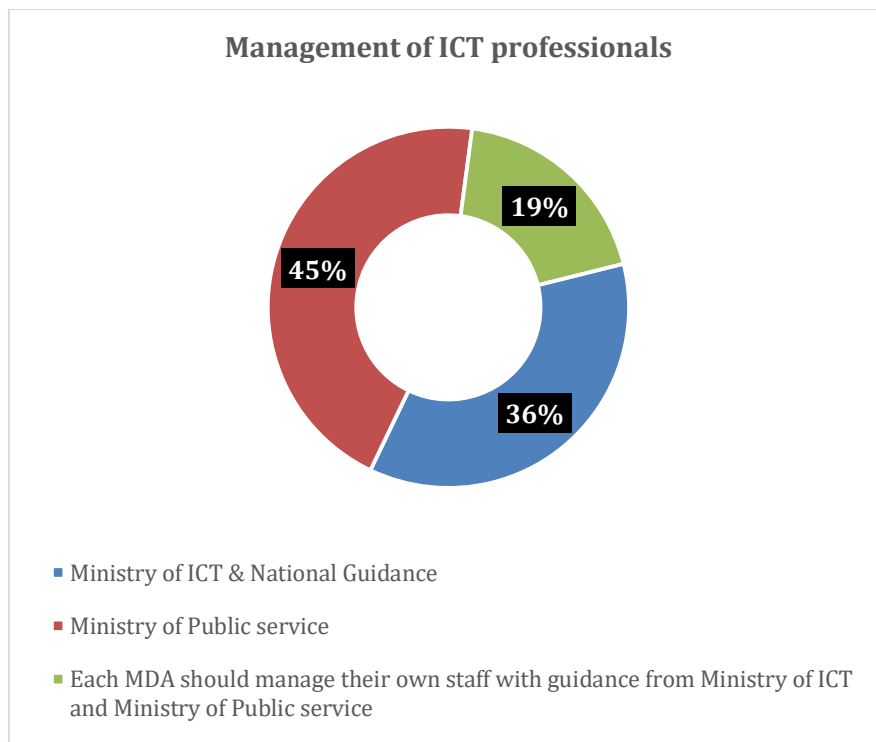


Figure 29: How ICT professionals should be managed

2.3.5 Academic Institutions and Private Sector Contributions to ICT Skills Development

Through focus group discussions and key informant interviews, the study sought out the opinions of stakeholders on what academia and private sector could do to contribute to improvement in ICT skills development in the country. The analysis of the responses as shown in figure 30 below revealed that; collaboration in curriculum development was more significant (28%) followed by improved structure (22%) such as availability of ICT equipment's, tailor-made courses (17%) to suit staff on the job they are currently undertaking, use of tracer studies to inform academic programme design and delivery (14%) and balancing technical and soft skills was the least significant (11%). A significant finding was the need to have field attachment for both students and academic staff. This was well summarized by one key respondent:

“Most of the lecturers in universities lack industrial exposure and teach according to the books they have read, which limited their contextual application of knowledge. I had attended classed where a lecture is practicing in the field and you're really enjoy and get applicable knowledge and skills”

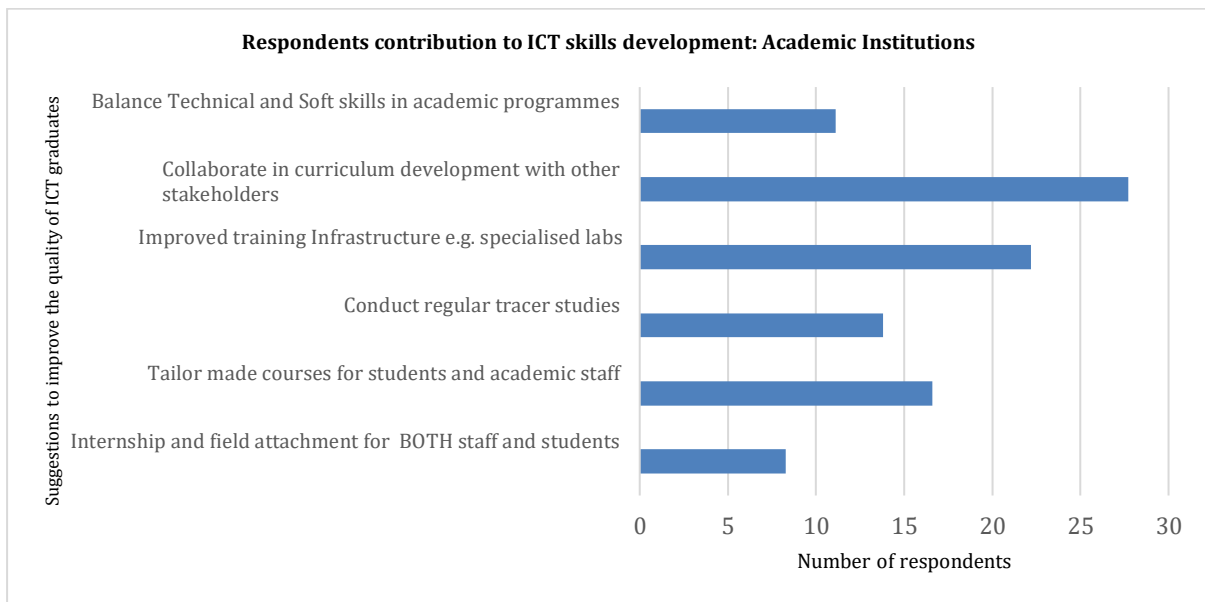


Figure 30: Suggested actions Academia should do to improve the quality of ICT graduates

For private sector contributions to ICT skills development traits, the most significant was the need for involvement in: internship and graduate training (28%) followed by participation in curriculum development (22%), resource sharing (19%) whereas participation in training delivery and joint research scored the same (11%) and the most significant was increased funding through Corporate Social Responsibility (CSR) as shown in **Figure 31** below.

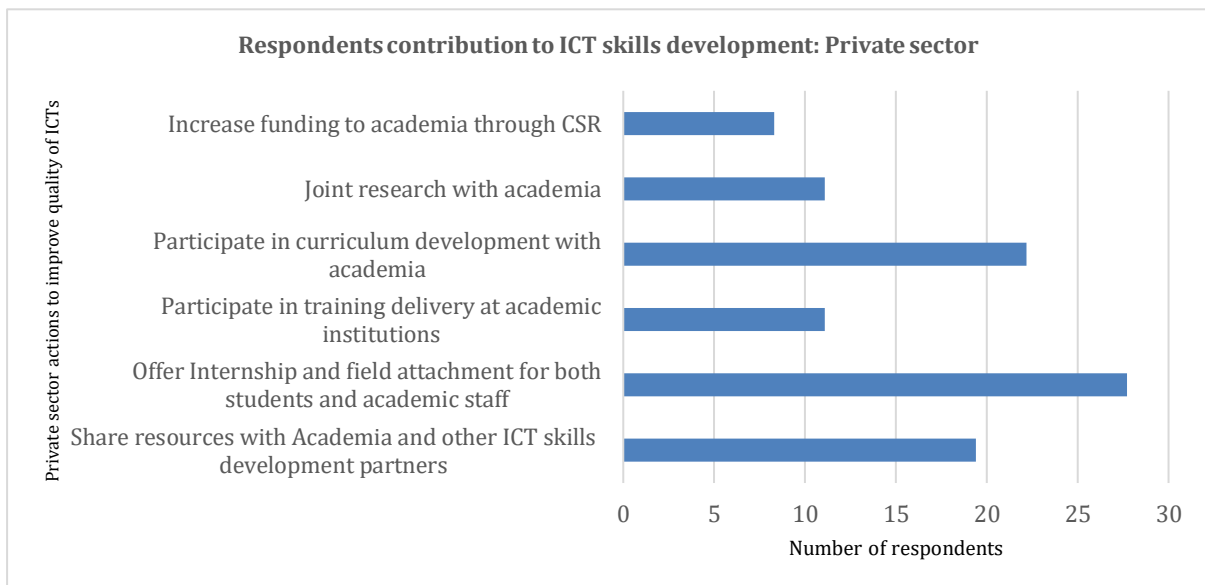


Figure 31: Proposed Private Sector Actions to improve quality of ICTs

It can therefore be concluded that internship, staff field attachment, graduate training programmes, and collaboration in curriculum development are critical pillars for ICT skills development in an ICT ecosystem.



2.4 ICT Skills Supply Patterns

Through key informant interviews and literature review, the supply side assessment focused on evaluation of curriculum development practices, estimated number of ICT graduates at bachelor and postgraduate levels annually, type of programmes offered, models of programme delivery, staff caliber, and level of stakeholder engagement in programme design and delivery modes. The details are discussed in the next sections.

2.4.1 Number of ICT graduates produced

From various stakeholder interviews in education and ICT sectors, it is currently estimated that Uganda's higher education system is producing about 7,000 ICT professionals annually at various levels of post graduate degrees, bachelor's degree, diploma and certificates. On average there are about 6 ICT based programmes at each university offering ICT training covering four levels of; certificate, diploma, bachelor's and postgraduate.

From the sampled training institutions, the sections below highlight their average annual graduation numbers at undergraduate level in ICT courses which mainly cover computer science, information technology, information systems, business computing, and software engineering, among others.

a) Makerere University, College of Computing and Information Sciences

The College of Computing and Information Science (CoCIS) runs over 50 programmes at certificate, diploma, bachelors and postgraduate levels in the 2 schools. The College uses a demand driven approach for curriculum development to gather stakeholder input mainly through curriculum development workshops, internship feedback, international benchmarking and to a lesser extent, tracer studies. CoCIS has the largest computing facility in the country with a number of leading specialized labs in artificial intelligence, data science, software systems, networking, among others.

The College boasts of the highest concentration of young PhD holders at any ICT faculty in the country, with over 50% PhD among the 122-academic staff, most of which have had postgraduate (Masters or PhD) training outside Uganda (~65%).

The college graduates an average of 4,000 students a year at various levels of certificate, diploma, professional, bachelors and postgraduate majority of which are at certification level. From the stakeholder key informant interviews 20% of the graduates from the CoCIS are perceived to have excellent technical skills and are making the majority of innovators in the ICT innovation sub-sector in the country.

According to the key informants, most of the ICT startups on Kanjokya Street (*a startups hub*) are alumni of the College. The college delivers training using student centered

learning, encouraging innovations, critical thinking, and entrepreneurship. The college also runs a number of professional programmes in collaboration with a number of partners such as; Huawei, CISCO systems, Microsoft, ITU among others. The college provides customized digital skills programmes through the Center of Innovation and Professional Skills Development (CiPSD) for both government and private sector. It is estimated that COCIS has trained over 50,000 people in the last 10 years on various levels (certificate, diploma, bachelors and postgraduate). In the last 12 months alone COCIS through CiPSD has trained over 5,000 individuals through Huawei, CISCO and MasterCard partnerships. Figure 32 below shows an advert of some of the courses at CoCIS.



Figure 32: Tweet showing some of the courses offered by COCIS

According to the key informants, most graduates of COCIS have averagely good technical skills but they lack soft skills, which are expected to be acquired through industrial training.

Makerere University, College of Computing and Information Sciences, is the largest ICT training facility in the country. Table 18 and Figure 33 below shows the number of ICT graduates from the College for the period of 2015 to 2019 as a trend indicator of ICT skills supply to the sector annually.

Year	Undergraduate	Masters
2019	780	24
2018	933	39
2017	1199	76
2016	1578	62
2015	1110	80

Table 18: Number of ICT graduates at COCIS from 2015-2019 (Source: Makerere University Annual Reports)

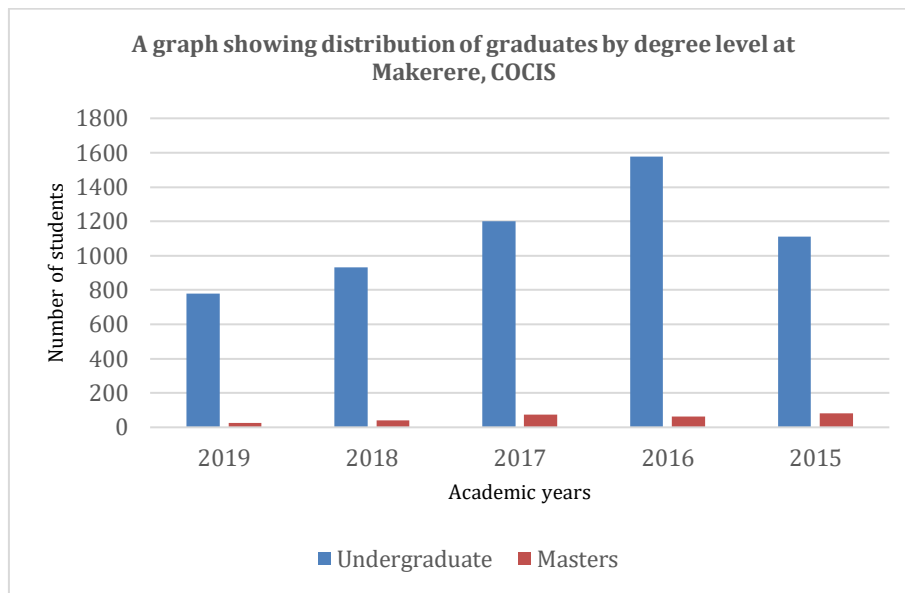


Figure 33: Graduates from Makerere COCIS 2015-2019

b) ISBAT University

ISBAT University is a chartered for-profit private university that focuses on technology. The university runs 3 Postgraduate, over 10 Undergraduate, 3 Diploma and Certificate programmes under its two (2) Faculties. The University training programmes are market driven and are developed or established through market demand analysis. According to the university senior management, ISBAT designs programmes by use of a consultative and reflective process through workshops, international benchmarking, employer's demand and tracer studies. The University has few PhD holders among the academic staff. Most of the Lecturers, however have Masters Degrees which were obtained locally and internationally. In pursuit of offering innovative and experiential learning experiences to its students, the university uses adjunct professors from other universities (local and international) who co-facilitate the learning process.

The University maintains its niche values in offering Bachelors and Master's Degree courses in disciplines that are internationally competitive such as Information and Communication Technology, robotics, artificial intelligence, e-Commerce, Multimedia and Animation, Engineering among others. According to the respondents at ISBAT, Uganda needs ICT training technocrats in both public and private universities in the areas of artificial intelligence, data science, cyber security, electronic engineering, and research and innovation management, ICT project management among others.

According to the dean and the VC, ISBAT graduates are the most sought after given the university's approach to teaching and learning which improves self-confidence and esteem. ISBAT graduates an average of 200 students annually at various levels. The university has state of art facilities for e-Learning, cyber security and e-enabled lecturer



rooms with Wi-Fi. The university does provide professional programmes and customized productivity programmes in various ICT areas such as cyber security and multimedia.

c) APTECH Computer School

APTECH Computer School runs a total of 16 programmes of which 6 are Diploma and 10 are Certificate programmes. APTECH is well known for production of highly skilled professionals in the areas of Information Technology such as Cyber security, CISCO and other short courses that last about 6 months. According to the key informants, APTECH is an accredited international testing center for various certifications in ICT. The school has a competent team of lecturers (instructors) with a mix of Nationals and International professionals. According to the Manager of APTECH, the school is a software engineering center with programmes suitable for Uganda's economic transformation and focuses on national skilling.

The key respondents indicated that curriculum development at APTECH is demand driven, from ICT professional's surveys and feedback of student's internship, workshops, and international benchmarking and tracer studies. Instructors' proficiency and skills are measured according to the internal quality framework of APTECH benchmarked on international best practices, such as use of current technologies in training, peer evaluation of delivery, the level of students' passing of international examinations and the student's feedback.

According to the key informants the school graduates about 1000 students per year in various programmes and it is one of the top ICT skills service providers in the country. The school has capacity to organize any customized ICT training programme with exception of those that require specialized training equipment, which need time to be mobilized.

d) Uganda Institute of Information and Communications Technology

Uganda Institute of Information and Communications Technology (UICT) is a government capacity building institution operated and managed by Uganda Communications Commission (UCC) in line with the UCC Act 2013. The institute runs over 10 programmes in the field of ICT (6 Diploma and 5 Certificate) all aiming at providing high quality market driven ICT skills to improve management and technical practices.

UICT uses relevant research from professional practice, student inquiries about courses, curriculum development committees to gather stakeholder needs plus international benchmarking to predict future ICT skills demands and trends.

The Institute employs highly trained staff well versed with the latest ICT knowledge and have qualifications such as PhD, Masters Degrees and professional certifications.



The institute graduates about 500 students per year with Diplomas and Certificates in various disciplines that also include digital skills in ICDL modules. Currently, the institute is undergoing a rebranding and reposition and in the process of implementing the turnaround strategy to make it an ICT Centre of excellence in sub-Saharan Africa. The institute also offers caravan training programmes on demand to various stakeholders especially digital productivity skills to government entities.

e) Mbarara University of Science and Technology

Over all, Mbarara University of Science and Technology runs over 16 Undergraduate programs, with a big number of Master's degree (22) and 06 Doctoral courses through the 6 faculties; including the Faculty of Computing and Informatics (FCI). The University also runs few programs at Diploma level (03) and has only one course at certificate level, all run in the 06 faculties.

The University is renowned for Medicine based programs and this is mainly to meet the growing demand for Doctors and Nurses in Uganda. Through the FCI, the University runs a number of certificate, diploma, undergraduate and postgraduate programs and according to the Dean, the FCI graduates about 300 students annually at all levels.

It was revealed that FCI programs are developed through a demand driven market analysis comprising of curriculum reviews at national level and with comparison with the International trend analysis. Stakeholder consultations on curriculum development are done through workshops, environmental scanning, sector opinion leaders' interviews, and national development plan analysis, among others.

MUST boasts of qualified academic staff at the FCI, at both senior lecturer and assistant lecture levels that hold Masters and PhD degrees. The faculty delivers training using student centered learning approaches, encouraging innovations, critical thinking, and entrepreneurship. The Faculty is open to providing customized training programs to the government using demand analysis and client engagement.

f) Gulu University

Gulu University is a public University and the first and the largest in northern and eastern Uganda. The university runs 4 Undergraduate and 1 diploma programmes in the areas of computing and IT, through the department of computer science.

The University graduates about 100 students per year according to the head of department of computer science. The university is planning to roll out certification and professional programmes.



The University uses the demand driven approach for curriculum development to gather stakeholder needs through curriculum development workshops, feedback from employers, Internship feedback and international benchmarking.

g) ICT Association of Uganda

ICT Association of Uganda is an Industry advocacy group, whose main purpose is to aggregate the voices of the members in the sector at key decision-making levels. The Association through its members does provide internship, coaching and mentoring programmes to mainly young professionals in the field of ICT. Through partnering, the association does provide capacity building programmes largely to members especially in the areas of business development, compliance, product innovation, among others. The association does participate in public dialogues, skilling initiative, curriculum development approaches and guest lecturing through her members. The association has also been at the forefront of ICT innovation sub-sector development as the driver of skilling and innovation development.

The association through its members does provide annually, over 1000 internship placements, 10 networking events and 3 training events, according to former committee members of the association.

h) Innovation Hubs

Uganda is estimated to have between 10 to 15 operational ICT innovation centers and hubs spread across the country. Most of these hubs are based at tertiary academic institutions. According to key informants, these hubs provide skilling programmes targeting both soft and hard technology skills. The most popular hubs are Outbox, HiveColab, Innovation village, Centre for Innovation and Professional Skills Development, Makerere Innovation Centre and ComTech Mbarara.

It is estimated by the key informant that these hubs do train about 500 people per year on various short terms skills. The hubs are largely unfunded and most work is done on cost recovery and margin mark ups.

2.4.2 ICT Curriculum Development Practices

The study sought to establish how academic and ICT training institutions develop their training curricula, with the view of establishing possible gaps. The analysis of the feedback revealed that training institutions are following a number of practices in the development of the curriculum. Figure 34 below summarizes the key practices captured.

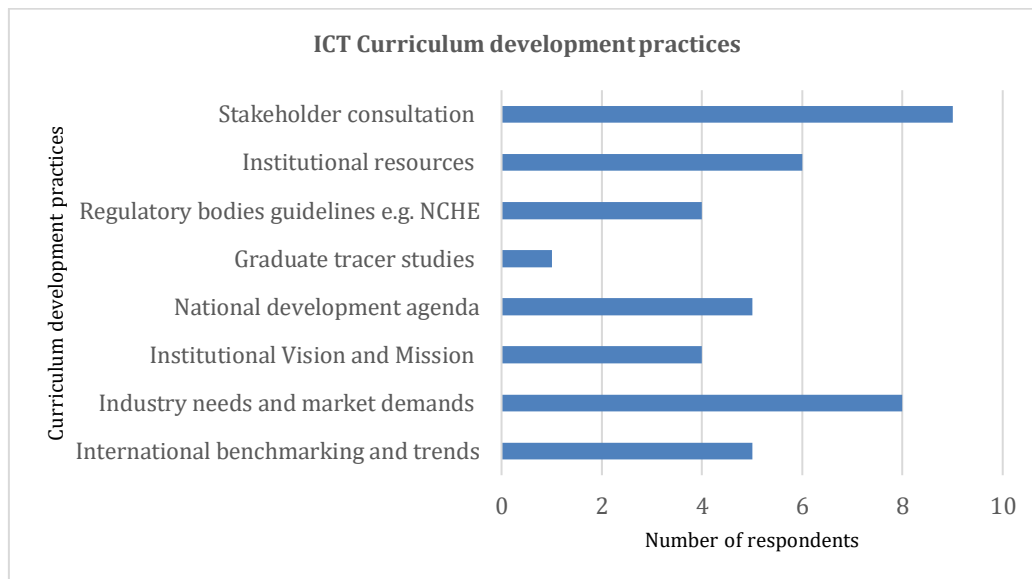


Figure 34: Key ICT curriculum development practices

The results indicate that stakeholder consultations, industry needs and institutional resources are the key pillars that influence the ICT programme development at given training institutions. This might explain the limited availability of high-end courses like data science, robotics and artificial intelligence, cloud computing, embedded systems, computer systems engineering and digital forensics as they are resource intensive and low practical careers in the current structure of the ICT ecosystem and economy.

2.4.3 Type of ICT Programmes Offered

The most common fields of study are information technology, computer science, software engineering and business computing and information systems among others.

The most common ICT professional certifications are Cisco networking, Microsoft technologies, Oracle, Cyber security and office productivity applications (ICDL). The ICT professional certifications are largely classified in three levels; associate, professionals and experts.

Most of the ICT professional associate certificate programmes cost an average of 600 USD to complete, meanwhile the professional courses cost about 1200 USD and digital literacy and productivity programmes cost an average of 85 USD. The average tuition fees for an ICT bachelor programme at universities is 300 USD per semester, exclusive of functional fees which averages 250 USD. Majority of higher education institutions and IT consulting firms do provide customized training programmes to suit the clients' unique requests. Table 19 below summarizes programs offered at all the aforementioned institutions in section 2.4.3 above.



No.	Institution	Short Courses/Certificates	Diploma Courses	Bachelors Courses	Postgraduate Qualifications
1	Makerere University	Certificate in computer application, ICDL, IT Essential 1&2, CCNA 1-4, CCNP, Oracle certified associate program, oracle certified professional, Microsoft certifications MCITP, MCDBA and MCSE, Website development	Diploma in Computer Science and Information Technology (DCSI)	Computer Science, Information Technology, Information Systems, Software Engineering, Data Communications and Software Engineering, Information Systems and Technology.	PGD in Information Technology, PGD in Computer Science, PGD in Data Communication and Software Engineering, PGD in Information Systems, MSc. in Computer Science, Master of Information Technology, MSc. in Data Communication and Software Engineering, MSc. In information systems, Msc in information Science, Msc. In records and archives management, PhD Computer Science, PhD Software Engineering
2	Uganda Institute of Information and Communications Technology	Certificate in Information and Communication Technology	Diploma in Computer Technology (DCT) Information Technology Business (ITB) Diploma in Multimedia Technology (DMT) Diploma in Information Technology Science (DITS) Diploma in Electrical and Electronics Engineering (DEEE)	Software engineering	



No.	Institution	Short Courses/Certificates	Diploma Courses	Bachelors Courses	Postgraduate Qualifications
			Telecommunications Engineering (TE)		
3	Aptech Computer Training	National Certificate in Information and Communication Technology, ACSE (Advanced Certificate in Software Engineering), CISSP - Certified Information Systems Security Professional PCSE (Professional Certificate in Software Engineering), CPISM (Certificate of Proficiency in Information Systems Management), HDIM (Higher Diploma in Multimedia), PCIM (Professional Certificate in Multimedia), CIMA (Certificate In Multimedia & Animation), CIM (Certificate in Multimedia), HDIM (Higher Diploma in Multimedia), PCIM (Professional Certificate in Multimedia), CIMA (Certificate In Multimedia	ADSE (Advanced Diploma in Software Engineering) HDSE (Higher Diploma in Software Engineering) HDIM (Higher Diploma in Multimedia)		



No.	Institution	Short Courses/Certificates	Diploma Courses	Bachelors Courses	Postgraduate Qualifications
		& Animation), CIM (Certificate in Multimedia)			
4	Kampala International University	Certificate in computer science Certificate in library and information science	Diploma in computer science Diploma in library and information science Diploma in information technology		PG diploma in computer science Masters of Education in comparative and instructional technology Masters of information technology Master of Science in Computer Science Master of Science Masters of science in information systems Master of science in software systems engineering PHD in management sciences: information systems
5	Uganda Technology and Management University	Certificate in Computer Applications and Systems (CCAS), CISCO Certified Network Associate (CCNA), Cisco IT Essentials (PC Hardware Repair & Maintenance), Certificate in Mobile Application Development (CMAD)	Diploma in computing	Bachelor of computer science	MSc. Computing (Information Technology), MSc. Computing (Information Systems), MSc. Computing (Mobile Computing), MSc. Computing (Computer Networks), MSc. Computing (Computer Security)



No.	Institution	Short Courses/Certificates	Diploma Courses	Bachelors Courses	Postgraduate Qualifications
6	Kyambogo University		Diploma in Computer Science, Diploma in Computer Engineering, Diploma in Library and Information Sciences	Bachelor of computer engineering	
7	Mbarara University of Science and Technology			Bachelor of information technology	Postgraduate Diploma in Health Information Technology Postgraduate Diploma in Information Systems Master's in Business Informatics Master of Science in Health Information Technology Master of Science in Information Systems
8	Clarke International University	Data Management and Analysis in Research (SPSS/STATS, Epi-Data & Info) 4 weeks Records Management and Information Systems in health Introduction to computer skills		Bachelor of information systems	Postgraduate Certificate in Applied ICT & Leadership PG Diploma in Technology Innovation PG Certificate in Applied ICT & Leadership



No.	Institution	Short Courses/Certificates	Diploma Courses	Bachelors Courses	Postgraduate Qualifications
9	Kampala University	Certificate in Computer and Information Technology (CCSIT) CCNA IT Essentials Cyber Security	Diploma in Computer Science and Information Technology (DCSIT)	Bachelor of library and information science	Master of Information Technology (MIT) Postgraduate Diploma in Information Technology (PGD(IT))
10	Cavendish University	Certificate in Information Technology	Diploma in Computer Science and Information Technology		
11	Victoria University	Basic Computer Applications Cisco Certified Network Associate (CCNA) Cisco- IT Essential	Diploma in Business Information Systems Diploma in Information Technology	Bachelor of Information Science, Bachelor of Science in Computer Science, Bachelor of Science in Computer Engineering, Bachelor of Science in Software Engineering, Bachelor of Information Systems & Technology, Bachelor of Science in Computer Security & Forensics, Bachelor of Science in Mobile Computing & Communications, Bachelor of Business Computing	
12	Bugema University	Certificate in Information Technology	Diploma in Computer Forensics.	Bachelor of Information Technology and Computing, Bachelor of Information	Master of Science in Information Technology



No.	Institution	Short Courses/Certificates	Diploma Courses	Bachelors Courses	Postgraduate Qualifications
		CISCO Certified Network Associate (CCNA) CISCO Certified Network Associate Security (CCNAS) Linux Professional Institute Certificate (LPIC)	Diploma in Information technology. Diploma in Information Technology	Systems, Bachelor of Library and Information Science	Post Graduate Diploma in Information Technology
13	St. Lawrence University		Diploma of library and information science Diploma in information technology Diploma in Computer science	Bachelor of Computer Science, Bachelor of Information Technology, Bachelor of Science in Software Engineering, Bachelor of Science in Computer Engineering	Bachelor of science in Computer Science PG Diploma in IT
14	Nkumba University	Computer essentials Microsoft Office, Online collaboration, IT security Advanced MS office, Data analytics, Advanced databases, ICT in education and health, Graphics and branding, Mobile app development	Diploma in Computer science Diploma in Graphic digital design Diploma in information technology		Master of Information Technology Master of Computing and Information Systems Masters of Science in Information Systems Master of Business Information Technology Masters of Information Technology



No.	Institution	Short Courses/Certificates	Diploma Courses	Bachelors Courses	Postgraduate Qualifications
15	Uganda Christian University	Data Management and Analysis, Health Informatics Cisco Certified Network Associate (CCNA) Certificate in Computer Applications Certificate in Web Development Certificate in Cyber-Security	Diploma in Entrepreneurship & Information Technology	Bachelor of Applied Computing & Technologies	Master of Information Technology
16	Ndejje University	Advanced certificate in computer science	Diploma in computing and information technology (DCIT) Diploma of computer science with education		Master of computer science Master of information technology
17	International University of East Africa	Certificate in Multimedia Design Certificate in Web Design and Web Development Certificate in Graphic Design Certificate in 3D Game Design and Development CCNA	Diploma in computer science	Bachelor of Computer Science and Information Technology (BCSIT)	Master of Science in Information Technology

Table 19: A summary of ICT programs offered at the Institutions consulted

2.4.4 Models of ICT Academic Program Delivery

Most undergraduate ICT programmes are delivered via face-to face lectures on day and evening study arrangements, while postgraduate programmes which offer more specialization and take persons through the field of practice are largely delivered through evening and weekend face to face programmes.

A few universities like Uganda Technology and Management University (UTAMU), ISBAT University and Virtual University have distinguished themselves as the online learning institutions and offer these programmes through blended learning models. Figure 35 below captures views of the key informants from the ICT skills supply side on ICT academic programme delivery.

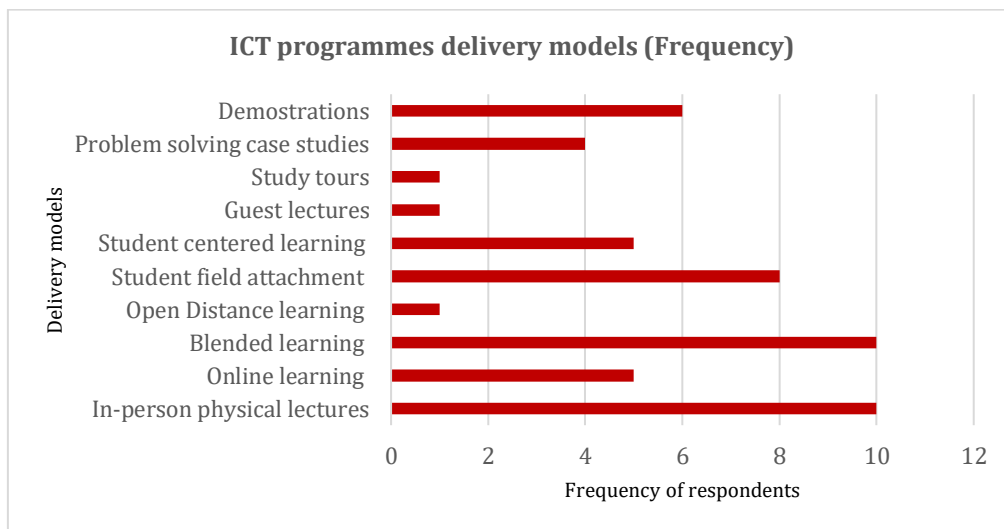


Figure 35: ICT academic programme delivery models

One Lecturer observed that:

“According to our programme design, nearly all ICT academic programmes have over 60% course load in terms of lecturer hour and about 40% in other learning activities. Also, all our undergraduate courses are designed to have course work at 40% and written final exam at 60%. Yet for courses of this nature, practical assessment and examination should have been the best”

2.4.5 Caliber of ICT Staff in training service providers

The recent studies by National Council for Higher Education (NCHE) and Makerere University show that Uganda has a total of 1,179 PhDs. Of these, 1,025 are based at public universities, while 172 are based at private universities, moreover, very few of these are in the ICT field. According to key informants, it is estimated that Uganda has less than 70



PhDs in computing and information technology, most of who (~65%) are estimated to be stationed at Makerere University College of Computing and Information Sciences. The analysis of respondent of ICT skills services provider revealed that most of the academic staff at universities (~70%) at least possess a master's degree a clear indicator of high caliber staff. However, fewer academic staff possess industrial professional certifications such as Cisco, Oracle, Microsoft certifications among others. The lack of professional qualification among academic staff might indicate the weak industrial experience passed on to graduates from these training institutions.

This is well stated by one key respondent at one of the universities consulted:

“Industrial professional certifications are not recognized by the university in terms of academic careers progress and there no other incentives for staff to acquire these qualifications. Reason most of us do not pursue those qualifications even if they're key in improving our quality of programme deliver hence, overall quality of graduates”

2.4.6 Level of MDA Participation in ICT academic programme design and delivery

There is a common argument that academic training institutions are not involving key stakeholders in programme development and delivery which results into having graduates who are not ideal for the industry. Accordingly, the study sought to establish the level of target stakeholder involvement on ICT programme design and delivery at various training institutions especially universities.

The analysis of the data shows that majority of stakeholders (58.3%) indicated “not” participating in ICT Academic programme design and delivery while 41.7% indicated yes. Of those who did indicate yes, the study sought to establish their means of involvement and the results are shown in Figure 36 below:

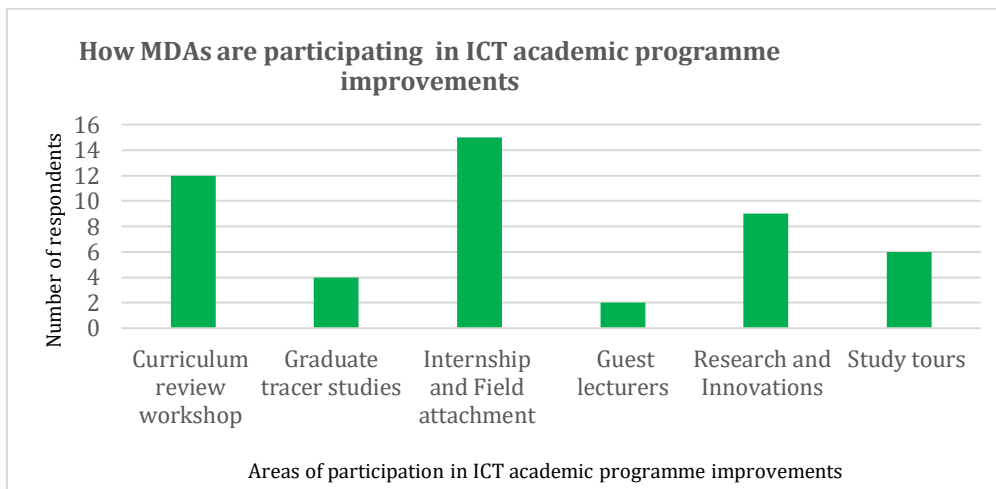


Figure 36: Means of MDA participation on ICT Academic Programming design and delivery

While for the majority who indicated that their lack of participation in ICT programme design and delivery cited a number of reasons. The most outstanding reasons per the frequency count are show in Figure 37 below:

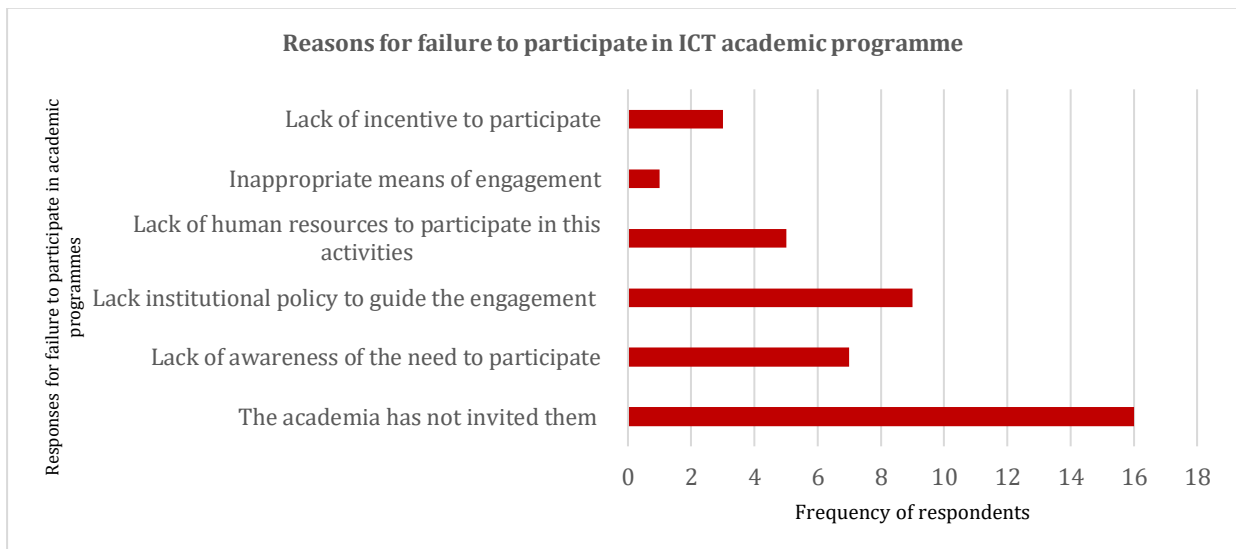


Figure 37: Reasons for low MDA participation in ICT programme delivery and design

Respondents that indicated “yes” on participation were well represented by focus group discussion participant, who observed that:

“At my organization we provide internship placement for ICT students everyone as guided by our human resource policy, but we have not been invited by academia to participation in curriculum development or delivery yet we have capacity to make a good contribution as one of the potential employers of ICT graduates”

Respondents that indicated “no” have their views well summarized by a key informant who stated that:

“We do not have clear policy of participation in ICT programme design and delivery as an institution besides we’re very few ICT staff and off over worked. There is not clear incentive for staff to engage in these extra-

2.4.7 Overview of ICT Skills training suppliers in the Country

In terms of training service providers, Uganda has 53 universities, majority (over 70%) of which do offer courses in ICT at the levels of certificate, diploma, bachelors and postgraduate level. There are also over 80 diploma awarding institutions which offer courses in ICT field.

Furthermore, there are over 500 private consulting firms which are listed by NITA-U as providers of ICT training services and programmes. There is a wealth of; Industry professional certifications (over 500), Open Source online programmes (In thousands) and On-Job coaching and mentoring (available in nearly all MDAs). Figure 38 below highlights the status of ICT skills providers in the country.

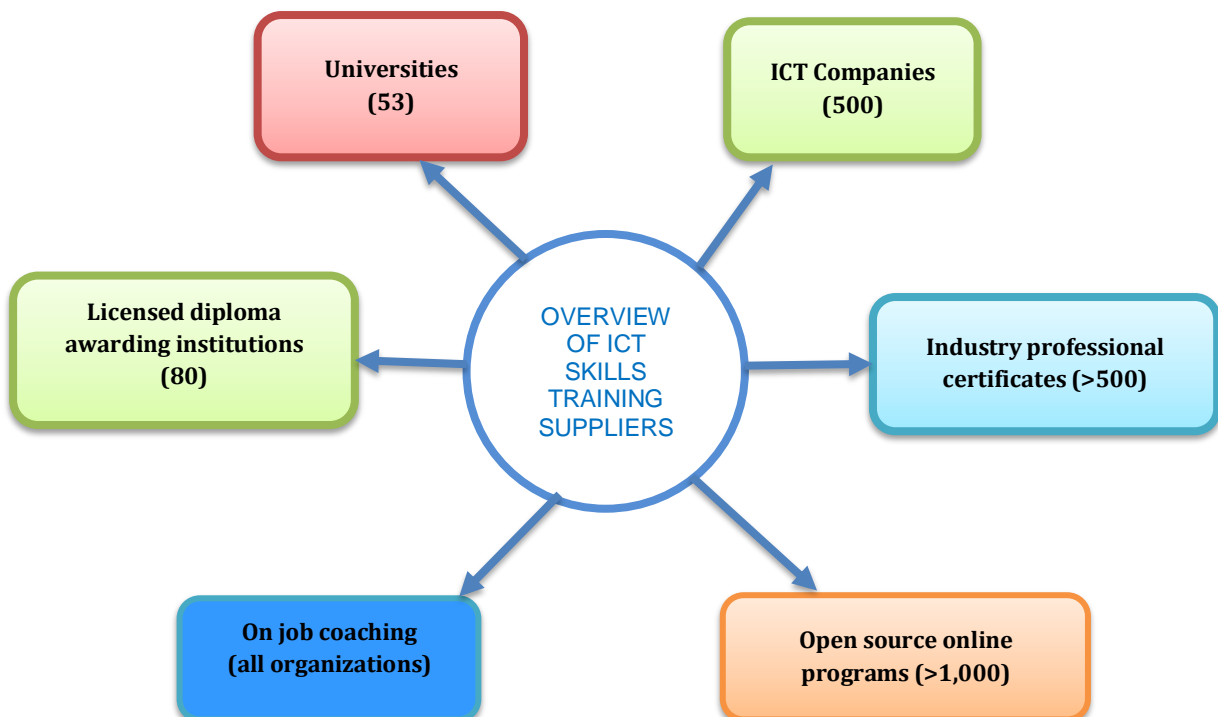


Figure 38: ICT skills service providers

2.4.8 Key ICT Skills in Short Supply

The study sought to establish the ICT skills in short supply or where MDAs were finding difficulty in filling positions. The result of the analysis revealed that cyber security, enterprise software development, data science, mobile and web application development - in that order of importance - are some of the ICT positions that are difficult to fill.

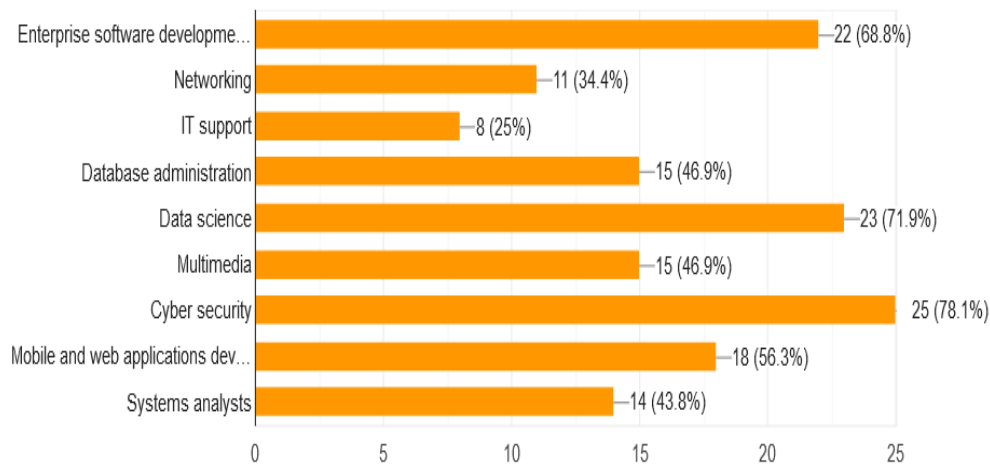


Figure 39: ICT skills in short supply from Stakeholders' perspective

The results are comparable to those from the Andela Software Developer Survey of 2019:

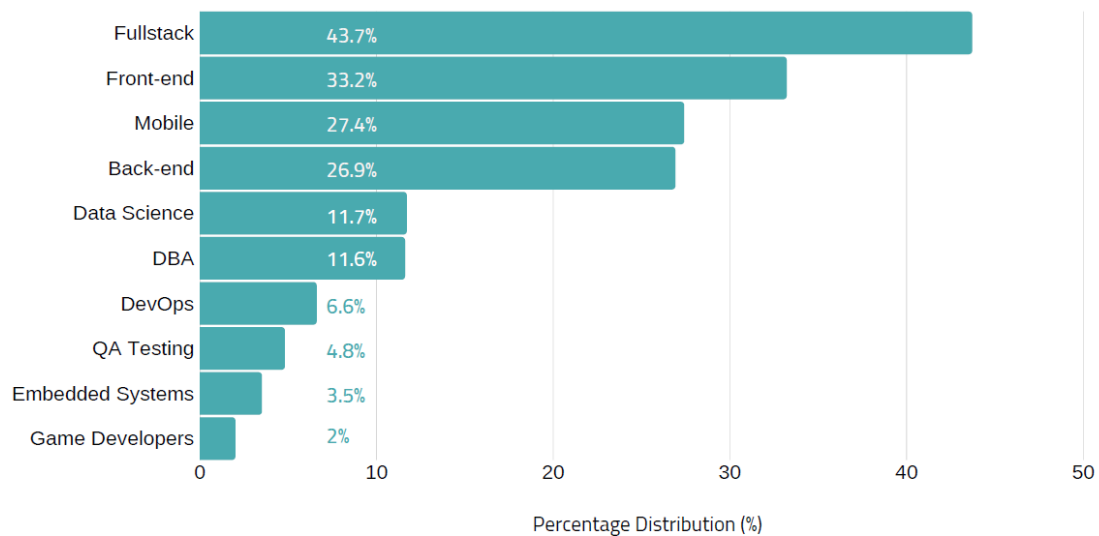


Figure 40: Software Developer Areas of Specialization (source: Andela Dev Survey 2019)

In terms of language specialization used by developers, there are three categories of software developments i.e. junior, mid-level and senior. As shown in Figure 41 below the Andela study indicates that most junior software developers use scripting languages and senior software developer use enterprise languages like C#.

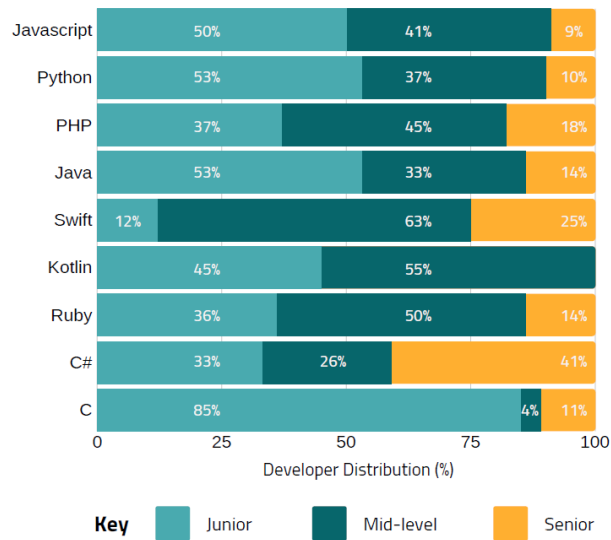


Figure 41: Distribution of expertise across different languages used by developers (Source: Andela Annual Developer Survey Uganda 2019)

The synthesis of literature revealed that other skills in short supply included: robotics, artificial intelligence, cloud computing, embedded systems, systems programming, animations and advanced graphics, big data analytics, computer systems engineering and digital forensics. Difficulty in filling out these positions (skillsets) within MDAs was attributed to the following: **(Figure 42)**.

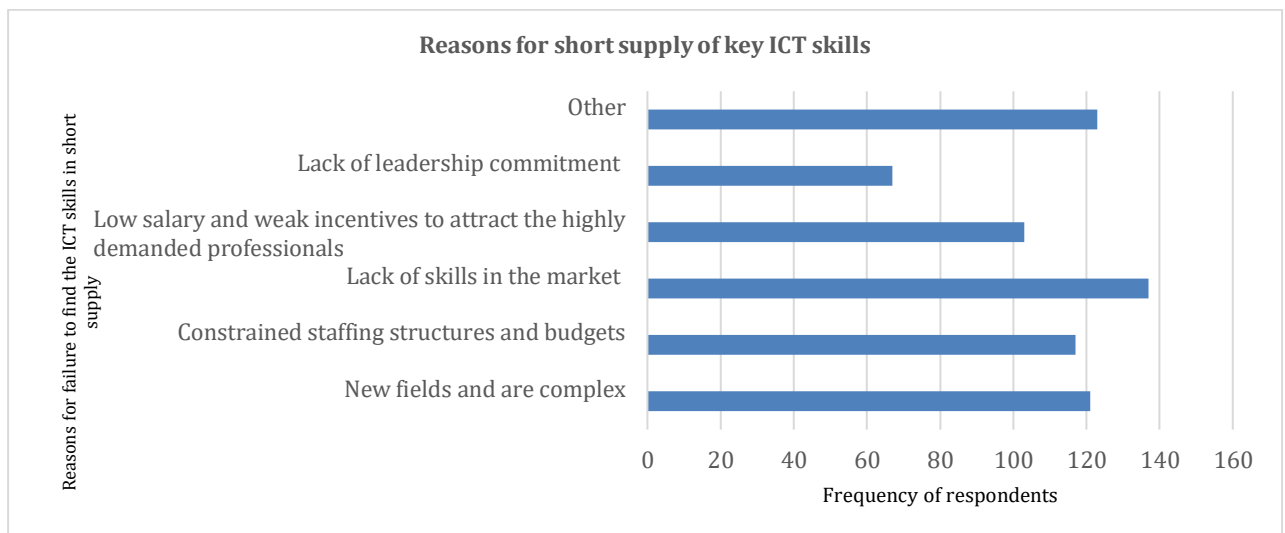


Figure 42: Reasons for failure to find the stated ICT skills

It is therefore evident that lack of skills in the market, constrained staffing structures, weak incentives and leadership commitments were the most outstanding reasons provided. These observations were well stated by one key informant who observed that:



“Public service staffing structures are rigid and are not responsive to the dynamic needs of the ICT sector. For example, we have information scientists and data Clarks as part of ICT staff. Furthermore, getting approval for the new establishment to accommodate new ICT professions and skills is a slow process and time consuming and with salary caps, those professional on high demand will find it is to join private sector than public service”

2.5 ICT Skills Supply Vs Demand

This section presents the analysis of ICT skills and training needs gaps in the RCIP target sectors and agencies. In section 3.5.1 a synthesis of quantity and quality of ICT professionals in RCIP target sectors and agencies is presented in terms of; ICT professionals staffing levels, observations skills and knowledge of ICT staff *vis a vis* the desired. Section 3.5.2 discusses current skills verses emerging demands, section 3.5.3 presents identified gaps in ICT staff recruitment processes, and section 3.5.4 presents the existing gaps in ICT skills development in target MDAs.

2.5.1 Quantity and Quality of ICT professionals

The assessment sought to establish the existing ICT staffing numbers *vis a vis* the desire numbers and the ICT skills gaps according to the level of responsibility.

a) Staffing levels: current vis-a-vis desired

Adequate staffing of the right quantity and quality of ICT staff at the right time, therefore has a huge potential to improve organizational productivity by making Government and business enterprises more efficient, effective and globally competitive. Nearly all RCIP implementing agencies and target sectors reported a disparity between the current staff establishment and the actual (desired) number of staff. The Table 20 below summarizes the staffing levels in the target MDA which were found to be wanting in terms of quantity and quality.

RCIP implementing agencies					
S/N	Institution	No. Established	No. Filled	No. Vacant	No. Desired
1	Ministry of ICT and National Guidance	18	13	5	18
2	NITA-U	112	46	66	112
3	Public Procurement and Disposal of Public Assets Authority	8	7	1	8
TOTAL		138	66	72	138
RCIP Target sectors					
S/N	Institution	No. Established	No. Filled	No. Vacant	No. Desired



Health Sector					
1	Ministry of Health	5	5	0	10
2	National Drug Authority	15	8	7	23
3	Uganda AIDS Commission	4	2	2	4
4	Uganda Blood Transfusion Services	7	3	4	10
5	National Medical Stores (11 Not sure)				
6	Uganda National Health Research Organization (UNHRO)	2	2	0	4
7	Health Service Commission	3	2	1	6
8	Uganda Virus Research Institute				
9	Mulago National Referral Hospital	9	3	6	12
3	TOTAL	51	25	26	77
Agriculture Sector					
S/N	Institution	No. Established	No. Filled	No. Vacant	No. Desired
1	Ministry of Agriculture	10	4	6	14
2	National Agricultural Research Organization	18	18	0	36
3	National Agricultural Advisory Services	5	1	4	6
4	Coordinating Office for Control of Trypanosomiasis in Uganda	1	1	0	0
5	National Animal Genetic Research Centre & Data Bank	5	3	2	8
6	Uganda Coffee Development Authority	4	2	2	5
7	Cotton Development Organisation	3	1	4	6
	TOTAL	41	27	16	70
Justice, Law and Order Sector (JLOS)					
S/N	Institution	No. Established	No. Filled	No. Vacant	No. Desired
1	Judiciary	15	3	12	18
2	Uganda Prisons Service	100	35	65	135
3	Directorate of Public Prosecutions	35	8	27	43
4	Uganda Police Force		135		
	TOTAL	150	46	104	196
Education Sector					
S/N	Institution	No. Established	No. Filled	No. Vacant	No. Desired
1	Ministry of Education and Sports	7	5	2	9
2	National Council for Higher Education	9	3	6	12
3	National Curriculum Development Centre	10	2	8	12
4	Education Service Commission	3	3	0	0
	TOTAL	29	11	18	37

Table 20: ICT Staffing Gaps on Target MDAs

Given the current establishments as shown in Table 20 above, most institutions are below average in ICT staffing levels. This in essence means most ICT posts are not filled. In-depth research, revealed that Data Scientists are the most insufficient, followed by Cyber Security Technicians, Software Developers, Network Engineers, System Analysts and Software Developers.



On the other hand, most institutions reported as having sufficient numbers of System Administrators, followed by IT Support Officers and Data Administrators. Meanwhile, quite a number of KII respondents (executives) reported as, **‘not sure’** of the sufficiency/insufficiency of the ICT staff in post in their institutions. This in itself signals the level of less importance attached to ICT by some institutional leaders and should be reckoned as an area of weakness (gap) requiring attention. Some institutions did not have ICT Units. This undermines the desired state of each public sector, having an established ICT Unit within.

Furthermore, the assessment sought to establish the level of adequacy of key ICT skills in the target MDAs. Table 21 below summarizes the perceived level adequacy in terms of numbers of key ICT staff in post in the assessed MDAs.

Professional category	Sufficient	Not sufficient	Not sure
Software Developers	20%	61%	19%
Data Scientists	12%	69%	19%
Cyber Security Technicians	14%	69%	17%
Network Engineers	33%	50%	17%
System Administrators	64%	25%	11%
System analysts	27%	42%	31%
IT Support	60%	28%	14%
Database Administrators	50%	39%	11%

Table 21: Level of adequacy of key ICT professionals in target MDAs

It suffices to note that the insufficiency of Data Scientists, Cyber Security specialist, Software Developers, Network Engineers, System analysts and Software Developers in most of the institutions has a direct negative effect on the capacity of such institutions to advance their mandates in line with e-governance framework and the National Development Plan II. This stands out as a gap and an area of focus for MoICT & NG going forward.

b) Desired behaviors

The synthesis of the stakeholder responses on desired behaviors for both ICT and non-ICT staff in target MDAs revealed that, the most desired behaviors for both ICT and non-ICT staff are continuous self-driven learning, data backup, security enhancing practices such using strong passwords and regularly changing passwords. Table 22 below summarizes the results.



Staff Category	Desired behaviors
ICT Professional	<ul style="list-style-type: none"> - Self-driven learning - Cyber security enhancing practices - Excellent communication skills - Flexibility and agility - Team work and integrity - Stable temperament - Humility
Non-ICT staff	<ul style="list-style-type: none"> - Self-led learning - Privacy enhancing practices - Data protection and backup - Humility

Table 22: Desire in target MDAs

2.5.2 Current skills vs emerging industry skill needs

We observe that the emerging digital world demands unique sets of skills from staff in an organization for both ICT and non-ICT professional staff. From international best practices and through the synthesis of the stakeholder responses, table 23 below summarizes the key emerging skills for the two categories of ICT staff on the target MDAs compared the observable ICT skills at the time of the assessment.

ICT staff category	Observable skills	Key emerging industry skills
ICT Head/ leaders	<ul style="list-style-type: none"> - Intermediate digital literacy - Systems administration - Network administration - Web portal management - User technical support - E-government system - Institutional enterprise systems administration - IT security - Basic IT project management - Basic programming skills 	<ul style="list-style-type: none"> - IT Strategic Management - Advanced Internet and social - Research and report writing - Cloud Computing - Leadership and Management - Data analysis and - Business process engineering - Mentoring and Capacity building - IT project management - Advanced system security - Mobile apps development - Enterprise system development - Collaboration - Wireless networking technologies
ICT Technical staff	<ul style="list-style-type: none"> - User support - Systems administration - Network administration - Programming - Basic graphics - Database systems 	<ul style="list-style-type: none"> - Enterprise systems development - Requirement engineering - Business processing engineering - Research and report writing - Cloud Computing - Artificial intelligence



ICT staff category	Observable skills	Key emerging industry skills
	<ul style="list-style-type: none"> - Anti-virus - Basic hardware trouble shooting 	<ul style="list-style-type: none"> - Business process engineering - IT project management - Advanced cyber security - Collaboration - Digital forensics - Wireless networking technologies - adaptation on 4IR technologies to the business environment - TV, Radio and communication - VM Ware, Oracle Database Management, Oracle E- - Business Suite ERP, Mobile/Web Application development using the latest Application Development platforms. - Complex Systems Design and their Implementation - Advanced technical trouble shooting skills - Artificial Intelligence and Virtualization - Data integration techniques

Table 23: Skills gaps among ICT professionals in target MDAs

Generally, the study revealed that ICT staff at two levels of responsibility lack significant skills for the emerging 21st Century digital world.

2.5.3 Recruitment and selection procedures

ICT being heavily skill and knowledge based, the procedures applied in the recruitment and eventual selection of the ICT professionals is paramount in determining their level of proficiency and performance.

The study among other things focused on determining the type of recruitment and selection criteria used by the different target MDAs. Traditional recruitment is the predominant subjective process approach, which involves shortlisting and selection through oral interviews. It is heavily over dependent on paper-based communication.

Competency-based recruitment on the other hand, is the highly cherished use of computer-based recruitment that involves hiring candidates that are not only the most qualified for the position to be filled, but who have a proven track record of achieving optimal and outstanding results in their given field of interest.



In total 35 out of 46 target respondents provided their responses, representing 76% participation. Of these, 29% reported using the consultants, who predominantly employ competency-based approaches. 62% of the target agencies and sectors reported use of the **traditional recruitment approaches**, while the other 9% reported their use of **interns to deliver service**. Given the traditional mode through which the majority of the current ICT professionals were recruited and selected, some level of doubt was cast on their level of competence. Such employees need urgent capacity building and continuous professional development for sustained performance.

On streamlining recruitment and selection through MoICT & NG as a mother ministry for all ICT professionals, approximately 90% of the target agencies and sectors were in support of this shift though not much effect is realized yet. Key insights for consideration in improving the new shift, includes:

- i) ICT recruitment should be done from the strategic perspective as opposed to the current reactionary approach based on urgent demanding situations.
- ii) The current recruitment and selection practice is largely haphazard.
- iii) Following Cabinet decision, the government has already provided a home for the ICT professionals at Ministry of ICT and National Guidance. This position be fast-tracked to enhance recruitment and selection procedures for better outcomes.

The reasons were well presented by one key informant who observed;

“The current recruitment and management of ICT professionals in services of government disproves government access to resident capacity in one unit/sector to other sectors. Furthermore, you find staff with similar qualification and responsibility have different remuneration as remuneration is based at local level. We should copy the best practices of managing accountants and auditors in service of government.”

2.5.4 Continuing Professional Development Gaps

One of the key focus of the assessment was to establish any Continuing Professional Development (CPD) gaps as far as ICT skills development is concerned in the target MDAs. The findings reveal that MDAs are applying different approaches to address the issues of CPD. These can be broadly categorized into two: job mentoring and staff training. Across the 36 respondent institutions, there was no uniform practices used to address ICT skill and knowledge gaps. It emerged from the study that each institution used the available means within their reach to provide CPD but more importantly, it emerged that some institutions had no CDP plans. The synthesis of stakeholder responses indicated the

predominant capacity building approaches (practices) used by institutions as shown in **Figure 43** below:

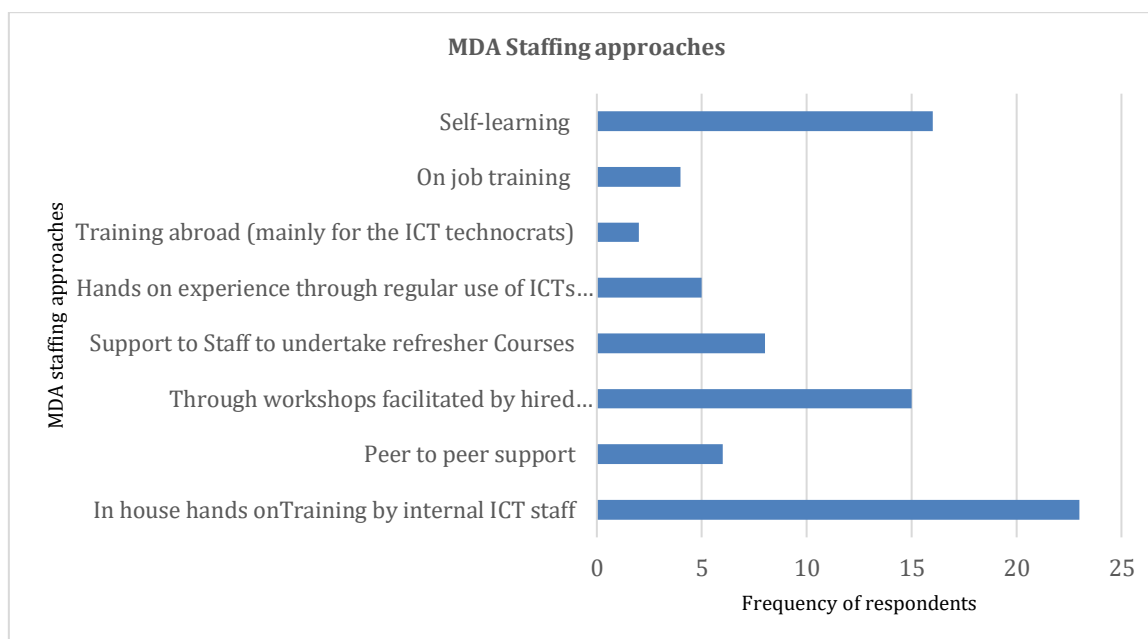


Figure 43: Staff training approaches in the target MDAs

The synthesis of stakeholder respondents indicated that, over 65% of the participating institutions did not have formal ICT skills development plans in place. This observation is also backed up by evidence of a training needs assessment as defined in the Uganda Public Service Training Policy, 2006. As shown in Figure 43 above, most institutions are relying on self-learning and in-house capacity building. This is largely attributed to budgetary constraints as noted by one key informant:

“We operate a constrained resource envelope much as we know the skills gaps, we need to cover, we do not have resources to support staff in these specialist ICT skills, reason we encourage staff to acquire these skills on their own and we recognize that in our performance appraisal.”

Given the dynamic nature of the ICT industry and technologies, continuous professional development is paramount for all civil servants in service of government. Thus, to remain relevant and competitive, institutions should adopt cheaper and (sometimes) budget neutral approaches to ICT continuous professional development, including but not limited to:

- i) Coaching: In-house hands-on support (skilling) to individual staff by senior internal ICT technocrats
- ii) Mentoring: Continuous guidance by senior ICT Technocrats
- iii) Job shadowing



- iv) Job rotation
- v) Computer or online-based **training** modules
- vi) Peer to peer support
- vii) Workshops facilitated by expert consultants
- viii) Refresher Courses
- ix) In-service training

Training abroad thought it has better benefits, is very expensive. It is recommendable for international level exposure and/or acquisition/transfer of new technologies or innovations in ICT. Some of the challenges affecting effective CPD at the target MDAs include:

- i) Weak institutional leadership commitment to the support of ICT skills development
- ii) Lack of quality software and appropriate infrastructure
- iii) Limited awareness of the ICT systems operations and importance to business operation by management
- iv) Inadequate understanding of e-government Framework Infrastructure by institutional leaders and key decision makers.



3.0 STUDY CHALLENGES AND LIMITATIONS

Like any other study, there are some challenges and limitations experienced. Below are notable ones:

- i) Some of the Accounting Officers that received introductory letters for the study delegated the activity to Heads of ICT Units, even though their personal contribution would have added more perspective to the exercise. Nevertheless, the Heads of ICT Units were very knowledgeable on the ICT skills in their organizations.
- ii) The study would have benefited from balanced participation of staff in MDAs. However, those that recorded high participation like the Judiciary had faster convergence of views on the subject matter, meaning that many respondents might not have necessarily influenced or changed the emerging conclusions.
- iii) The study was only limited to RCIP target sectors (ICT, Education, Health, Agriculture and JLOS). This number was not representative of the 18 Government Sectors.
- iv) Generally, there was low appreciation of remote stakeholder consultations in majority of government agencies as most of the key respondents still preferred physical meetings. The time scheduling was constrained by the busy schedules in these offices as it took an average of 3 physical visits in a time span of 3 weeks to secure appointments. This led to delayed completion of stakeholder consultations and caused overlaps in implementation schedule.
- v) The Consultant made nearly 100% contact with the identified stakeholders. However, it took an average of 5 reminders (physical site visits, phone calls and email reminders) to get responses from stakeholders.
- vi) Some respondents were not comfortable providing personal identification information, especially those working in JLOS, even though this was a formal government programme. Their names have not been included in the list of those consulted but have been unanimously veiled under the institutional leadership teams and office positions.
- vii) Limited availability of official information in print or websites of respondent institutions, such as strategic plans, annual work plans, budgets, annual performance reports, approved staff establishments, staffing levels, among others.



4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the finding of the ICT skills and Training Needs Assessment (STNA), conclusions from the study are presented in section 5.1 and in Section 5.2 key recommendations in line with the thematic issues of the assessment are presented.

4.1 Assessment Conclusions

From the stakeholder consultations, 271 responses were obtained against the targeted 216 responses. These responses were obtained through Key Informant Interviews, Focus Group Discussions, Individual self-assessments, and Institutional Assessments. Furthermore, desk review of selected documents provided by the stakeholders was conducted by the Consultant to find answers to key research questions. A total of 6 international case study benchmarking analysis was conducted, on countries that have interesting ICT development indicators ideal for Uganda to learn from.

From the level of responses, it can conclusively be highlighted that sufficient data was provided by the stakeholders to enable the Consultant tease out the “*As-Is*” and “*To-Be*” ICT skills, knowledge, behaviors and training needs in the STNA report eventually leading to the development of the STAP.

Approximately, two-thirds of the individual self-assessment respondents were ICT professionals, while the remainder were non-ICT. Of the 46 respondent categories targeted, including the ICT skills suppliers, 8 did not respond at all. These were not from the core RCIP implementing agencies or target sector agencies. They were largely from the supply side of the ICT skills and training stakeholders, hence, considered less essential to the outcome of the stakeholder consultation process.

From the analysis of data, the following key conclusions are emerging as far as the current status of ICT skills and training needs in the target RCIP MDAs are concerned:

- i) Most organizations are **not following the proposed ICT Cadre Schemes of Service as updated** by Ministry of ICT & NG in the structuring and recruitment of ICT staff. Moreover, those with other tertiary/constituent institutions such as MoES (with ESA and Department of BTVET), UNHRO (with NCRL), have not set up ICT Units to provide ICT services at that level. This leaves the ICT Unit at the parent ministry/institution overwhelmed and therefore, less efficient.
- ii) Majority of the MDAs assessed indicated that they were **understaffed as far as ICT professional staff** are concerned compared to their level of mandate and results framework, e.g. Uganda Police Force, Uganda Prisons Service, among others.



- iii) Across board, there is a trend of insufficiency of some specific ICT professionals, such as Data Scientists, Cyber Security Technicians, Software Developers, Network Administrators, among others.
- iv) Most ICT professionals in service of MDAs assessed have an **average professional level of skills and competences** in systems administration especially windows technologies, networking, user technical support, organizational enterprise systems, basic cyber security and office productivity applications but **lack critical 21st century skills**, such as cloud computing and virtualization, data science, cyber security, mobile and web technology, research and knowledge management, among others.
- v) The assessment of the state of Continuous Professional Development (CPD) reveal that about 70% of the organizations sampled **had not provided any specific ICT skills training to both ICT and non-ICT professionals** as a means of building their ICT competences in the last 12 month or more. This is contrary to the principle of **Professionalism**, which requires all public sector institutions to plan, monitor and evaluate trainings, as espoused in the Uganda Public Service Training Policy (2006). The few organizations (such as DPP) that indicated to having provided these training programmes stated that they provide basic computing skills training based on demand especially during the rollout of new enterprise systems, clearly confirming the lack of ICT skills development programmes in most of the MDAs targeted in this study.
- vi) In terms of **incentive structures** for staff to acquire ICT skills, results revealed that majority of the institutions offer **appraisal points, recognition of staff, sponsorship of the training activities, salary increment, promotion**, and some do pay costs for staff to study in that order of importance.
- vii) In terms of level of willingness to acquire ICT skills, **majority of both ICT and non-ICT staff indicated that they very willing to invest** in ICT skills development if they are sponsored or given time off, but less willing if they are required to sponsor themselves.
- viii) The most **preferred means of** ICT skill training was a combination of online and face to face, lasting not more than 5 days.
- ix) Most MDAs do not publish key reports on their websites and do not update their websites regularly. This failure to update websites by MDAs undermines commitment of Access to Information Act (2005) and the Open Government Initiative.
- x) Currently, the recruitment and management of ICT professionals is heavily decentralized, in most cases done with limited involvement of the MoICT &NG. There is **lack of harmony in the management of ICT professionals** in service of government as each MDA operates on its mandate. The existing approach limited



sharing of vital knowledge and skills among MDAs, critical for effective operationalization of e-government services.

- xi) The study revealed that generally there is **low participation of MDAs, in ICT training activities at training institutions**. Nearly 80% of organizations indicated that they do not participate in curriculum development or delivery at training institutions, citing inhibiting factors, such as lack of collaboration or engagement from universities, lack of time and work overload, lack of facilitation to participate in the events, among others.
- xii) It is clear from the stakeholder consultations that ICT function as a whole and ICT skills capacity building in MDAs is **not adequately funded** as most of the organizations assessed did not have a dedicated budget voted for ICT skills development.
- xiii) A predominant pattern emerging from all organizations sampled indicated that IT **strategic leadership is lacking** in most organizations. Most senior leaders in organizations have limited **awareness** and appreciation of IT hence the limited investment and alignment of ICT in organizational business processes. It was evident that in places where top organizational leadership had a zeal and aspiration for ICT integration, the ICT Units were better facilitated and overall ICT skills levels and behaviors were evidently above average. Furthermore, it was clear from stakeholders that most senior leaders lack critical ICT skills, competencies and knowledge. Key observed skills at organizational strategic levels included; emails and internet browsing, basic smartphone usage, and basic MS word processing. On average there is limited awareness of the E-Government framework and associated pillars at this level of occupation in most organizations. The ICT behaviors are characterized by use of simple passwords across many platforms and limited backup of data, which clearly indicates the limited knowledge and skills in the areas of cyber security, risk assessment and impact to the individual and organization.
- xiv) The results of the assessment show that Majority of senior management teams in **MDAs do not have sufficient knowledge** in IT strategic management, change management and IT leadership, decision enhancement. Majority have basic skills and knowledge in office applications, email and web browsing, social media usage. Their behaviors patterns can be characterized as less aligned to cyber security and technology leadership. The weak ICT leadership is part to blame for the slow ICT skills development on some of these institutions.
- xv) In terms of ICT skills possessed by non-ICT professionals in the target MDAs, the results revealed that majority of professional staff in organizations like; accountants, doctors, auditors **have basic skills in office applications and functional specific systems such as IFMS, IPPS, EMIS, HMIS, NPR, URA portal** among others. Generally, most non-ICT professional staff have low awareness of



- cyber security, and use simple passwords across systems and platforms. These categories of cadres do not practice clear desk policy and generally do not backup their personal computers if not automatically backed up by the enterprise systems. They lack skills in data analysis and visualization, social media for productivity, among others.
- xvi) In terms of knowledge and behaviors, **most ICT professionals demonstrated knowledge in core ICT concepts** (such as networking technologies, information system architecture and IT systems integration among others), organizational policies particularly those related to ICT, and key pillars of Uganda's E-Government frameworks. In terms of behaviour, ICT programmes indicated greater awareness of cyber security demands and used acceptable password management practices, PC care practices (e.g. no pouring water on them), data backup and ethical consideration in service provisioning and self-learning. While skills lacking most include advance cyber security and digital forensics, data science and data analysis, enterprise systems development, cloud computing and virtualization, wireless network technology such as Internet of things, animations and graphics, IT strategy management, change management, mobile and web development, artificial intelligence, among others.
- xvii) From the study findings, it is estimated that the country **produces about 7,000 ICT professionals every year** at various levels, majority of whom are at certificate level in various areas of ICT such as Cisco Networking Academy, Web development among others. However, the country still faces skills deficiency in critical areas of ICT such as cyber security, animations, artificial intelligence, data science, complex systems development, cloud computing and virtualization, computer engineering, among others. The low supply of these critical skills is attributed to a number of factors and key among them include being new fields of specialization and the high costs of training these professional.
- xviii) The study revealed that is a **strong contribution by innovations hubs and ICT skilling centers in the development** of ICT skills.
- xix) In terms of skills new **ICT graduates lack the most**, the study revealed the following; cyber security (20%), data science and database management (16.3%), Basic ICT skills (16%), complex system design and analysis (13%), among others.
- xx) Most ICT skills training service providers **do not have capacity to deliver top end competencies ideal for 4IR given the high capital investment** needed in terms of labs like robotics, big data labs, artificial intelligence laboratories, cyber security and forensics labs, computer systems engineering labs, among others.
- xxi) With over 600 ICT skills training service providers in the country, it can be prudently concluded the country has **sufficient suppliers of basic ICT skills and mid-range skills**.



- xxii) In terms of MDA contribution to skills development, about 50% of the MDAs assessed indicated to provide internship options to students' most of which do not provide any facilitation and do not have a clear policy on internship training.
- xxiii) It was evident from the study that, about **50% of the organizations indicated to have a general staff capacity development** budget covering all functional areas of the organization. Important to note is that nearly all did indicate the budget was too low to cover the demands of the organization.
- xxiv) It was also reviewed that staff training budgets are often classified as wasteful expenditure by the Ministry of finance, planning and economic development hence prone to budgetary cuts from time to time. This has greatly affected the staff capacity building programmes in MDAs.
- xxv) The stakeholder consultations also revealed that all levels of responsibilities in all organizations needed some form of ICT capacity building.
- **At strategic leadership and senior management levels**, the most desired skills include IT strategic leadership, advanced office productivity, cyber security, change management, IT project management, E-government systems, and social media and web technologies.
 - **At ICT professional level**, the most desired skills include artificial intelligence, cyber security, data science, cloud computing and virtualization, complex system development, animations and graphics, mobile and web development, CCTV and wireless technologies and internet, among others.
- xxvi) The results of the assessment also revealed that some agencies and departments **did not have ICT Units**, despite their strategic importance to the economy and the critical role played by ICT in sustaining service delivery in the current era of COVID-19 pandemic. Access to ICT services in such institutions follows longer bureaucracy, thus inefficiency. Some institutions in question included Education Standards Agency and BTVET Department which rely on the ICT service of MoES, their mother Ministry. The other was Natural Chemotherapeutics Research Laboratory which relies on the ICT services of Uganda National Health Research Organization.



4.2 Key Recommendations

From the assessment findings, the following recommendations have been made:

No	Issues to address	Action/Recommendation	Actor	Priority
1	Streamlining recruitment and management of ICT professionals in government	ICT professionals in government should be recruited and managed by MoICT & NG. The recruitment should be done through Competency based recruitment approach with offers better outcomes as demonstrated by experiences in Australia and Estonia	Cabinet, Ministry of Public Service and MoICT & NG	High
2	Outdated ICT Cadre Schemes of Service	MoICT & NG, in collaboration with Ministry of Public Service, needs to update the ICT Cadre Scheme of Service to reflect new skills and person specifications for the different positions in line with the e-government framework. The Ministry should thereafter conduct 3-year regular review of the Schemes of Service to ensure Uganda's competitiveness internationally.	Ministry of Public Service and MoICT & NG	High
3	Harmonising ICT structures with ICT Cadre Schemes of Service (updated 2019)	MoICT & NG should regularize ICT establishments in MDAs in line with the ICT Cadre Schemes of Service	Ministry of Public Service and MoICT & NG	High
4	Annual ICT skills development work plans	In line with the Uganda Public Service Training Policy (2006) and the Digital Transformation Programme in NDP 3, all MDAs should provide an annual training plan with a dedicated budget line for ICT skills development in their annual work plans to MoICT & NG and provide an annual results framework of the same.	ALL MDAs and MoICT & NG	High
5	Integrating e-government into digital literacy curriculum	As part of improving digital literacy skills and increasing awareness of e-government framework, some of the e-government systems and concepts should be integrated in National Digital Literacy Skills Framework at all levels of education and training.	National Council for Higher Education, NITA-U and National Curriculum Development Centre	High
6	Providing free online training programmes to MDAs	MoICT & NG, through its agencies such as NITA-U, and UICT, should set up online training programmes for various government agencies in areas where capacity gaps have been identified.	MoICT & NG, UICT and NITA-U	High



No	Issues to address	Action/Recommendation	Actor	Priority
7	Establishing Centers of Excellence	MoICT & NG should partner with academic institutions to establish centers of excellence in critical areas of ICT development which have higher capacity investment costs like robotics labs, computer systems engineering, artificial intelligence, digital forensics labs, among others.	MoICT & NG, Academic Institutions	Medium
8	Ringfencing staff training budgets	MDAs should ringfence staff training budgets from budgetary cuts since this affects staff productivity.	All MDAs	Medium
9	Regular update of MDA websites	MoICT & NG should ensure all communication officers in various MDAs maintain updated websites with all important information like annual reports, budgets, and strategic plans, among others.	MoICT & NG and all MDAs	High
10	Establishing Community-based knowledge and information centers	MoICT & NG, through its agencies such as NITA-U, UCC and UICT, should establish community-based knowledge and information centers to promote ICT skills development for civil servants and general public as it is in the case of South Korea.	MoICT & NG	Medium
11	Mandatory ICT Continuing Professional Development (CPD)	All employees of government should complete a minimum of 40 hours of ICT CPD annually. NITA-U should set up an online tracking portal for this CPD on each individual staff.	All MDAs, NITA-U	Lower
12	National Digital Literacy Skills Framework	NITA-U should develop a National Digital Literacy Skills Framework which incorporates best practices from the different international frameworks such as ICDL and the National Local Context Policy.	NITA-U	Medium
13	Outdated Primary, Ordinary and Advanced level ICT Curriculum	The ICT curricula at Primary and Secondary levels of education should be reviewed and aligned to the Digital Transformation Programme to ensure that basic digital literacy skill stops at Primary level and advanced computing skills (such as computer programming, networking, gamification, animations among others) are introduced at both Ordinary Level and Advanced Level in incremental manner.	The National Curriculum Development Centre, Ministry of Education and Sport	Medium
14	Alignment of academic programmes with Digital Transformation Programme and National Development Agenda	All ICT academic programmes developed by universities and other tertiary institutions should be reviewed and approved by MoICT & NG before being accredited by National Council for Higher Education. Moreover, the ICT academic programmes should be subjected to a 3 year mandatory review to ensure continued competitiveness and compliance with accreditation requirements.	Academic Institutions, NCHE and MoICT & NG	High



No	Issues to address	Action/Recommendation	Actor	Priority
15	Nurturing ICT leadership among Accounting Officers and leaders of MDAs	MoICT & NG and her agencies should organize regular annual training programmes for leaders in MDAs covering critical areas such as IT strategic leadership, change management, IT project management, cyber security and collaborative technologies among others. Every leader should be exposed to minimum of 40 hours of ICT training in a year.	MoICT & NG, NITA-U, UICT	High
16	Continuous benchmarking and learning	ICT Professionals in different sectors of Government should regularly research about best practices in other countries and apply them in the Ugandan context. MoICT & NG should continuously establish bilateral collaborations with countries that are internationally recognized as leading in ICT development to benefit from knowledge exchange and learning.	MoICT & NG	Medium
17	Providing enabling infrastructure	MoICT & NG and all MDAs should provide the basic enabling ICT facilities especially, computers and internet, to all government employees, with special attention to those in JLOS.	MDAs and MoICT & NG	High
18	Subsidising internet and computers for government employees	The government should waiver taxes on ICT devices and internet purchase by government employees as a means of promoting e-government agenda.	MoFPED MoICT & NG	Medium
19	Academic staff field attachment	Academic training institutions should provide academic staff with 10-20 percent time attachment to industry to enable them acquire critical industrial skills and experience that are key in delivery of ICT training	All academic training institutions	High
20	Industrial certification of Academic staff	All academic institutions should encourage their staff to acquire industrial certification to improve their knowledge and skills of developing and delivering market demanded training content.	Academic training institutions	Low
21	Promoting student-centered problem-based learning	Academic training institutions should focus student centered problem-based learning to promote skills development. Also, they should promote practical or competence based academic progression assessment as opposed to theoretical examinations.	Academic training institutions	High
22	Improvement in management and supervision of field attachment	Academic training institutions should improve management and supervision of student field attachment to ensure meaningful	All academic training institutions	High



No	Issues to address	Action/Recommendation	Actor	Priority
		engagement of students in their respective fields of study.		
23	ICT training quality assurance	National Council for Higher Education (NCHE) should ensure that all training institutions of various ICT programmes have appropriate ICT infrastructure such as specialized laboratories to deliver the proposed programmes before approval. The Council should thereafter subject all training institutions to a 3-year mandatory curriculum review to ascertain the functionality of the infrastructure to support continued teaching of the approved curriculum, given the fact that most ICT equipment has a 3-year lifespan.	NCHE	Medium
24	Demand driven curriculum development	Alignment between the practical skillset needed by the employment industry and the curricula delivered in institutions of higher learning is very critical. This may require innovative approaches by academic institutions in involving the industry in curriculum design.	Academic training institutions	High
25	Ensuring basic ICT skills are a pre-condition for government employment	In recruiting ICT professionals, the appointing authorities in the Uganda Public Service (PSC, ESC, HSC, JSC, DSCs, Police Authority and Prisons Authority) should consider enriching the current traditional (open competition) recruitment and selection approach with competency-based procedures which facilitate selection of candidates with high level competencies for the ICT jobs. Such approaches could be computer-based recruitment and selection and practical (simulated) interviews as it is in the case of Australia.	All appointing authorities	High
26	ICT recruitment	Recruitment of ICT professionals should adhere to the institutional strategic and annual manpower plans as opposed to the current reactionary approach based on urgent demanding situations.	All MDAs	Medium
27	Embedding behavioural competencies in ICT recruitment and selection framework	The appointing authorities in various MDAs need to accord special emphasis on behavioral competencies, such as emotional self-awareness, teamwork, ethics and integrity and networking, in addition to the technical ICT competencies. This will inspire mindset change towards performance, accountability and innovation.	All MDAs	Low



No	Issues to address	Action/Recommendation	Actor	Priority
28	Operationalising ICT function in every department of government	Ensure effective operationalization of e-government, every public service entity should have a fully operational ICT Unit.	All MDAs	Medium
29	Expanding this study to provide a holistic picture of the state of ICT skills and training across government	Given the narrow scope of this study, MoICT & NG needs to expand this study beyond 5 sectors of government and 36 respondent organisations to cover the 13 remaining sectors and 147 Local government in order to provide a holistic status of the current ICT skills and training needs across government.	MoICT & NG	Medium
30	ICT skills a mandatory requirement on entry into public service	The appointing authorities in the Uganda Public Service (PSC, ESC, HSC, JSC, DSCs, Police Authority and Prisons Authority) should consider possession of basic ICT skills and competencies as evidenced by recognized certifications such as ICDL as a prerequisite for entry into public service.	All appointing authorities	High
31	Promoting local content in line with Buy Uganda Build Uganda Initiative	With over 600 ICT training service providers, over 50 Universities and over 20 innovation and incubation centers, MDAs should be encouraged to use local solutions and hire local services providers given the capacity the exists in the country. For example, international consultants should only be hired where local capacity does not exist.	All MDAs and MoICT & NG	High

Table 24: Recommendations from the study

ANNEXES

Annexes include Key informant interview protocol (**Annex 5a**), Institutional assessment (**Annex 5b**), individual self-assessment (**Annex 5c**), focus group discussion guide (**Annex 5d**), document review guide (**Annex 5e**), list of stakeholders consulted (**Annex 5f**), International Benchmarking (**Annex 5g**) pictorial highlights of stakeholder engagement (**Annex 5h**) and some of the documents reviewed as part of ICT STNA (**Annex 5i**).

Annex 5a: Key Informant Interview Protocol

The Government of Uganda with support from the International Development Association (IDA) is implementing a number of activities under the Regional Communications Infrastructure Program (RCIP). Among the key activities is undertaking of an ICT Skills and Training Needs Assessment (STNA) for various Ministries, Agencies and Department (MDAs) and development an ICT Skills and Training Action Plan (STAP) for RCIP implementing agencies and beneficiary sectors. These MDAs include MoICT & NG, NITA-U and PPDA and the target sectors are: Agriculture; Education; Health; and Justice, Law and Order (JLOS). The purpose of this tool is to establish the current state (supply and demand) of ICT Skills, Knowledge and behavior in your sector and establish the desired; ICT skills, knowledge and behavior for various levels of responsibility in the targeted MDAs. The tool seeks opinions of individuals at the levels of, key sector opinion leaders, Board Members, Permanent secretaries and Executive Directors of target MDAs.

Disclaimer: *In line with the data privacy Act 2019, the information provided shall be strictly used for purposes of the study and any personal identifiable information shall be held with utmost confidentiality and shall only be used for verification of facts by the researchers, and at the end of the assignment the personal data shall be destroyed.*

Part one: Respondent Profile Information

1. Name: _____ Gender: _____
2. Phone: _____ E-mail: _____
3. Designation (Position) _____ Organization:
4. Years of experience at senior management level in the sector: _____
5. How you had any ICT skills training in the least 2-year, list if any? _____
6. Which office and internet applications do you use? _____



Part Two: Awareness of e-Government Systems and State of Enabling environment

1. Are you aware of the E-government framework? What are its key pillars?
2. Do you use e-government services? Which one and what are your experiences?
3. In your opinion, what are your thoughts on the state of Uganda's ICT legal and regulatory environment as far as ICT skills development is concerned? Is it promoting skills growth or constraining and why?
4. In your opinion do you think there is sufficient participation of all key stakeholders such as the private sector, civil society and others in the ICT sector in the policy making process? Highlight examples if any?
5. Have you or your organization participated in any ICT curriculum development? And do you think there is sufficient engagement between academia and industry in curriculum development and course delivery?
6. If there is any participation in what form? Graduate tracer studies, workshop, innovations competition, public debates, others...?
7. In your opinion do you think the current structure of hiring and deploying ICT professionals in the service of government (MDAs) is appropriate? Provide more details on your stand.

Part Three: Current state of ICT skills and Training needs for MDAs

1. Do you think your MDA /sector has a sufficient number of ICT professionals such as in service?
 - software developers
 - data scientists,
 - cyber security technicians,
 - network engineers,
 - system administrators,
 - system analysts,
 - IT support
 - database administrators
2. Do you think non-ICT professionals in service of government (MDA) have sufficient ICT skills to enable them to implement the e-government agenda? state the kind of skills they currently possess and justify your stand
3. How satisfied are you with the current level of ICT competences, knowledge and behavior of staff in MDAs at the following levels of responsibility? And give your reasons



- Policy level (PS, board members for MDAs, etc)
 - Top MDA leadership (Permanent secretaries, directors and commissioners)
 - ICT Heads
 - Non-ICT professional staff (e.g. accountants, HR, procurement, auditors, etc)
 - ICT professional staff (e.g. systems admin, software developers, network engineers, data scientist, etc)
4. In your opinion, how long on average does it take for a fresh university ICT graduate to be trained by an MDA to an appreciable level of productivity? 2months, 3month, 6month or 1 year?
 5. Do non-ICT fresh graduates who join MDA have sufficient digital literacy skills for their level of responsibility? Rank on the scale of 1-5, with 5 being the highest and justify your stand.
 6. Currently how is ICT staff capacity development of MDAs conducted?
 7. Do MDAs have a dedicated budget vote for ICT skills capacity building? provide more details
 8. Currently how MDAs are addressing the ICT skills demand for both ICT professionals and non-ICT staff?
 - Through staff hiring
 - Training
 - Use of interns
 - Use of local Consultants
 - Use of international Consultants
 - Others...

Part Four: ICT Skills Supply and Sector Trends

1. In your opinion, what is the estimated number of ICT professionals being produced by the education sector at the following levels?
 - a) Graduate level
 - b) bachelor level
 - c) Diploma and certificate level
2. Which ICT skills areas does your MDA have challenges in filling the vacant positions? and what could be the reasons? (e.g. enterprise software development, networking, IT support, database administration, data science, multimedia, cyber security, mobile and web applications developers, systems analysts)



3. Which category of higher education institutions in your opinion is producing quality ICT professionals ideal for your MDA? List some and highlight the associated ICT programs these graduates come with.
4. On a scale of 1 (lowest) to 5 (Highest) how would you score the level of competencies, knowledge and skills for graduates of the following key ICT programs in the organisation?
 - a) Computer science
 - b) Information technology
 - c) Software engineering
 - d) Networking or Telecom engineering
 - e) Cyber security and forensic
 - f) Information System or business computing
 - g) Computer engineering
5. How is the e-government systems staff capacity currently conducted? In your opinion, are the current approaches of ICT staff capacity development to use e-government service sufficient?

Part Five: Desired Skills, Knowledge and Behavior in MDAs and how to deliver them

1. Which key skills and knowledge are currently and will continue to be demanded by MDAs like yours for ICT professionals?
2. Which key skills and knowledge are currently and will continue to be demanded by MDAs like yours for non- ICT professionals?
3. What type of individual employee traits would you consider ideal for successful implementation of E-Government in your sector? (not more than ten)
4. In your opinion, how should ICT professionals in MDAs be recruited and managed?
5. How should ICT skills for non-ICT professionals and policy makers in government be sustainably enhanced?
6. What should the academic institutions do to enhance the availability of appropriate skills in government service?
7. Which contribution can the private sector make in enhancing availability of appropriate skills in MDA?
8. Provide any comments or remarks on how ICT skills in government service for ICT and non-ICT professionals can be sustainability enhanced.

Thank you for participating in this Study



Annex 5b: Institutional Self-Assessment

Institutional ICT Training Needs Self-Assessment Tool for MDA in RCIP Implementing Agencies

The Government of Uganda with support from the International Development Association (IDA) is implementing a number of activities under the Regional Communications Infrastructure Program (RCIP). Among the key activities is undertaking of an ICT Skills and Training Needs Assessment (STNA) for various Ministries, Agencies and Department (MDAs) and development an ICT Skills and Training Action Plan (STAP) for RCIP implementing agencies and beneficiary sectors. These MDAs include MoICT & NG, NITA-U and PPDA and the target sectors are: Agriculture; Education; Health; and Justice, Law and Order (JLOS). The purpose of this tool is to establish the current state of ICT Skills development in your organization and also establish the desired ICT skills, knowledge and behavior for various levels of responsibility. The tool seeks opinions of human resource managers and in the target MDAs.

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MDA:

Name of Accounting:

Officer:

Signature:

Date:

Tel:

email:

1. What kind of ICT training have you offered (do you offer) to your non-ICT professionals in the last 12 months? (List all)
2. How many ICT professionals do you have in your Organization?
3. How many non-ICT professionals do you have in your organization?
4. What kind of ICT training have you offered (do offer) to your ICT professional employees in the last 12 months? (list all)
5. What are the skills that new ICT employees in your MDA lack the most? (tick as many as you can)
 - a) General computer literacy
 - b) use of internet
 - c) use of email



- d) hardware assembling
- e) basic installations
- f) networking
- g) securing IT environment
- h) writing official documents
- i) teamwork
- j) Others (list)

- -----
- -----
- -----

6. "Where do you source your ICT professionals?"

- a) Private Universities
- b) Public Universities
- c) Cross Boarder universities etc.
- d) Professional Bodies

7. How satisfied are you on the scale of 1-5, with 5 being the highest with your ICT employees that come from?

Institution category	1	2	3	4	5
Private universities					
Public Universities					
Private BTVET institutions					
Public BTVET institutions					

8. Which of these technical skills does your MDA need most for your ICT core staff? rank on the scale of 1-5, with 5 indicating most needed

Skill	1	2	3	4	5
E-government systems e.g. IFMS technical maintenance and user support					
Artificial intelligence and data science					
Internet and social media applications					
Research and knowledge management					
System administration					
Cyber security and digital forensics					
Networking and wireless technologies					
Multimedia systems					
Mobile and web application development					
Database management system					
enterprise systems development					
Business process engineering					
Computer Repair					



9. Do graduates from non-ICT disciplines have sufficient ICT skills and knowledge for their entry level position?

- a) Yes b) No c) very little d) just sufficient to start

What incentive do you provide to your staff to motivate them to pursue ICT skills development?

Incentive	1	2	3	4	5
Sponsor the training					
Promotion					
Salary increase					
Recognition					
Paid time off to take the course					
Core to staff performance and appraisal					

10. Provide a snapshot of the state of your ICT department as of October 2020

Element of measure	Established number	Actual status	Remarks
Number of ICT professionals			
Target number to be recruited in the next 24 months			
Number of master holders			
Number of ICT staff who have left service in last 4 Years			

11. Which training delivery mode for ICT training would you prefer for your MDA?

- a) Online (b) face-to-face on station (c) face-to-face off-station (d) Combination of online and face-to face (e) Others (specify)

12. How long would you prefer the online training to be?

- a) less than a one week (b) less than 4 weeks (c) about 8 weeks (d) not more than 12weeks (e) Other

13. How long would you prefer the on-station face to face training to be?

- a) less than a one-day (b) less than 3 days (c) about 5 days (d) not more than 12weeks (e) Others (specify)

14. How long would you prefer the face- face off -station training to be?

- (a) less than a one-week (b) less than 4 weeks (c) about 8 weeks (d) not more than 12weeks (e) Others (specify)

15. How long would you prefer the blended (online and face-face) training to be?



(a) less than a one-week (b) less than 4 weeks (c) about 8 weeks (d) not more than 2weeks (e) Others (specify)

16. Summary of your MDA ICT skills and knowledge needs per line position of responsibility

Level of Responsibility in the MDA (desired level of skills and knowledge)	Line position	Current observable ICT skills, knowledge and behavior	Desired ICT skills, knowledge and behavior
Policy level (expected to have <i>basic digital literacy skills, policy awareness, strategic IT management</i>)	Permanent secretaries,		
	Commissions and boards		
MDA Top Management (expected to have <i>basic digital literacy skills, policy awareness, strategic IT management, technical skills on use of e-government services, etc</i>)	Executive Directors, Directors and Commissioners		
	Functional Line Managers		
Operational Functional Staff (non-ICT) (expected to have <i>basic digital literacy skills, policy awareness, strategic IT management, technical skills on use of e-government services, use of functional specific softwares and systems etc</i>)	Finance and accounting		
	Procurement		
	Human resource		
	Other professionals aligned to the sector		
	<Add rows as appropriate >		
Senior ICT Staff-leadership (expected to have <i>high digital literacy skills, policy awareness, strategic IT management, technical skills on use of e-government services, a broad range of ICT technical skills including software development, networking, security, systems administration, mobile and web technologies, etc</i>)	Public relations		
	Head of ICT		
	ICT section heads		
ICT Technical Staff (expected to have <i>basic digital literacy skills, policy awareness, strategic IT management, technical skills on use of e-government services, a broad range of ICT technical skills including</i>)	Systems administrators		
	Networks engineers		



<i>software development, networking, security, systems administration, mobile and web technologies, etc)</i>	Software developers		
	IT end user support staff		

17. Provide comments on the ICT skills and Training needs for your organization, which can make a basis for providing ICT capacity enhancement for your organization

Thank you for your participation in this Study



Annex 5c: Individual Self-Assessment

Background

The Government of Uganda with support from the International Development Association (IDA) is implementing a number of activities under the Regional Communications Infrastructure Program (RCIP). Among the key activities is undertaking of an ICT Skills and Training Needs Assessment (STNA) for various Ministries, Agencies and Department (MDAs) and development an ICT Skills and Training Action Plan (STAP) for RCIP implementing agencies and beneficiary sectors. These MDAs include MoICT & NG, NITA-U and PPDA and the target sectors are: Agriculture; Education; Health; and Justice, Law and Order (JLOS). The purpose of this tool is to establish the current existing ICT Skills, Knowledge and behavior among staff of MDAs and also establish the desired ICT skills and knowledge levels required of them (staff) for enhanced performance in line with level of responsibility of each staff. The tool seeks opinions of individual staff within the target MDA at the levels of; ICT heads, ICT technical Staff, Functional Line Managers, and non-ICT professional staff e.g. human resources, accounts etc.

Disclaimer: *In line with the data privacy Act 2019, the information provided shall be strictly used for purposes of the study and any personal identifiable information shall be held with utmost confidentiality and shall only be used for verification of facts by the researchers, and at the end of the assignment the personal data shall be destroyed.*

Instructions

NB: While Parts 1-3 are compulsory, Part 4 is strictly to be answered by **non-ICT Professionals** and Part 5 to be answered by **ICT Professionals**

Part one: Respondent's Profile

1. Name: _____ Gender: _____
2. Phone: _____ E-mail: _____
3. MDA: _____ Designation (Position) _____
4. Highest Academic qualification _____
a) PhD b) Masters c) Bachelors, d) Diploma
5. Have you attended any ICT professional or short course training in the last 12 months?
a) Yes b) No



6. Detail (at most 4) most recent ICT trainings you attended (if any) indicating; qualification, awarding institution and year.

S/n	Qualification	Awarding Institution	Year
1			
2			
3			
4			

7. Your age group

a) less than 25 b) 26-35 c) 36-45 d) 46-55 e) 56 and above

8. Years of professional working experience

a) 0-2 b) 3-5 c) 6-10 d) 11-20 & 20 and above

9. Years of experience at senior management level in the MDA or your sector

a) None b) 1-2 c) 3-5 d) 6-10 e) 11-20 (f) 20 and above

10. Professional category

a) ICT b) Non-ICT

Part Two: Awareness and Understanding of Enabling environment

- Does your MDA have an ICT policy?
- Do you use e-government services?
- What e-government services do you use?
- Does your MDA annual provide ICT training programmes to staff?
- Yes b) No
- If yes in 4, above list at least 2 trainings you attended organized or supported by your MDA (title, date and award (if any))
- Do you have appropriate ICT infrastructure at your workplace to support you; acquire, grow and retain appropriate ICT skill for your level of responsibility? (rank your level of satisfaction)

ICT infrastructure	1	2	3	4	5
Internet is reliable at my duty station					
I have an up-to-date computer					
I have updated software for my office productivity					

8. On a scale of 1 (poorest) to 5 (the best), how would you rate the E-Governance services usefulness to you



Part Three: Office Productivity Digital Skills, Knowledge and Behavior self-assessment

A: Digital skills

1. On a scale of 0 (very low) to 5 (very high), indicate your level of proficiency in the following computer applications.

Skill	1	2	3	4	5
Word (General document formatting, automatic generation of table of contents, file protection, mail merge, macros, forms, bibliographic databases, extensions, export and importation from other office applications)					
Excel (Sheet formatting, cell management, functions, charts, pivotal tables, inter sheet/inter workbook operations, exportations and importation in other applications, excel data analysis, macros)					
PowerPoint (Making basic presentations, animations, slide design, slide transition, linkage to other applications, slide automation, sounds, macros)					
Password management (use a password that is more than 8 characters, which is alphanumeric, change password regularly every 3 months)					

2. On a scale of 0 (very low) to 5 (very high) indicate your level of proficiency in the following computer applications.

Skill	1	2	3	4	5
Access (design view and wizard creation of tables, forms, queries and reports, macros, modules using VB)					
Web Publishing (website development, CSS, knowledge of some CMSs, securing website, optimising website)					
Any Graphical Design software					

3. On a scale of 0 (very low) to 5 (very high) indicate your level of proficiency in the following computer applications.

Skill	1	2	3	4	5
Using alternate Operating Systems (Using spreadsheets, word processors and presentations from non-windows operating systems and exporting/importing to/from windows)					
Big document processing using Latex, publishers and other software					

4. On a scale of 0 (very low) to 10 (very high) indicate your level of proficiency in the following computer applications.

Skill	1	2	3	4	5
Web browsing: (Searching the web, optimising search keys, use of bookmarks)					
Managing email account, sending, replying, copying, carbon copying, blind carbon copying, managing address book, mail merging emails, auto replies					
Using common cloud services like google docs					

5. On a scale of 0 (very low) to 5 (very high) indicate the extent to which you can carry out the following operations in a typical workplace environment.



Skill	1	2	3	4	5
Traditional structured data analysis using excel, SPSS, Stata, R etc					
AI based data analysis (KNN, Random Forest, Naive Bayes, etc)					

6. On a scale of 0 (very low) to 10 (very high) indicate the extent to which you can carry out the following operations in a typical workplace environment

Skill	1	2	3	4	5
Managing PC: (Installation of basic applications, installing devices, configuring applications, cleaning disk, defragmentation, backups, disk partitioning, antivirus updating, virus scans, monitoring of background processes, setting and analysing audit trails)					

B: Current State of ICT Knowledge

Considering the scale from 0 [knowing nothing] to 5 [Knowing very well], how would you gauge yourself in knowledge about the following ICT aspects

Knowledge	1	2	3	4	5
Security					
Network based attacks to computer systems					
Online privacy protection					
operation of antivirus software					
Contacting CERT					
Process and Project Management					
Business processes modeling					
Information system requirement definition					
IT project management					
IT service performance monitoring					
E-government trends					
Systems integration					
ICT trends					
Cloud computing					
Mobile apps					
Social media					

C: Day today workplace behavior

9. Do you share your passwords with colleagues on systems you access?
10. Do you use the same password on multiple systems?
11. Do you maintain an online diary?
12. Do you back up your office data and if so, on what devices?

Part Four [Non-ICT Professionals]: Level of ICT skills need, means of delivery, cost and affordability

13. Would you take a professional certificate or short course in ICT areas?
a) Unlikely b) less likely c) likely d) most likely



14. To what extent would you need the following ICT skills in your current position to become more effective in-service delivery. Score from 1-5, with 5 being the highest

Skill	1	2	3	4	5
Basic digital literacy like word processing and office applications					
E-government systems like IFMS, e-procurement, IPPS, etc					
Internet and social media applications					
Data science and data analysis					
Basic computer maintenance and troubleshooting					
Cyber security and digital privacy					
Online collaboration systems and cloud services					
Graphics and content authoring					

15. List any other ICT skills or knowledge areas in which you would prefer to have more training, in order to be effective and efficient at your workplace

16. What would be your motivation for taking such a course? (rank from 1-5, with 5 being the highest)

Motivation	1	2	3	4	5
Skills development					
The professional award received					
Improved earning					
Job security					
Job promotion					
Networking					
Others					

17. Which training delivery mode for ICT training would you prefer?

- (a) Online (b) face-to-face on station (c) face-to-face off-station (d) Combination of online and face-to face

18. How long would you prefer the online training to be?

- (a) less than a one week (b) less than 4 weeks (c) about 8 weeks (d) not more than 12weeks

19. How long would you prefer the on-station face to face training to be?

- a) less than a one day (b) less than 3 days (c) about 5 days (d) not more than 12weeks

20. How long would you prefer the face- face off -station training to be?

- a) less than a one week (b) less than 4 weeks (c) about 8 weeks (d) not more than 12weeks

21. How long would you prefer the blended (online and face-face) training to be?

- a) less than a one week (b) less than 4 weeks (c) about 8 weeks (d) not more than 12weeks



22. For face to face trainings what would be your preferred time of study?

- a) fully day off-duty (b) evening after work (c) weekend

23. Would you attend an ICT training course if?

If	1	2	3	4	5
You're sponsored					
Required to pay the training costs					
Given time off to attend the training					

Part Five [ICT Professionals]: Level of ICT skills need, means of delivery, cost and affordability

24. Would you take a professional certificate or short course in ICT training like CCNA?

- a) Unlikely, (b) less likely, (c) likely, (d) most likely

25. To what extent would you need the following ICT skills in your current position to become more effective in-service delivery? Score from 1-5, with 5 being the highest

Skill	1	2	3	4	5
E-government systems e.g. IFMS technical maintenance and user support					
Artificial intelligence and data science					
Internet and social media applications					
Research and knowledge management					
System administration					
Cyber security and digital forensics					
Networking and wireless technologies					
Multimedia systems					
Mobile and web application development					
Database management system					
enterprise systems development					
Business process engineering					
Systems analysis and design					

26. List any other ICT skills or knowledge areas in which you would prefer to have more training, in order to be effective and efficient at your position

- a)
b)
c)
d)

27. What would be your motivation for taking such a course? (rank from 1-5, with 5 being the highest)

Motivation	1	2	3	4	5
Skills development					



The professional award received					
Improved earning					
Job security					
Job promotion					
Networking					
Others					

28. Which training delivery mode for ICT training would you prefer?

- (a) Online (b) face-to-face on station (c) face-to-face off-station (d) Combination of online and face-to face

29. How long would you prefer the online training to be?

- a) less than a one week (b) less than 4 weeks (c) about 8 weeks (d) not more than 12weeks

30. How long would you prefer the on-station face to face training to be

- a) less than a one day (b) less than 3 days (c) about 5 days (d) not more than 12weeks

31. How long would you prefer the face- face off -station training to be?

- (a) less than a one week (b) less than 4 weeks (c) about 8 weeks (d) not more than 12weeks

32. How long would prefer the blended (online and face-face) training to be?

- b) less than a one week (b) less than 4 weeks (c) about 8 weeks (d) not more than 12weeks

33. For face to face trainings what would be your preferred time of study?

- (a) fully day off-duty (b) evening after work (c) weekend

34. Would you attend an ICT training course if?

If	1	2	3	4	5
You're sponsored					
Required to pay the training costs					
Given time off to attend the training					

35. Provide any comments on the preferred ICT training needs for your current position in your organization

.....

Thank you for participating in this Study



Annex 5d: Focus Group Discussion Guide

The Government of Uganda with support from the International Development Association (IDA) is implementing a number of activities under the Regional Communications Infrastructure Program (RCIP). Among the key activities is undertaking of an ICT Skills and Training Needs Assessment (STNA) for various Ministries Agencies and Department (MDA), and development of an ICT Skills and Training Action Plan (STAP) for RCIP implementing agencies and beneficiary sectors. These MDAs include; MoICT& NG, NITA-U and PPDA and the target sectors are: Agriculture, Education, Health, and Justice, Law and Order (JLOS). The purpose of this tool is to guide focused group discussion among selected stakeholders so as to deepen the conceptualization of the ICT status quo as well as design efficient and acceptable strategies. The tool seeks opinions of key stakeholders on overarching factors necessary for fruitful implementation of e-Government as well as capacity development among the different e-Government players.

Disclaimer: *In line with the data privacy Act 2019, the information provided shall be strictly used for purposes of the study and any personal identifiable information shall be held with utmost confidentiality and shall only be used for verification of facts by the researchers, and at the end of the assignment the personal data shall be destroyed.*

Guiding Questions for Discussion

1. What is your view about Uganda's e-Government policy framework? What would you consider as the strengths and weaknesses? Could there be something, in your view, that needs improvement?
2. How best should government recruit, retain and manage ICT professionals in MDA?
3. E-Government is central in a knowledge-based workplace. What is the core knowledge a resourceful worker in an e-Government environment should have? Do you think that some aspects of knowledge are insufficient in the Ugandan set up?
4. E-Government requires every stakeholder to be ICT literate. ICT literacy can be broad. What do you consider to be the critical ICT skills, knowledge and behavior that workers should have? Which of the skills do you feel have a bigger level of deficiency?
5. Are you satisfied with the level of ICT skills, knowledge and behavior from possessed by graduates for ICT at entry level? And how best should education services providers improve the quality of graduates?
6. In your opinion do you think MDAs have sufficient resources; infrastructure, financial etc. to attract, grow ICT skills and retain highly ICT skilled workforce?
7. Different countries have different workplace cultures. Looking at a workplace environment of a typical Ugandan MDA, what aspects do you think promote or derail the e-Government effort? For those which may derail, suggest progressive interventions should be employed?



8. Quite often there is need for training as a means of capacity development – improving knowledge, skills and attitudes. What would you consider as the effective modes of training in an e-Government set up?

Thank you for participating in this Study



Annex 5e: Document Review Guide

Part One: Background

The Government of Uganda with support from the International Development Association (IDA) is implementing a number of activities under the Regional Communications Infrastructure Program (RCIP). Among the key activities is undertaking of ICT Skills and Training Needs Assessment (STNA) for various Ministries, Agencies and Department (MDAs), and development of ICT Skills and Training Action Plan (STAP) for the RCIP implementing agencies and beneficiary sectors. These MDAs include MoICT & NG, NITA-U and PPDA and the target sectors are: Agriculture, Education, Health, and Justice, Law and Order (JLOS). As part of the task, relevant documents will be reviewed to broaden the Consultants' understanding of the task and state of practice. The purpose of this tool is to lay out a document review guide the Consultant will use in ensuring relevance and completeness.

Part Two: Guiding Questions for Discussion

1. *Functionally, what is e-Government?*

The document should address what constitutes e-Government, the intended benefits, and the success and failure factors of e-Government.

2. *What is the state of e-Government in Uganda?*

The document should address the rationale for e-Government in Uganda, what were the aspirations as e- Government was first introduced in Uganda, the rate of growth of e-Government in Uganda vis a vis what was intended, the current state of e-Government and the expected state in the future.

3. *What is the current state of ICT human capacity in MDAs in relation to ICT staffing levels, existence of ICT training programmes, Incentives for ICT skills development, among others.* Documents such as strategic plans, MoPS, man power analysis,

4. *What is the state of e-Government capacity in Uganda?*

The document should address the existing capacity of e-Government in Uganda. This will involve human capacity, technological capacity and infrastructure capacity in relation to the envisaged capacity assessment.



Annex 5f: List of stakeholders consulted

Institutions	Respondents
MoICT & NG	Permanent Secretary
	Commissioner Information Technology
National Information Technology Authority, Uganda	Executive Director
	Director Finance and Administration
PPDA	Director E-Government Procurement (E-Gp) Project-Head/Chair of Information, Communication and Technology Working Group
	Head ICT
Uganda Communications Commission	Director ICT and Research
	Head Strategy
	Manager, RCDF
Uganda Broadcasting Corporation (UBC)	Head of ICT Research Development
The Vision Group	Head ICT
Uganda Media Centre	Executive Director and 4 staff
ICT Initiatives Support Programme (NIISP)	Programme manager
National Drug Authority	Executive Director,
	Director Operations
	Manager Human Resources
	ICT officers and Staff
National Medical Stores	Head, ICT
	Executive Director
Uganda National Health Research Organization	Executive Director
Uganda Aids Commission	Director General
	Head ICT University
	Human Resource and Administration officer
Health Service Commission	Secretary
	Head of ICT
Uganda Blood Bank Transfusion Services	Executive Director/ System admin
	Director Operations
Uganda Virus Research Institute	Head of Institute
	Head, data management and biostatistics
National Referral Hospital Mulago	Executive Director
	Director, Human resource and Administration
	Head of ICT
Natural Chemotherapeutics Laboratory	Director



	Head of HR
	Director of Research
Judiciary	Head, ICT
	Registrar Planning and Development
	Registrar, Judicial Training Institute
Uganda Prisons Service	Commissioner of prisons/ Head IT
	Application manager
Directorate of Public Prosecutions	Assistant Commissioner ICT DPP
	State Attorneys
Uganda Police Force	Director ICT
	Director Human Resource Development
	Deputy IGP
	Director, Research planning and development
	Director Human resource management and administration
	Commandant police Senior command and staff college
	Commandant Police Training College
National Agricultural Research Organization	Deputy Director General, Technology, Innovations and Promotions
	Director Corporate Services
	Director Human Resource Management
National Agricultural Advisory Services	IT Systems Administrator
Coordinating Office for Control of Trypanosomiasis in Uganda	Executive Director
	IT/Data Officer
National Animal Genetic Resources Centre and Data Bank	Head Data Bank
	Head Planning, M&E
	Head Finance and Administration
Uganda Coffee Development Authority	Managing Director
	Director Development Services
	Manager M&E
	Head IT
Cotton Development Organisation	Board Secretary
	Head IT
National Council for Higher Education	Executive Director
	Director – Quality Assurance & Accreditation
	Director- Research, Development and Documentation
National Curriculum Development Centre	Deputy Director
	Administrative Secretary
	Head of procurement and disposal Unit
	Head Department of ICT



Directorate of Education Standards	Director
	Head of ICT
Education Service Commission	Chairperson
	Secretary
	Head of ICT
Department of Business Technical Vocation Education and Training	Head of department
Makerere University College of Computing and Information Sciences (COCIS)	Dean
	Head CISP (Center for Innovation and Professional Skills Development)
ISBAT University,	Dean (ICT)
	VC
	Director HR
APTECH ICT Training Company	Head Academics
	Head Operations
Uganda institute of information and communication Technology	Principal
Mbarara University of Science and Technology	Dean, Faculty of Computing and Information Technology
Gulu University	Head of Department, Department of Computer Science
ICT Association of Uganda	Chairman
3 innovation Hubs	CiPSD, Makerere Innovation Centre and Outbox



Annex 5g: International Benchmarking Tool

Elements	Status	Observations and Remarks
Per capita income		
Data protection and privacy		
Global ICT Development Index (IDI),		
Access to internet (Internet penetration level)		
Percentage of population using the top 5 social media platforms		
Global Innovation Index (GII) rank		
E-government Development Index (EDI) rank		
System of governance, e.g. federal or unitary presidential system		
Political stability rank		
Level of literacy		
Recruitment and management of ICT professionals in Government		
Legal and regulatory environment (key laws and regulator reputation)		
Maturity of the fourth estate, literacy levels (<i>Media, Diversity, and Content Manipulation</i>)		
Approach to digital skilling in government		
ICT Skills supply side		
Higher education system status in Kenya		
Elements	Status	Observations and Remarks
Stakeholder participation in curriculum development		
Pedagogical approaches used		
Status of eLearning		
Funding for ICT skills development		

Annex 5h: Pictorial highlights of stakeholder engagement



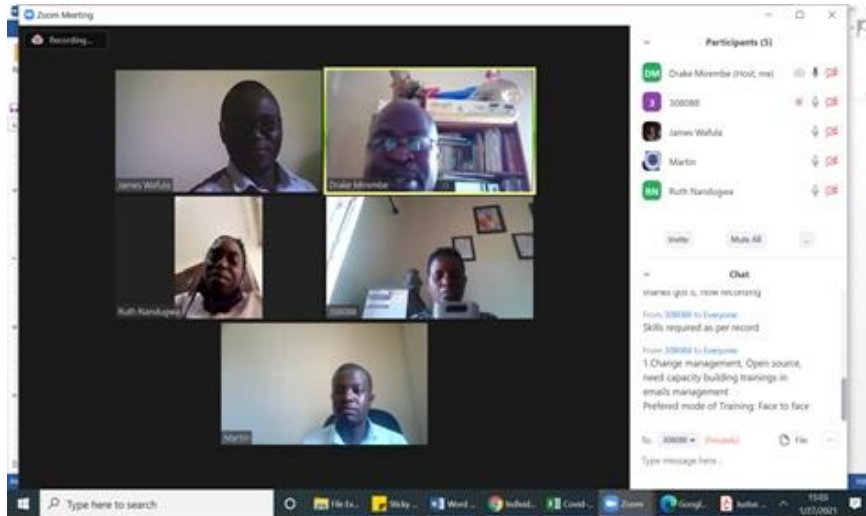
ED and Top Management of National Drug Authority



After meeting Deputy Director ICT Uganda Police Force



Meeting ED and Member of Top Management at Cotton Development authority



Dr. Drake Patrick Mirembe leading a Zoom Focus Group discussion with



Engagement at ISBAT University with VC and Dean



Engagement at APTECH Computer School



Annex 5i: Some of the Documents reviewed as part of ICT STNA

1. RCIP Uganda Project Appraisal Document
2. ICT Sector Strategy and Investment Plan, 2015 – 2020
3. National Information and Communications Policy for Uganda, 2014
4. National Electronic Government (e-Government) Policy Framework, 2011
5. The 3rd National Development (NDP III), 2020/21-2024/25
6. The 2nd National Development Plan (NDP II), 2015/16-2019/20
7. Uganda Vision 2040
8. Report on comprehensive restructuring of the Uganda Public Service
9. Position Paper on Institutionalization of Information and Communications Technology (ICT) Function in Ministries, Departments, Agencies/Local Governments (MDAs/LGs) developed in 2012/13
10. Uganda Public Service Standing Orders, 2010
11. Cabinet Memo (77 CT2016)
12. Health Service Commission. Analysis of the Manpower Structure as at 18/03/2021
13. Ministry of Health. Costed Establishment Analysis for the Ministry of Health (2017)
14. Ministry of Education and Sports (MoES). Costed Establishment Analysis for MoES, 2021
15. Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). Costed Establishment Analysis for MoES. 2021
16. National Council for Higher Education. Strategic Plan, 2020/2021 - 2024/2025
17. National Council for Higher Education (NCHE). Recommended Functional and Macro Structure for NCHE
18. Mulago National Referral Hospital. Proposed Manpower Structure for Mulago National Referral Hospital
19. National Animal Genetic Resources Centre and Data Bank. Human Resource Manual, 2017
20. National Animal Genetic Resources Centre and Data Bank. Manpower Structure, 2021
21. National Agricultural Research Organization. Manpower Structure
22. National Curriculum Development Centre. ICT Staffing Levels, 2021
23. MoPS for JLOS 2019/2020
24. National ICT Policy, 2014
25. National Broadcasting Policy
26. Uganda Communications Act, 2013



27. E-Government Strategy and e-Government Master Plan
28. NITA-U Strategic Plan, 2018/19-2022/23
29. National Cyber Security Framework
30. Business Outsourcing (BPO) Strategy
31. Data Protection and Privacy Act, 2019
32. ICT and Disability Policy, 2017 (draft)
33. BTVET Strategic Plan, 2011-2020
34. ICT Issues Paper, 2018
35. Access to Information Act, 2005
36. Uganda Public Service Training Policy, 2006
37. Evidence for ICT Policy Action: Policy Paper (8, 2012)
38. The draft report for Enhancement of the ICT function in Government
39. Human Resource manuals for the respective entities
40. The NITA-U e-Service Delivery Model
41. The Curriculum for e-Government developed by NITA-U
42. Uganda's Readiness assessment for the 4th Industrial Revolution Report
43. Andela Annual Developer Uganda Survey 2019
44. UN E-Government Survey 2020: Digital Government in the Decade of Action for Sustainable Development
45. Serbia ICT Sector Skills Needs Analysis in Vojvodina, 2017
46. Kosovo Association of ICT: CT Skills Gap Analysis, 2013



THE NATIONAL INFORMATION TECHNOLOGY AUTHORITY- UGANDA (NITA-U)

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