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

FINAL REPORT

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ACRONYMS

BPO	Business Process Outsourcing
CCNA	Cisco Certified Network Associate
CPD	Continuing Professional Development
CoCIS	College of Computing and Information Science
DPP	Directorate of Public Prosecutions
DSC	District Service Commission
DUV	Digital Uganda Vision
EMIS	Educational Management Information System
ERP	Enterprise Resource Planning
ESC	Electronic Switching Center
FGDs	Focus Group Discussions
4IR	Fourth Industrial Revolution
HMIS	Health Management Information System
HSC	Health Service Commission
ICDL	International Computer Driving License
ICT	Information Communications Technology
IDI	ICT Development Index
IFMS	Integrated Financial Management System
IPPS	Integrated Personnel and Payroll System
ISD	Institutional Strengthening and Development
ITU	International Communications Union
JLOS	Justice Law and Order Sector
JSC	Judicial Service Commission
KIIs	Key Informant Interviews
LGs	Local Governments
MDAs	Ministries, Departments and Agencies
M&E	Monitoring and Evaluation
ME&L	Monitoring Evaluation and Learning
MoES	Ministry of Education and Sports
MoFPED	Ministry of Finance Planning and Economic Development
MoGLSD	Ministry of Gender Labour and Social Development
MoICT & NG	Ministry of ICT and National Guidance
MoPS	Ministry of Public Service
MTN	Mobile Telephone Network
NBI	National Backbone Infrastructure
NCDC	National Curriculum Development Centre

NCRL	National Chemotherapeutics Research Laboratories
NCHE	National Council of Higher Education
NITA-U	National Information Technology and Information, Uganda
NDPIII	Third National Development Plan
NPR	National Public Radio
PESTLE	Political Economical Social Technological Legal Ecological
PhD	Doctor of Philosophy
PIT	Project Implementation Team
PPDA	Public Procurement and Disposal of Public Assets Authority
PSC	Public Service Commission
RCIP	Regional Communications Infrastructure Program
STAP	Skills and Training Action Plan
STNA	Skills and Training Needs Assessment
ToRs	Terms of Reference
UCC	Uganda Communications Commission
UICT	Uganda Institure of Information and Communications Technology
UNHRO	Uganda National Health Research Organisation
URA	Uganda Revenue Authority

FOREWORD

Given the rapid development of the ICT sector and advancements in technologies, the Government of Uganda continues to take 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 to all government employees with emphasis on e-governance; developing ICT centers of excellence, Innovation hubs, community knowledge and information centre; reviewing and implementing ICT training curriculum at all levels of education system in line with the emerging technologies; integrating digital literacy and e-governance in civic education and implementing targeted capacity building initiatives for teachers and lecturers 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 (MoICT & NG) through NITA-U, conducted an ICT Skills and Training Needs Assessment (ICT STNA) of the RCIP implementing agencies and target sectors, conducted desk-based international benchmarking with countries like Estonia, Australia, South Korea, Ghana, Mauritius and Kenya, on best practices of ICT skills development and absorption into government. From the findings, a pragmatic ICT Skills and Training Action Plan (STAP) has been developed to sustainably address the ICT gaps RCIP implementing agencies and the target sectors of Agriculture, JLOS, Health and Education. The key tenets of this Action Plan are summarized in this report. The ICT STAP is a dependable reference and guide to all key implementing institutions, having been preceded by an ICT Skills and Training Needs Assessment (ICT STNA) that was conducted with active involvement of my Ministry and other stakeholders from the demand and supply side of ICT skills.

My Ministry in no distant future will extend this study to all other Ministries, Departments, Agencies and Local Governments in order to provide more evidence for uptake of ICT STAP.

Amidst the fast changing and ever advancing ICT landscape, this ICT STAP has in addition addressed the issue of positioning our country to competitively meet the 21st Century work place and the Fourth Industrial Revolution (4IR) requirements.

I therefore urge all the responsible actors identified in the ICT STAP to internalize the document and diligently implement the actions thereof.

Dr. Amina Zawedde
Permanent Secretary
Ministry of ICT and National Guidance
FOR GOD AND MY COUNTRY

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 pursuit of the aforementioned agenda, Ministry of Information and Communications Technology and National Guidance (MoICT& NG) through National Information Technology Authority-Uganda (NITA-U) on behalf of Government of Uganda is implementing the Regional Communications Infrastructure Program (RCIP) Project ,which is 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 for the ICT STNA and STAP was to provide a basis for systematic development of ICT capacity building and training for Government. The Specific Objectives were to: i) conduct an AS-IS Landscape Assessment specific to MoICT & NG, NITA-U and PPDA and the target sectors of Agriculture, JLOS, Health and Education; ii) engage stakeholders to determine the desired TO-BE State for MoICT & NG, NITA-U and PPDA and the target sectors of Agriculture, JLOS, Health and Education; iii) conduct a Gap Analysis in MoICT & NG, NITA-U and PPDA and the target sectors of Agriculture, JLOS, Health and Education; iv) put in place an actionable ICT STAP to sustainably address the identified gaps for the target group which includes MoICT & NG, NITA-U and PPDA and the target sectors of Agriculture, JLOS, Health and Education; v) identify priority ICT training programmes and other capacity building interventions for the target group which entails MoICT & NG, NITA-U and PPDA and the target sectors of Agriculture, JLOS, Health and Education.

Approach and Methodology for the Assignment

The assignment was executed in five phases, namely: Inception Phase, Stakeholder Consultation Phase, ICT Skills and Training Needs Assessment (STNA) Phase; ICT Skills

and Training Action Development Phase; and Final Reporting Phase. The assignment was conducted in a participatory and consultative manner, involving relevant stakeholders at each phase of execution. This was meant to ensure consensus, facilitate knowledge transfer and ownership of the final outputs.

In terms of general approach to ICT STNA and STAP, the Consultant employed the Queensland Government's ICT Skills Assessment Framework (QGISAF) to conduct a situation analysis of the current AS-IS landscape (current) and TO-BE (desired) state of ICT skills and training needs 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).

The ICT STAP was developed using the Queensland Government's ICT Workforce Capability and Planning Cycle, which recommends six steps for this purpose, as the overall design framework. The six steps include: i) Workforce profiling/analysis, ii) Forecast future needs, iii) Analyze gaps, iv) develop intervention strategies, v) develop actions and, vi) design a monitoring and evaluation framework. The development of ICT STAP involved future work characteristics analysis, future demand forecasting, and international benchmarking among others.

All key deliverables were subjected to stakeholder validation as means of enhancing product quality, besides the Consultant's internal quality assurance mechanism.

Key ICT STNA 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 were 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 implementing 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 line 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 MDAs assessed do not have sufficient knowledge in IT strategic management, change management and IT leadership decision making. 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 providers, it can be prudently concluded 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) The study also revealed 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, and 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 (MoPS), 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 (CDP) 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 JLOS.

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.

The aforementioned recommendations from the ICT STNA phase informed the development of ICT STAP. In line with the ToR, the actions are prioritized to address unharmonised and disjointed deployment of ICT staff in MDAs and LGs; absence of professional and common ICT leadership guidelines/standards in MDAs and LGs; the need to update and/or develop public service human resource policies and regulations to cover ICT cadre; misalignment between ICT education programmes offered by the Academia and ICT skills needs of the industry; and mindset change among public officers.

The gaps identified were anchored on the six (6) strategic objectives drawn from four (4) chapters in NDPIII [i.e. Chapter 14, Chapter 16, Chapter 18 and Chapter 20]. Each gap was manifested by a set of findings driving it, and linked to the relevant sections and figures in the ICT STNA report.

In order to address the identified gaps in ICT skills and training needs for the RCIP MDAs and overall government, the key drivers of change in the ICT sector were identified along with associated strategic actions linked to the strategic objectives. These actions were costed to a sum of **UGX 80,540 billion** which will be a combined effort of all RCIP implementing agencies and target sectors. Implementation of these actions will take place over the next five years with periodic monitoring evaluation and learning to ensure achievement of the intended outcomes and positive impact on evidence-based decision-making process.

1.0 INTRODUCTION

Empower Consult (hereinafter referred to as "the Consultant") was contracted by National Information Technology Authority-Uganda (hereinafter referred to as "the Client") under Procurement Reference No. NITA-U/RCIP/CONS/18-19/00119 to undertake an Information and Communications Technology (ICT) Skills and Training Needs Assessment (STNA) and thereafter, develop an ICT Skills and Training Action Plan (STAP).

This Final Report is submitted to National Information Technology Authority, Uganda (NTA-U) as the last deliverable in line with the Terms of Reference (ToR).

This assignment would not have been successful without the input and dedication of a number of actors. Therefore, The Consultant would like to thank in a special way the following categories of persons that contributed to successful execution of the entire assignment: The Contract Manager, for playing effective coordination, liaison and first line quality assurance roles that significantly the Consultant to act with minimal holdup; The Project Implementation Team (PIT) for timely review of submitted deliverables and provision of professional opinion and advice; The Senior Management Team of Ministry of ICT and National Guidance (MoICT & NG) for rendering oversight and approval roles, making execution process smooth and legitimate; and Key informants and respondents from Regional Communications Infrastructure Program (RCIP) implementing agencies (NITA-U, MoICT & NG PPDA) target sectors of Agriculture, Health and Education and Justice, Law and Order Sector (JLOS) for providing valuable time, expertise and relevant review documents for the study.

2.0 BACKGROUND AND CONTEXT TO THE ASSIGNMENT

The Government of Uganda recognises ICTs as critical to the delivery of its national Vision 2040. Digital Uganda Vision (DUV) provides government's integrated policy and strategic framework of how ICT shall support the delivery of the national Vision 2040 by striving to empower citizens and achieving the goals of universal inclusion, sustainable development, economic progress and poverty eradication through digital innovation.

ICT and ICT-enabled services have been identified by the Government of Uganda as being crucial to transforming its economy and people's lives through job creation, accelerated economic growth and increased productivity. The Uganda Vision 2040 clearly stipulates that there is potential to improve the availability of digital content and e-products; to provide automated government processes and inter-agency connectivity; to bridge the gap between industry and academia; and to enhance the commercialisation of research and development.

In a bid to improve ICT skills, digital literacy and knowledge, the Government of Uganda has committed to develop, improve and retool its ICT knowledge base; build robust ultra-high-speed, pervasive, and intelligent ICT infrastructure all over the country, in line with changing technologies; foster and support business process outsourcing (BPO) business activities; and encourage innovation to harness the full potential of the digital economy and technological innovation.

Specifically, through the harnessing of knowledge and ICT, the Government commits itself to develop, improve and retool its ICT talent-building mechanism by adopting globally benchmarked, industry-rated skills assessment as well as training and certification standards.

Thus, in pursuit of the digital transformation agenda, MoICT &NG, with support from the World Bank, is implementing the RCIP through NITA-U. 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 MoICT& NG through NITA-U. 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.

2.1 Justification for ICT STNA and STAP

Implementation of the Institutional Strengthening and Development (ISD) sub-component of the RCIP Uganda Project is aimed at supporting capacity building of RCIP beneficiary agencies and target sectors by stimulating mindset change among public officers to utilize ICT and provide government services efficiently and effectively.

In this regard, the Consultancy to conduct ICT Skills and Training Needs Assessment (STNA) and develop ICT Skills and Training Needs Action (STAP) was prioritized to address to the following key underlying factors.

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 cadre*: 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 several

graduates annually, most graduates do not have the technical, market-oriented expertise required by public and private sectors. In addition, local education institutions are not yet 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 government has procured and instituted ICT programmes to enhance efficiency in service delivery, full uptake and utilisation of such programmes (e.g. IPPS) have not been achieved. Some pockets of public officers still prefer to use analogue (paper based) approaches.

It was highly anticipated that successful implementation of ICT STAP for RCIP implementing agencies and target sectors mentioned above would contribute to the following key outcomes, among others:

i) Improved and streamlined remuneration of the ICT workforce in Regional Communications Infrastructure Program (RCIP) implementing agencies and target sectors;

ii) Improvement in the quality and quantity of ICT services in RCIP implementing agencies and target sectors;

iii) Development of strategies for addressing current and future skills gaps;

iv) Support to career planning and succession planning;

v) Alignment of skill development to business goals and needs of various MDAs;

vi) Higher chances of greater return on learning and development investment on capacity building of the ICT work force;

vii) Identification of future ICT skills needed by various categories of civil servants in selected MDAs over the next 3 to 5 years; and

viii) Development of strategies to address the systematic skills gaps and enhance uptake and utilization of ICT.

2.2 Objectives of the Assignment

The overall objective of the ICT STNA and STAP is to provide a basis for systematic development of ICT capacity building and training for Government employees. The specific objectives of the assignment have been illustrated in **Figure 1**:

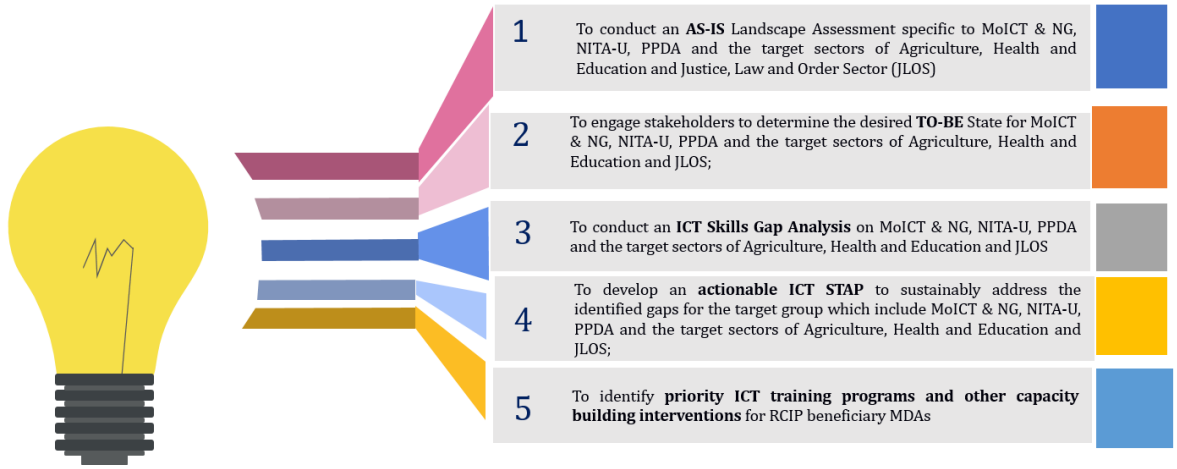


Figure 1: Objectives of the Assignment

After a thorough review of the key documents, including the Uganda Vision 2040, the National Development Plan III, the Uganda E-Government Master Plan (2012), the NITA-U Strategic Plan (2018/19 - 2022/23), the BTVET Strategic Plan (2011-2020), the ICT Policy Paper No.8 (2012), the Uganda Public Service Standing Orders, the Schemes of Service for ICT Cadre, the Public Service Training Policy (2006) and other documents of relevance, the Consultant affirms that development of ICT STNA and STAP is aligned to, and will facilitate the intended purpose of Institutional Strengthening and Development of RCIP implementing agencies and target sectors to fully operationalize e-government in Uganda.

2.3 Key Activities undertaken

The Consultant undertook the following key activities to ensure effective completion of this assignment:

i) Kick-off meeting between the Consultant and MoICT & NG and NITA-U to review and agree on different aspects of the assignment.

ii) Stakeholder consultations to conduct AS–IS landscape assessment and understand the TO-BE state of the RCIP implementing agencies and target sectors.

iii) Performing a gap analysis to determine where skills development and/or training is required for the target organisations.

iv) Determining problems that may not be solved by training, for example policies, practices and procedures that may need to be reviewed.

v) Identifying and documenting ICT skills and training required for MoICT & NG, NITA-U, PPDA and the target sectors which include Agriculture, Health, Education and JLOS at various levels (Institutional, Occupational and Individual) and

functionaries (Government Leaders, Officers and Information Technology Officers) to address the identified Gaps.

vi) Conducting a stakeholder validation workshop for ICT STNA report. The Consultant's role was to manage the workshop, present the findings and record the deliberations, and produce the rapporteur's report. In addition, the Consultant organised all logistical requirements for the workshop including but not limited to procuring the venue, food and beverages, public address systems, stationery, rapporteur and sending out invitations.

vii) Developing an Action Plan, including short, mid and long-term capacity building programmes to address the deficiencies identified in the RCIP implementing agencies and target sectors.

viii) Preparation of a substantive, comprehensive and final report in accordance with the objective of the assignment and Terms of Reference (ToR).

2.4 Scope of the Assignment

The scope of work entailed interacting with various stakeholders in government, including but not limited to human resource managers, ICT sector opinion leaders, ICT service providers (suppliers), ICT and non-ICT staff, senior officials and decision makers in RCIP implementing agencies and target sectors.

In order to achieve holistic and integrated benefits from the assignment, the ICT STNA and STAP was conducted at organizational, occupational, and individual employee levels as detailed below:

a) Organisational Assessment: This entailed assessment of the AS-IS ICT human capacity of the target MDAs in terms of numbers of ICT professionals, ICT skills capacity building, and ICT usage among others. This assessment helped to determine the current state of ICT knowledge, skills and behaviours in the organization and established the TO-BE state or desired ICT knowledge, skills and behaviours for various levels of responsibilities. All the above was done in line with the existing global workflow ICT systems, overarching and operational workflow ICT systems within sectors and institutions e.g. IFMS, IPPS and the sector/organisational specific operational workflow systems e.g. EMIS for education, HIMS for health, etc.

b) Occupational Assessment: This entailed examination of the ICT knowledge, skills and abilities required for performing a particular job category in the target MDAs. The assessment helped to identify occupational ICT knowledge and skills discrepancies based on industrial best practices and the 21st Century knowledge workers' ICT competency or potentially what would be introduced by the new direction of an institution or sector when ICT is adopted.

c) **Individual/Employee assessment**: This entailed analysis of the ICT knowledge, skills and behaviours of various categories of staff in targeted MDAs. The assessment helped to establish the existing ICT knowledge, skills and behaviours among staff of targeted MDAs and also establish the desired ICT knowledge, skills levels required of them (staff) for enhanced performance in line with the level of responsibility. This exercise helped to provide information on where employees needed training and what kind of training they needed and how the training could be delivered.

2.5 Assignment deliverables

In line with sub-clause 41.2 of the Special Conditions of Contract, the following were the main deliverables of the assignment:

- An acceptable Inception Report;
- A Stakeholder Consultation Report detailing current and desired ICT Skills, competencies, Skills Training, among others;
- An approved ICT Skills and Training Needs Analysis Report; and
- An approved ICT Skills and Training Action Plan, and Final Report.

Each of these deliverables is detailed in the approach and methodology in the next section.

2.6 Approach and methodology for the Assignment

The assignment was executed in five phases, namely: Inception Phase, Stakeholder Consultation Phase, ICT Skills and Training Needs Assessment (STNA) Phase; ICT Skills and Training Action Development Phase; and Final Reporting Phase.

In terms of general approach, the assignment was participatory and consultative, involving relevant stakeholders at each phase of execution. This was meant to ensure consensus, facilitate knowledge transfer and ownership of the final output.

2.6.1 Inception Phase

The assignment began begin with a kick-off meeting between the Consultant and MoICT & NG and NITA-U through their constituted Project Implementation Team, to review and agree on different aspects of the assignment contained in the already shared draft Inception Report. Aspects of the assignment that were discussed include but not limited to the purpose of the assignment, expected deliverables, approach and methodology, work plan, list of documents needed from MoICT & NG and NITA-U, and any other issues relevant to successful execution of the assignment. The Consultant reviewed relevant background documents and developed preliminary questions to guide the discussion.

After the meeting, the Consultant utilised the feedback to review, enrich and submit the final draft Inception Report to the Client for approval.

2.6.2 Stakeholder Consultation Phase

In line with the terms of reference and in order to get the holistic picture of the ICT skills demand and supply characteristics, two broader categories of stakeholders 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. 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-assessment). Uganda Police Force (UPF) had the highest response to the exercise (with 51 members for three focus groups, 13 individual and 6 key informants) followed by the Judiciary with (43 participants from focus groups, 12 Individual self-assessment, one key informant and one institutional assessment).

The process was executed in three stages, namely *Inception, Execution and Reporting* as summarized in **Table 1** below, which highlights the key tasks, associated methods and tools which were used to accomplish each task.

Phase	Key tasks	Key activities and methods
Inception	Entry meetings with the Client's Project Implementation Team	Online entry meetings with the client PIT to understand the assignment, discuss strategies for the stakeholder consultation and get inputs and approval on tools and strategies. A total of 4 meetings were held.
	Stakeholder identification	In consultation with the Client PIT a stakeholder mapping was conducted that established key stakeholders for consultation. • The organizations were selected based on their roles in the RICP programme. • The organizations' top-level respondents (accounting officers, head of human resources and head 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 his or her delegated officer.
	Tool development	• Involved the design of data collection tools, tool testing and validation, and data collection tool digitalization.

Phase	Key tasks	Key activities and methods
		• 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) Key Informant Interview Protocol (**Annex X**), ii) Institutional Assessment (**Annex VIII**), iii) Individual Self-assessment (**Annex IX**), iv) Focus Group Discussion Guide (**Annex XI**) and v) Document Review Guide (**Annex IV**). 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.
Execution	Team orientation	A team orientation workshop involving experts and research assistants on the research tools and methods, processes and observance of COVID-19 Standard Operating Procedures as key items of the agenda, was conducted. This was done at the Consultant's offices in Ntinda
	Introduction letters	The contents of the letters were drafted and reviewed and approval sought from the client. The introductory letters were delivered to the stakeholders by the client's courier services via registered mail.
	Appointments	Involved physical visits, phone calls and emails to fix appointments with various stakeholders.
	Key informant interviews	Interviews were conducted with key informants via physical meetings, Zoom or phone interviews using the key informant interview protocol. A total of 46 interviews were conducted.
	Focus group discussions	A number of focus group discussions were held either online or off-line with some stakeholders. A total of 7 focus groups involving 101 participants were conducted.
	Administering tools to respondent	Institutional assessment and self-assessment tools were administered to selected respondents. The institutional self-assessment tools were completed through a self-administered approach and guided interviews were facilitated by enumerators.

Phase	Key tasks	Key activities and methods
	Document review	Documents provided by the stakeholders were reviewed to enhance the Consultant's situation analysis of the organizations. The documents included Ministerial Policy Statements, Strategic Plans, Annual Reports and Staff Establishment Reports.
	Data completeness and follow up	One of the challenges faced during this stakeholder consultation process was the delays by the stakeholders to submit the self-administered tools. There was need to establish a robust mechanism of follow up with the stakeholders to ensure completed tools were received. This involved regular checks on the dashboard for data updates and issuing of follow-up reminders in the form of physical visits, phone calls and emails.
Reporting	Establishing of reporting channels	The Consultant established reporting and coordination procedures, at Consultant level and with the client PIT. A project mailing and a WhatsApp group were created. The primary mode of communication was email and Zoom meetings.
	Regular updates	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.
	Preparation of Stakeholder Consultation Report	This involved data mining of thematic issues from stakeholder responses, systematic aggregation of key observations, drafting, review and finalisation of the stakeholder consultation report.

Table 1: Stakeholder Consultation Phase tasks, activities methods

2.6.3 ICT Skills and Training Needs Assessment (STNA) Phase

To carry out a situation analysis to identify and document ICT skills and training needs of the staff in RCIP implementing organisations and target sectors, the Consultant employed ***Queensland Government's ICT Skills Assessment Cycle.*** This methodology recommends five steps for undertaking an ICT skills assessment as detailed below:

a) **Identify core skills and level of responsibility**: This involves analysis, identification and documentation of the individual's knowledge, skills/competencies

and behaviours required for a specific role now and in the future. Initial information was obtained from human resource manuals, project documents and contracts. This information was later discussed with the employees and their supervisors, to confirm the skill/competency and performance requirements for the respective roles.

b) **Employee self-assessment**: For this element, the employees took an individual self-assessment to establish their individual level of capability versus the knowledge, skills/competencies and behaviours required for their respective roles.

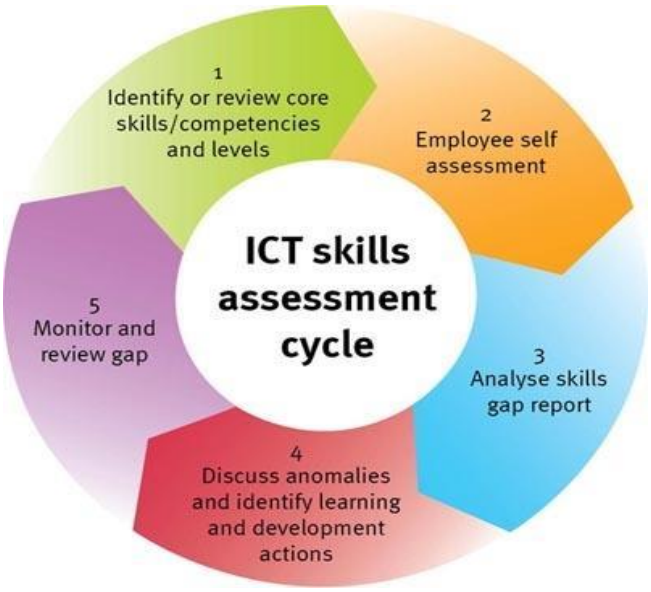
c) **Analyze skills gap report:** In this step, the Consultant reviewed the outcomes of the employee self-assessment to identify gaps. Where necessary, there were follow up conversations between the Consultant and the employee (s) to refine the employees' assessment in case the Consultant believed the gap was more or less than what was originally assessed.

d) **Discuss anomalies and identify learning and development actions**: The Consultant reviewed the skills gap(s) and or surplus (es), discussed any anomalies and identified possible learning and development activities. These included, but were not limited to mentoring/coaching; internal training; external training such as formal courses, attendance at briefings/information sessions, etc.

e) **Monitor and review:** This involved ensuring that learning and development takes place to close the identified gap(s). All recommendations would be monitored and evaluated, and key learnings reported through a robust Monitoring, Evaluation and Learning Framework for ICT STAP implementation (*see Section 7*). An annual skills assessment process was recommended to ensure alignment between 'required' and 'actual' skills. This process can also assist with succession and career planning as well as planning for the future of changing technologies. The annual skills assessment process was also included regular skills assessments and learning and development actions for identified gaps.

The five elements are represented graphically in **Figure 2** below:

Figure 2: ICT Skills Assessment Cycle



Source: *Queensland's Government's ICT Skills Assessment Methodology*

The above elements guided data collection and analysis and reporting during the situation analysis to identify and document ICT skills and training needs for the target MDAs. This assessment however targeted both the ICT staff and non-ICT staff in target MDAs in the identified sectors as the stated in the ToR.

Detailed Methodology

To undertake a thorough situation analysis to accurately identify and document ICT skills and training needs, the Consultant employed the following methodology:

a) Synthesis and utilization of Stakeholder Consultation Report

The Consultant heavily utilised stakeholder consultation findings on AS-IS landscape and TO-BE state of RCIP implementing agencies and target sectors as well as AS-IS and TO-BE supply side of ICT skills and training needs as critical input in conducting robust ICT STNA.

b) Desk Review

The Consultant carried out an extensive review of relevant policies, legislations, guidelines, strategies, frameworks, codes, Acts, research reports and other documents that were developed to support the enhancement of the capacity of the ICT workforce in government. The aim of the review was to examine recruitment, development and advancement of the ICT workforce in the RCIP implementing agencies and target sectors.

The review covered but was not be limited to: the current schemes of service, covering the roles and responsibilities of different ICT positions, education and skills of position

holders/expected, competencies, facilitation, legal and regulatory framework, training and education opportunities, and general institutional mechanisms, and processes for the development of the ICT human resource in RCIP implementing agencies and target sectors.

Key relevant policies, legislations, guidelines, strategies, frameworks, codes, Acts, and research reports that were reviewed are provided in **Annex III.** In addition, the Consultant reviewed regional and international ICT sector/e-Government performance reports to establish the competitiveness of Uganda's ICT workforce regionally and globally, and areas that need improvement. Such reports included but were not limited to the Annual United Nations E-government Survey and ITU's annual ICT Development Index (IDI).

The Consultant understood that there was need to undertake a policy and legal framework assessment to ascertain whether the proposals for skills assessment findings and recommendations integration were within the scope of the law or whether there were gaps that needed addressing within the legal and policy environment. ICT skills assessment recommendations that cannot be implemented because of legal and policy challenges are a waste of resources. The Consultant, through consultations and desk review, produced policy and legal framework overview with crucial analysis for enablers of the ICT skills assessment recommendations that formed part of the situational analysis report. Document Review Guide and Policy and Legal Framework Assessment Tools were used to aid capture of this data (refer to **Annexes IV** and **V** respectively for the tools).

c) International Benchmarking

Furthermore, the Consultant reviewed ICT sector policies, regulations and strategies in countries that have successfully established and developed strong and sustainable ICT Functions in their Governments to identify best practices Uganda can adopt. The review process provided a deeper understanding of the current situation of the ICT skills and training needs of the ICT workforce in RCIP implementing agencies and target sectors versus what is desired in terms of:

i) Gaps in the existing ICT skills and training needs;

ii) The existing institutional mechanisms and processes for recruitment, development, advancement and succession of the ICT work force in RCIP implementing agencies and target sectors and existing gaps;

iii) Potential short term, mid-term and long-term interventions that can address existing gaps and or facilitate the attainment of the desired optimal state;

iv) Identification of main institutional and individual actors/stakeholders; and

v) Best practices about recruitment, development, advancement and succession of the government ICT work force from countries that have successfully established and developed strong and sustainable ICT Functions in government.

The overall goal of benchmarking was to ensure transfer of knowledge and experiences from these countries by identifying best practices in ICT human resource capacity development that Uganda can adopt. Based on their performance as enshrined in the E-Governance Development Index, International Communications Union (ITU) and the ICT Development Index (IDI), 2020. The ICT human resource capacity development strategies of these countries were extensively studied through review of relevant literature available in the public domain (such as policies, laws, research reports, websites of MDAs and LGs, etc.).

The entire process for executing this task included the following steps:

i) Identifying and agreeing upon the leading countries in ICT human resource capacity particularly in government to benchmark, including those with conditions similar to Uganda's;

ii) Identifying best practices from the chosen countries in building the capacity of the ICT human resource that are relevant to Uganda's context;

iii) Adapting international best practices to the conditions in Uganda; and

iv) Developing best practices specifically tailored for Uganda.

Table 2 below provides a guide that was followed for benchmarking:

Process	Key steps to be undertaken	Key activities /Comments
Planning	• Identify opportunities and determine what to benchmark • Choose benchmarking countries or institutions • Data collection and management	• Map greatest ICT improvement potentials • identify functions where ICT improvements are most essential • Create and familiarize benchmarking team with the vision, mission and long-term goals of the sector • Identify critical success factors for the organization/sector • Prioritize critical processes that require benchmarking based on the scope of improvement and predetermined criteria based on the sector's success factors • Develop measurement metrics • Ensure participation of organization's leadership in benchmarking process • List and select possible organizations with best-in-class standards to use for comparison • Design data collection tools and collect data systematically using appropriate methods

Process	Key steps to be undertaken	Key activities /Comments
		• Compare, identify extent of gaps in performance, practices, structure of process etc • Determine adaptability of innovations or new standards • Determine the cost of process improvement • Map and share potential benefits of process improvement based on best practice
Analysis	• Data analysis based on key improvement aspects • Identify gaps and innovations • Select performance and practices indicators • Set Goals	• Ensure team has the resident analytical, creative and innovative skills • Conduct process and performance gap analysis through comparison looking for effectiveness, efficiency and responsiveness • Participatorily identify reasons for better performance • Compare and analyze process definition documents, work processes, flowcharts of the organizations and note impact of the differences in work practices • Brainstorm processes for improvement and develop proposals • Consultants share with senior management and/or interested parties in the organization • Document and seek approval of proposals for improvement • Conduct cost-benefit analysis of proposed improvement plan • Develop action plan for roll out with senior management commitment
Integration	• Document and approve improvement Plan • Communicate plan widely and gain ownership • Establish sectorial functional goals	• Convert ICT performance goals to SMART operational goals • Draft and share improvement plan in formats for dissemination and input • Determine audience for dissemination of improvement plan • Identify and use different channels and means of sharing findings within sector or departments • Seek feedback on any reservations and difficulties on improvement plans • Revise or develop mechanisms to take care of reservations on plans • Map potential impact of changes and track them • Seek senior management approval of all steps and outputs
Action	• Develop an action plan	• Consultants with client develop an action plan to implement the changes • Document the changes required for implementing the new process and work practices • Prioritize and sequence actions according to priority based on importance

Process	Key steps to be undertaken	Key activities /Comments
		• Seek commitment from staff and leadership on the plans • Realign sectoral plans and documents to take into consideration all new plans • Develop a monitoring and review process

Table 2: International Benchmarking Guide

The expected output from the benchmarking exercise was an International Best Practice recommendation covering different models that have been used to build the capacity of the ICT workforce particularly in RCIP implementing agencies and target sectors in terms of roles, responsibilities, competencies/skills, education, career paths, training and education opportunities, etc.

After carrying out a thorough situation analysis involving Desk Review, Stakeholder Consultations (ICT demand and Supply side) and International Benchmarking, the Consultant produced the first draft ICT Skills and Training Needs Analysis (STNA) Report. This draft report was presented to the PIT comprising technical representatives of MoICT & NG and NITA-U for internal validation. This was followed by revision of the first draft based on the feedback received, to produce the second draft. The Consultant then organized and presented the second draft to the senior management team of MoICT & NG in a validation workshop (refer to **Annex II** for combined stakeholder workshop participants).

The deliverable of this activity was an **approved ICT STNA Report** articulating the recommendations on general ICT training requirements for Staff in the RCIP implementing agencies and target sectors. The recommendations provided details of required and desired ICT skills for various levels (Institutional, Occupational and Individual including target functionaries), competencies, positions, 'gaps' not solved by training, and a table which mapped recommended skills/training/competencies to address the gaps identified among the RCIP implementing agencies and target sectors.

2.6.4 ICT Skills and Training Action Plan (STAP) Development Phase

To develop the ICT STAP for RCIP implementing agencies and target sectors, the Consultant employed Queensland Government's ICT Workforce Capability and Planning Cycle, which recommends six steps for this purpose, as the overall design framework. The basis for this choice is its focus on ICT workforce planning and simplicity. The six steps include: Workforce profiling/analysis, forecast future needs, analyze gaps, develop strategies, implement strategies, monitor and evaluate.

The above steps are illustrated in **Figure 3** below:

Figure 3: ICT Workforce Capability and Planning Cycle

Source: *Queensland Government's ICT Workforce Capability and Planning Methodology*

In the context of the assignment, application of each of the six steps is described in the section below:

Detailed Methodology

The following techniques were used to develop an ICT STAP for RCIP implementing agencies and target sectors in Uganda.

a) Workforce Profiling/Analysis

i) ***SWOT Analysis:*** SWOT is an acronym for Strengths, Weaknesses, Opportunities and Threats, a technique used to analyze the internal and external environments of an organization in terms of strengths, weaknesses (internal to the organisation), and opportunities and threats (external to the organisation). Under this technique, the Consultant undertook analysis of internal and external environments of the current ICT workforce in the RCIP implementing agencies and target sectors using SWOT analysis. The purpose of the analysis was to establish the key drivers and hindrances to having a highly skilled and knowledgeable ICT workforce in the RCIP implementing agencies and target sectors.

The SWOT analysis was first applied on the results of the desk review, stakeholder analysis and international benchmarking reports. Then, the results of this initial review, formed the basis for a stakeholder-based SWOT analysis to validate, refine and enhance

initial results. The SWOT analysis process was guided by the eight (8) questions that the ***Queensland Government's Workforce Capability and Planning Cycle*** recommends when reviewing an organisation's internal and external environments in relation to its workforce namely:

- What are the organisation's current and future business, work functions and activities?
- What is the required workforce composition and competencies?
- What are the anticipated changes over the planning period?
- How is technology expected to change and how will these changes influence the type and number of jobs available, and the skills and education needed for these jobs?
- What is the impact of current or future government regulations such as the Uganda Data Privacy and Protection Act 2019?
- How is the economy performing?
- What are the sources of competition for attracting people (salary, benefit packages, training and education opportunities, etc.)?
- What other trends may impact the organization such as trends towards outsourcing or restructuring?

ii) ***PESTLE (Political, Economic, Social, Technological, Legal and Ecological) Analysis****:* PESTLE analysis describes a framework of macro-environmental factors used in the environmental scanning component of strategic management. This technique was used alongside SWOT analysis in the study of internal and external environment of the current ICT workforce in the RCIP implementing agencies and target sectors. The purpose of PESTLE is to identify all the various external political, economic, social, technological, legal and environmental factors that might affect an organization/ business for the leadership to assess the risks that the identified factors pose and use that knowledge to develop appropriate strategies.

b) Forecasting future ICT Workforce needs for RCIP implementing agencies and target sectors

Forecasting the future of ICT in the current era of rapidly changing technological advancement world over, is not an easy task. The following trustworthy techniques were heavily employed to achieve the desired ICT forecast.

i) ***Literature review*** was conducted to enhance the Consultant's situation analysis of RCIP beneficiary agencies and target sectors. Guided by the Literature Review Framework, the Consultant reviewed relevant national, regional and international official documents (such as Policies, Laws and Regulations, Strategic Plans and

Reports) and scholarly publications (*see 7. References*) to document the current ICT workforce and forecast future ICT workforce needs of the institutions under study.

ii) ***Key Informant Interviews*** were conducted to aid the establishment of the current (AS-IS) and the desired (TO-BE) state of ICT knowledge, skills and behaviours in the areas of awareness of e-Government Systems and status of the enabling environment; current state of ICT skills and training needs for RCIP implementing agencies and target sectors; and the ICT skills demand and supply patterns. From each RCIP implementing agency and target sector, responses were obtained from Accounting Officers, senior government officials delegated by their Accounting Officers and Board members.

iii) ***Focus Group Discussion (FGD)*** was used for highly specialized and multi-disciplinary fields like health informatics, eLearning and cyber security within the ICT workforce of the RCIP implementing agencies and target sectors to gain information quickly. The designed FDGs tools were specifically applied on the ICT User professionals, comprising top and middle level professionals from the RCIP implementing agencies and target sectors.

iv) ***Scenario planning*** was used to generate narrative statements of the possible future for the ICT workforce in RCIP implementing agencies and target sectors. In undertaking scenario planning, the Consultant considered the following parameters:

- Key ICT workforce segments critical to achieving the visions and missions of RCIP implementing agencies and target sectors***;***
- The behaviours and skill characteristics required by these ICT workforce segments;
- Assumptions about future demand for services; and
- The key segments of the ICT workforce that would be the most costly to lose or would be difficult to find.

c) Gap analysis

Following the future ICT workforce needs forecast exercise**,** the Consultant undertook an analysis of the gap between the current state of capacity of ICT workforce in RCIP implementing agencies and target sectors, and the desired state using the four steps for conducting a gap analysis as recommended by clear Point Strategy[1]. The four steps (customized for this assignment) include:

i) Identifying the current state of the capacity of ICT workforce in RCIP implementing agencies and target sectors;

[1] Conducting a Gap Analysis: A Four-Step Template

ii) Identifying the desired state for the capacity of ICT workforce in RCIP implementing agencies and target sectors;

iii) Identifying the gaps in the capacity of ICT workforce in RCIP implementing agencies and target sectors; and

iv) Devising improvements to close the gaps in the capacity of ICT workforce in RCIP implementing agencies and target sectors.

d) Developing the ICT Skills and Training Action Plan (STAP)

Given the strategic importance of, and the need for ICT STAP in enhancing the uptake and operationalization of e-governance among the RCIP implementing agencies and target sectors, the Consultant employed the following effective techniques in coming up with a comprehensive and responsive ICT STAP.

i) ***Visioning and Strategizing****:* To develop the strategies to address the current gap(s), the Consultant engaged the key institutional and individual actors/stakeholders from RCIP implementing agencies, target sectors, other relevant MDAs, academia and ICT Association of Uganda, to collaboratively formulate the vision and mission for achieving the desired capacity of the ICT workforce and the strategy (ies) for achieving the same in target RCIP implementing agencies and target sectors. The information in the gap analysis report was used to prepare and facilitate the visioning and strategy workshop.

ii) ***Drafting the ICT Skills and Training Action Plan (STAP):*** The Consultant utilized a combination of data from the Situation Analysis, Stakeholder Analysis, International Best Practices, Workforce Profile, future ICT workforce needs forecast, Gap Analysis and the visioning and strategy workshop Reports to provide detailed information that informed the development of the first draft of STAP. The draft covered a brief background/motivation, vision statement, mission statement, core values, situation analysis, goals, activities and deliverables. To facilitate easy implementation as well as monitoring and evaluation of STAP, the Consultant developed and included an implementation plan in the STAP. The implementation plan provided a tabulated summary of the STAP covering strategic goals, activities, methods, deliverables, lead organization, timeline, cost and performance indicators to support the implementation as well as monitoring and performance measurement of STAP.

e) Implementation strategies: Under this step, the Consultant developed an implementation strategy for the gaps in the current and future workforce needs covering Execution of the strategies;

Execution of strategies covered specifying what is needed to put into action the developed ICT workforce skill improvement and development strategies based on fundamentals of good HR and project management practices. Examples of such practices included but were not be limited to:

i) Ensuring organisational buy-in and support is obtained as executive level support for the workforce strategies is vital;

ii) Clarifying roles and responsibilities in implementing strategies and actions. This includes identifying who is involved in implementing what; and where coordination among different parts of the agency or with different agencies is needed;

iii) Developing project plans for the implementation of each workforce strategy. This also involves establishing budget and resource requirements, timelines and milestones for key deliverables and stages;

iv) Allocating the necessary resources and teams required to implement the workforce strategies;

v) Determining performance measures, success indicators and reporting systems; and

vi) Developing communication plan to inform all employees of the strategies to be implemented; what has been done, why and how it was developed, how and when it will be applied and how it will affect staff.

f) Monitor and evaluate: Successful workforce planning/development and implementation of an action plan is an active, ongoing and dynamic process that must be monitored and adjusted in the course of the implementation process. Hence, the Consultant developed a monitoring and evaluation plan to support regular monitoring and review of the developed workforce development plans/strategies in order to:

i) To track any internal or external developments and make essential changes when environmental factors change;

ii) Regularly monitor demand and supply data to track progress towards achieving workforce planning goals like age profile of the workforce, the turnover rate, gender profile of applicants, quality of applicants, etc;

iii) Review performance measurement information;

iv) Assess what is working and not working; and

v) Identify and address new workforce and organizational issues that might occur.

The first draft ICT Skills and Training Action Plan (STAP) was presented to the PIT comprising technical representatives of MoICT & NG and NITA-U for internal validation. This was followed by revision of the first draft based on the feedback received, to produce the second draft. The Consultant then organized and presented the second draft to the senior management team of MoICT & NG in a validation workshop.

The deliverable of this activity was an **approved ICT STAP** detailing recommendations of how the identified Gaps would be addressed for the broad categories of public officers

including political and technical leadership, Managers of ICT Departments/Units, ICT Project Officers, and other ICT and non-ICT staff within the RCIP implementing agencies and target sectors.

2.6.5 Final Reporting Phase

Finally, the Consultant produced and submitted a comprehensive **Final Report (This document)** in accordance with the objective of the assignment and the ToR. The Final Report includes all deliverables and documents already submitted to the Client and details all findings and analyses for phases 1-3 above and an Action Plan detailing how the identified ICT skills and training gaps may be addressed for the broad categories of public officers, including but not limited to political and technical leadership, Managers of ICT Departments/Units, ICT Project Officers, and other ICT and non-ICT staff within the RCIP implementing agencies and target sectors.

2.7 Assignment 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.

viii) The Consultant lost one of the original members of the consulting team (Mr. Grace William Maiso, Skills Development & M&E Specialist). May his soul rest in eternal peace!

ix) Some members of the consulting team suffered from COVID-19 pandemic, which slowed down the team progress, hence some of the delays experienced on the project.

2.8 Core Consulting Team

In our quest to provide quality service, we deployed a team with a reinforcing blend of knowledge and expertise in the sector and subject matter to undertake the assignment. Below are details of the team:

- Mr. Henry Tumusiime-Senior Capacity Building Expert/Team Leader
- Mr. Frederick Anyine- Institutional Development Specialist/Alternate Team Leader
- Dr Drake Patrick Mirembe -ICT Expert
- Mr. Joreme Ojulun-Manpower Planning Expert
- Ms. Anita Komukama-Skills Development & M&E Specialist

2.9 Report organization

This report is organized in seven (7) main sections as outlined below:

Section one presents **introduction** to the assignment, specifically highlighting the assignment title, parties to the contract and procurement reference number. It also acknowledges various contributors of data and information that enabled successful delivery of the contract.

Section two presents **background and context to the assignment**, including justification, objectives, key tasks, scope, deliverables, challenges and limitations; core consulting team; and approach and methodology for the assignment.

Section three presents **detailed findings** from stakeholder consultations and ICT STNA.

Section four presents **conclusions and key recommendations** from ICT STNA.

Section five presents **ICT STAP**, with specific focus on the key drivers of change (also known as thrust for the development of ICT STAP), and strategic objectives, strategies and strategic actions.

Section six presents **ICT STAP implementation**, with specific focus on implementation of ICT Skills and Training Strategic Actions and Financing Plan for ICT STAP.

Section seven presents **Monitoring, Evaluation and Learning (ME&L) Framework for ICT STAP Implementation**, with specific focus on the Guiding Principles of ICT STAP ME&L Framework, ME&L Framework for ICT STAP, and Reporting and Dissemination Plan for ME&L Products.

3.0 DETAILED FINDINGS

This section detailed overall findings from the AS-IS (current) landscape assessment and TO-BE (desired) state of RCIP implementing agencies and target sectors. It also documents problems/gaps that cannot be addressed through ICT skills and training interventions.

3.1 AS-IS (Current) Landscape Assessment of RCIP Implementing Agencies and Target Sectors

This section presents the state of ICT skills Continuing Professional Development (CDP) in 3.1.1, ICT staffing structures and capacities in 3.1.2, the current state of ICT skills, knowledge and behaviors in the target RCIP MDAs in 3.1.3, adequacy of ICT professionals in key MDAs in section 3.1.4.

3.1.1 State of Continuing Professional Development (CPD)

a) Availability of Annual ICT Training programmes

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 4** below:

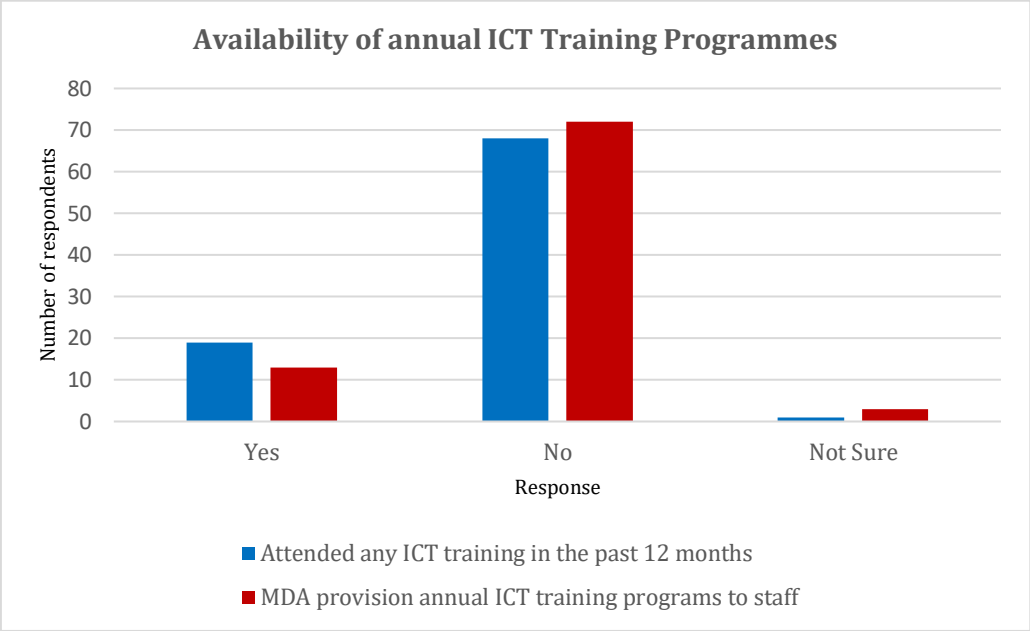


Figure 4: Provided or attended ICT Training in the last 12 Months

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 5** below:

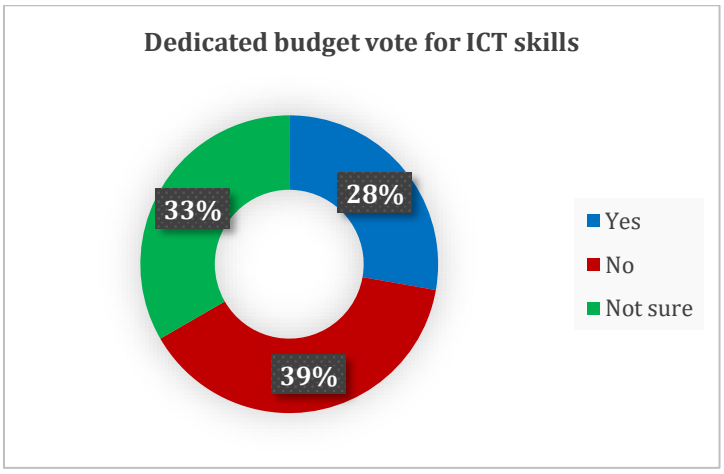


Figure 5: Availability of dedicated ICT skills development budget vote

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 6** below).

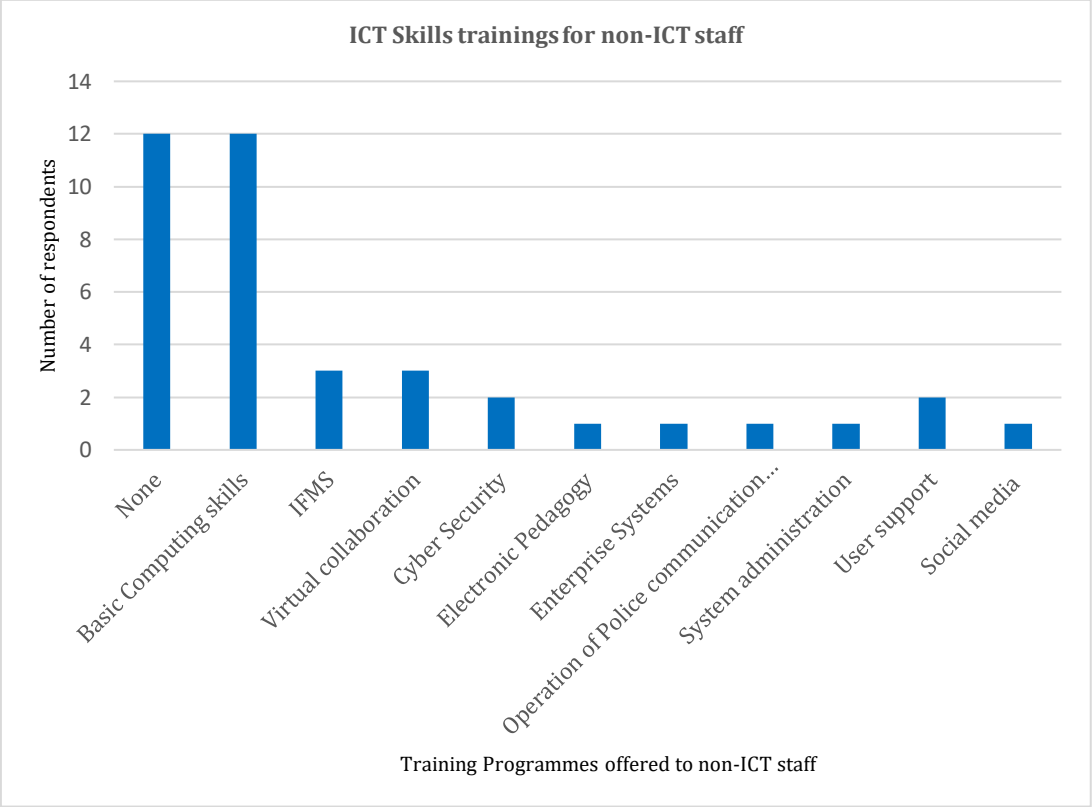


Figure 6: Types of ICT training programmes offered to non-ICT staff in last 12 months

Figure 7 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:

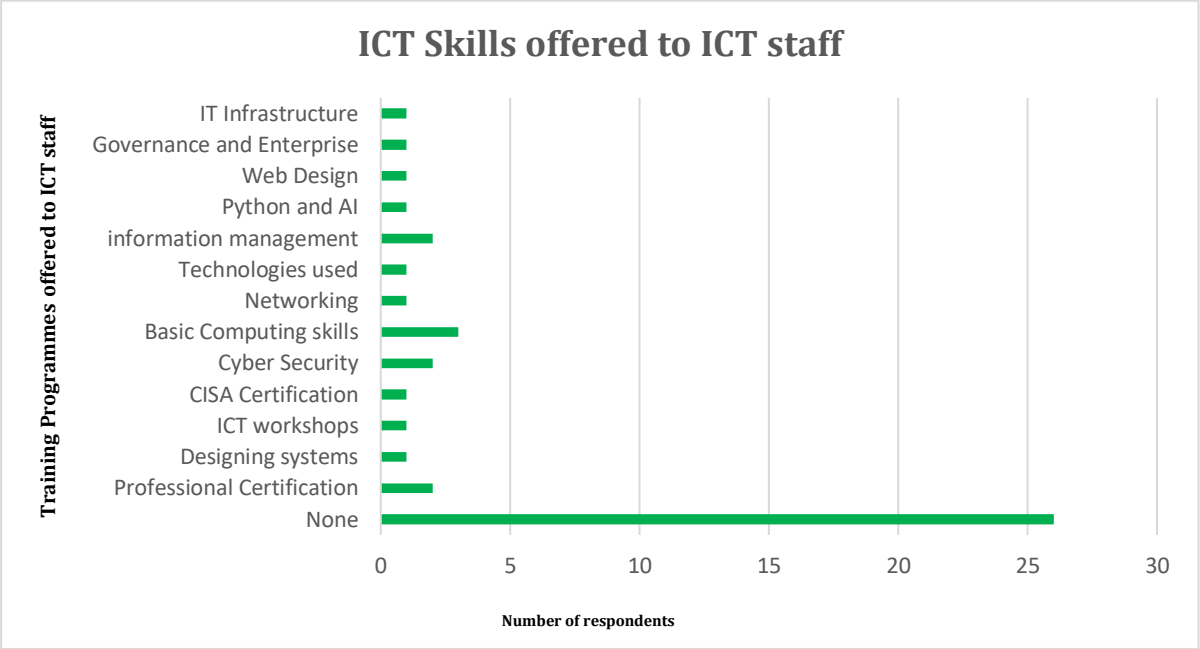


Figure 7: Types of ICT training programmes offered to ICT staff in last 12 months

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 8** 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:

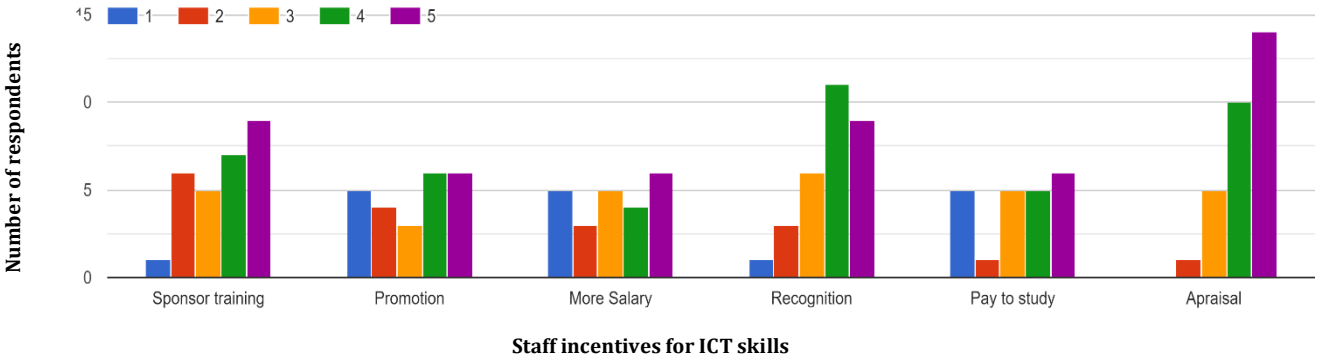


Figure 8: Incentives for ICT skills Development to MDA staff

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

3.1.2 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 Units 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 3** 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 3: ICT Cadre Staffing levels in RCIP target organizations

These findings are comparable to the 2017/2018 National IT survey results (shown in **Figure 9** below) 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 posses entry level grade of ICT skills.

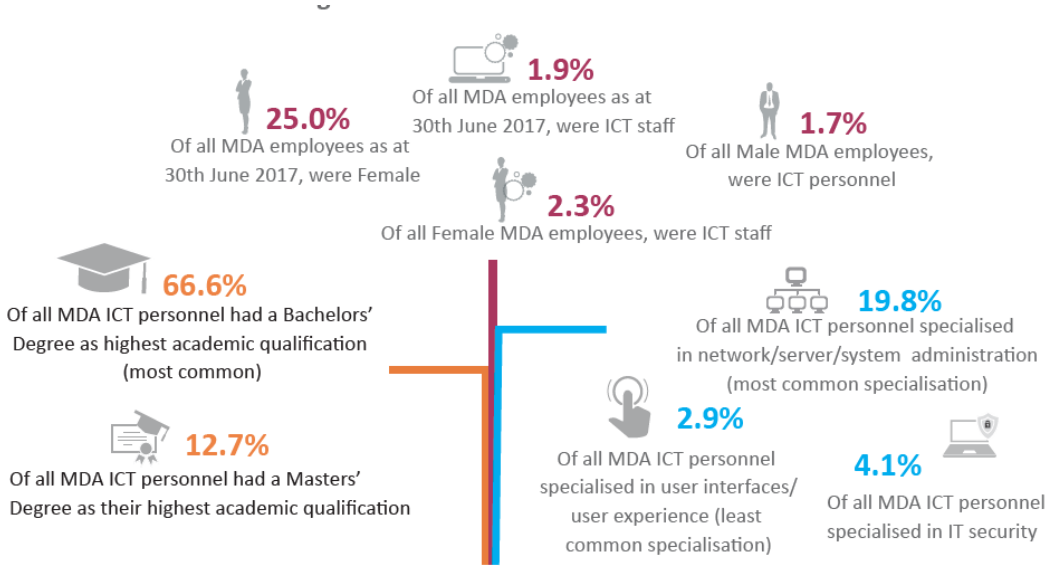


Figure 9: ICT workforce in MDAs at a glance (source: National IT Survey 2017/2018)

3.1.3 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, communicaction, 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 4** below:

Category	Cadre	Variable	Frequency	Percentage (%)
Policy level	Permanent Secretaries, Directors, Commissioners and Board Members	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, Commissioners and 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

Category	Cadre	Variable	Frequency	Percentage (%)
		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
		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

Table 4: 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 10** below:

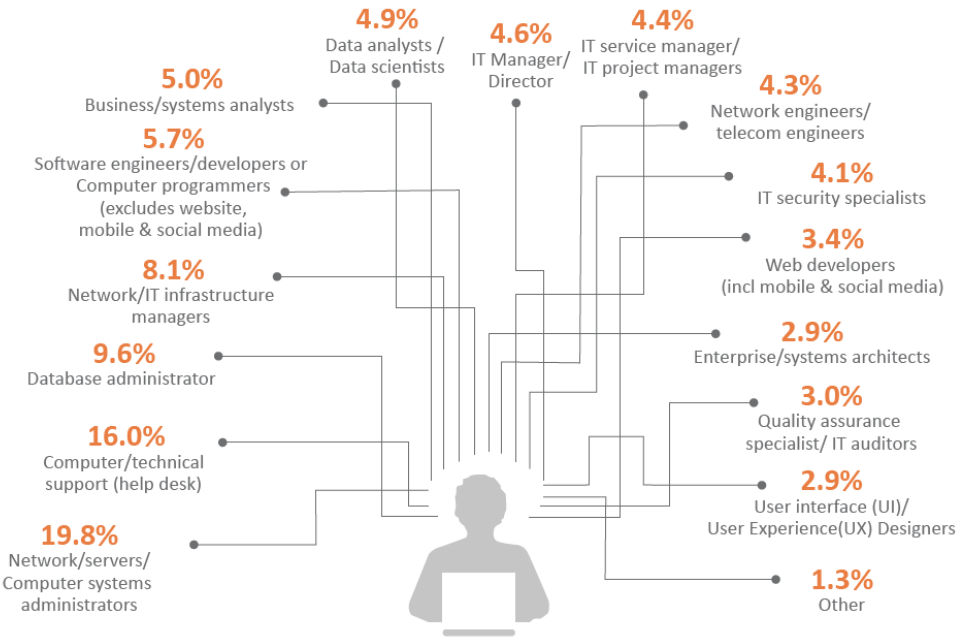


Figure 10: Specializations of ICT employees across MDAs (Source: National IT survey

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 11** below:

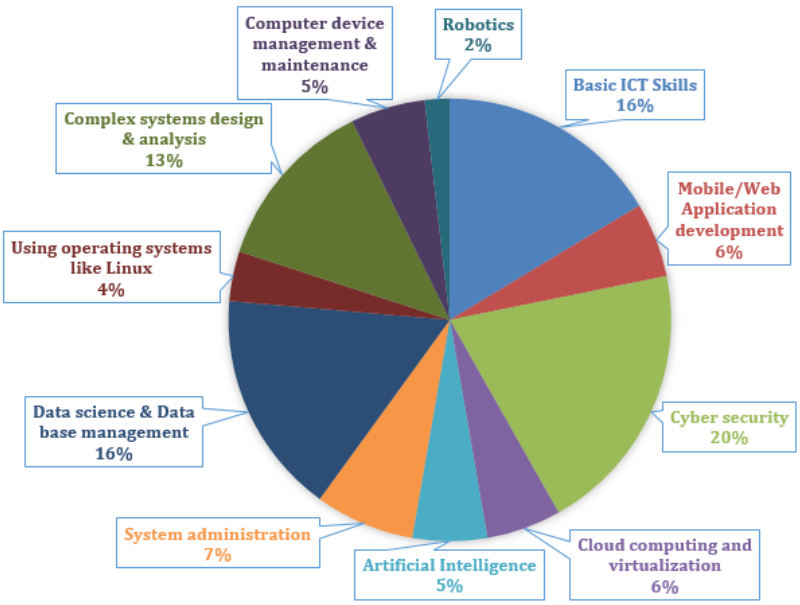


Figure 11: Skills new ICT professionals lack the most

A surprising finding was that of ICT professionals lacking basic ICT skills especially office applications. A key informant mentioned that 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 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 5** below:

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

Table 5: 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 6** below highlights the results of thematic content analysis:

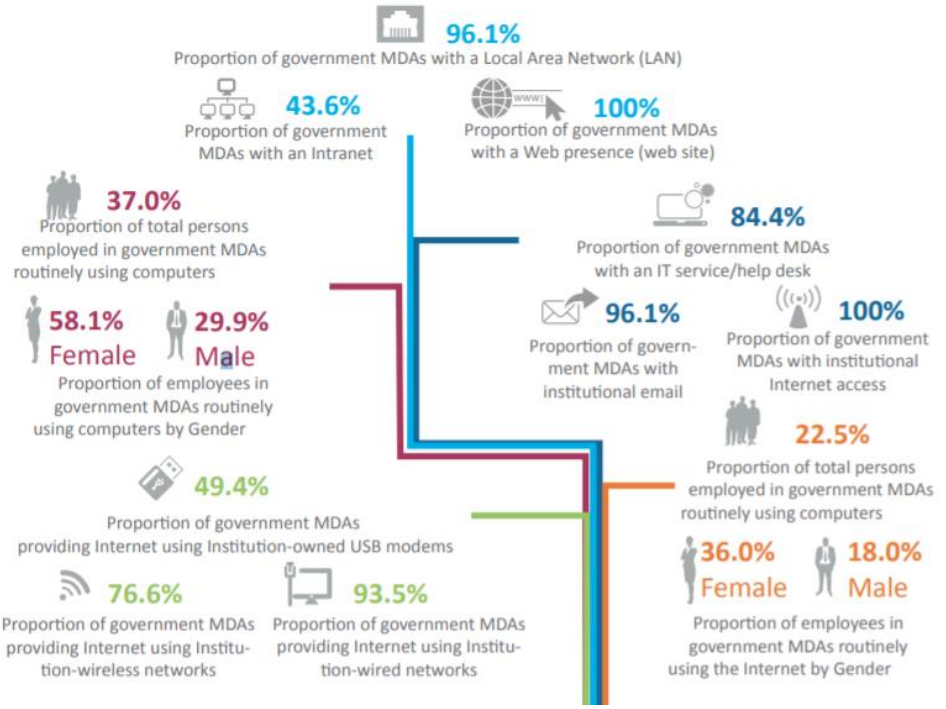
E-Government Pillars	Frequency	Percentage (%)
Institutional framework	5	13.9
Common ICT Infrastructure and shared Services	7	19.4
Legal and regulatory framework	6	16.7
Identified priority e-government applications and services	3	8.3
E-government skills development	10	27.8
Communication and advocacy	5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

Table 6: 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 12** below:

Figure 12: 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 13** 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 an 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)*

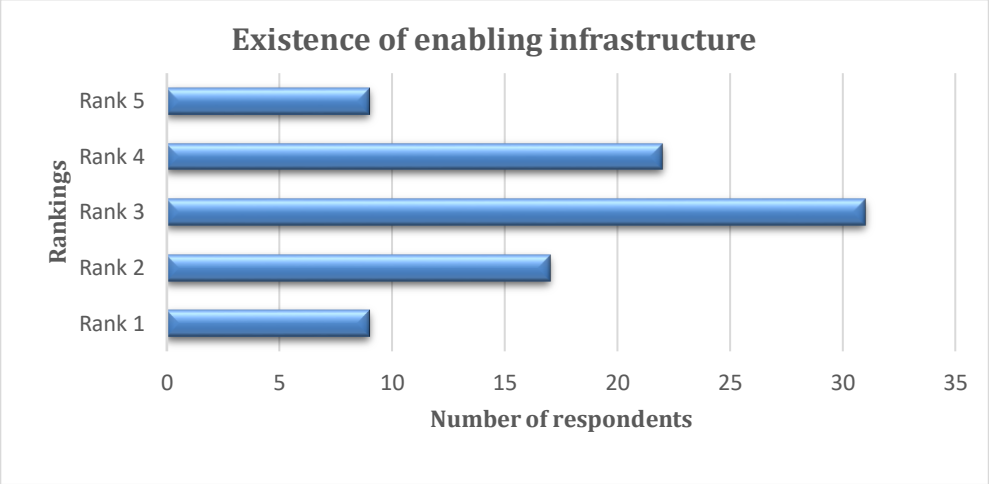


Figure 13: Existence of Enabling Infrastructure

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 then fully embrace ICT systems"

e) Proficiency in key computer applications

Figure 14 below highlights the different proficiencies in key computer applications for ICT and non-ICT staff in the RCIP implementing agencies and target sectors.

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*

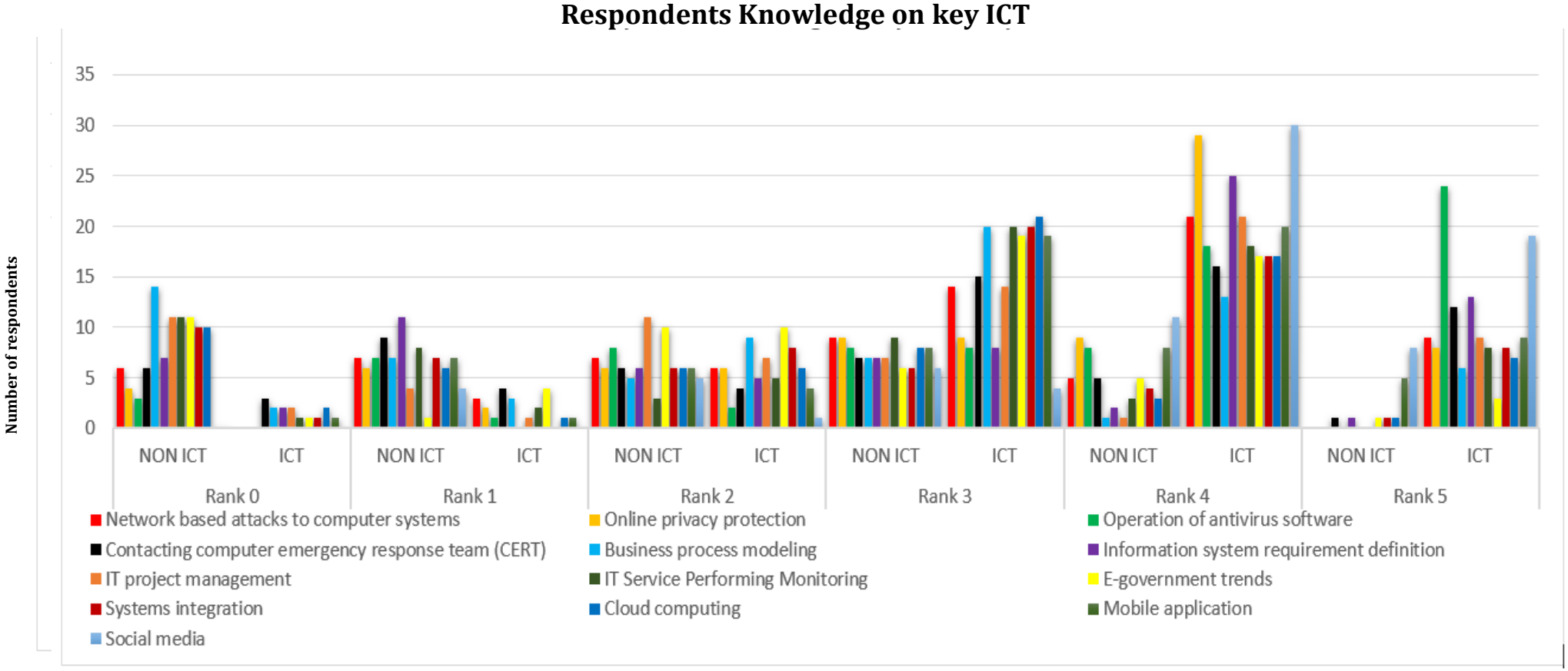


Figure 14: Staff knowledge in key ICT Concepts

f) 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 15** below:

Day today employee work place behavior

Figure 15: Key ICT workplace behaviors among staff of target MDAs

g) 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 16** below:

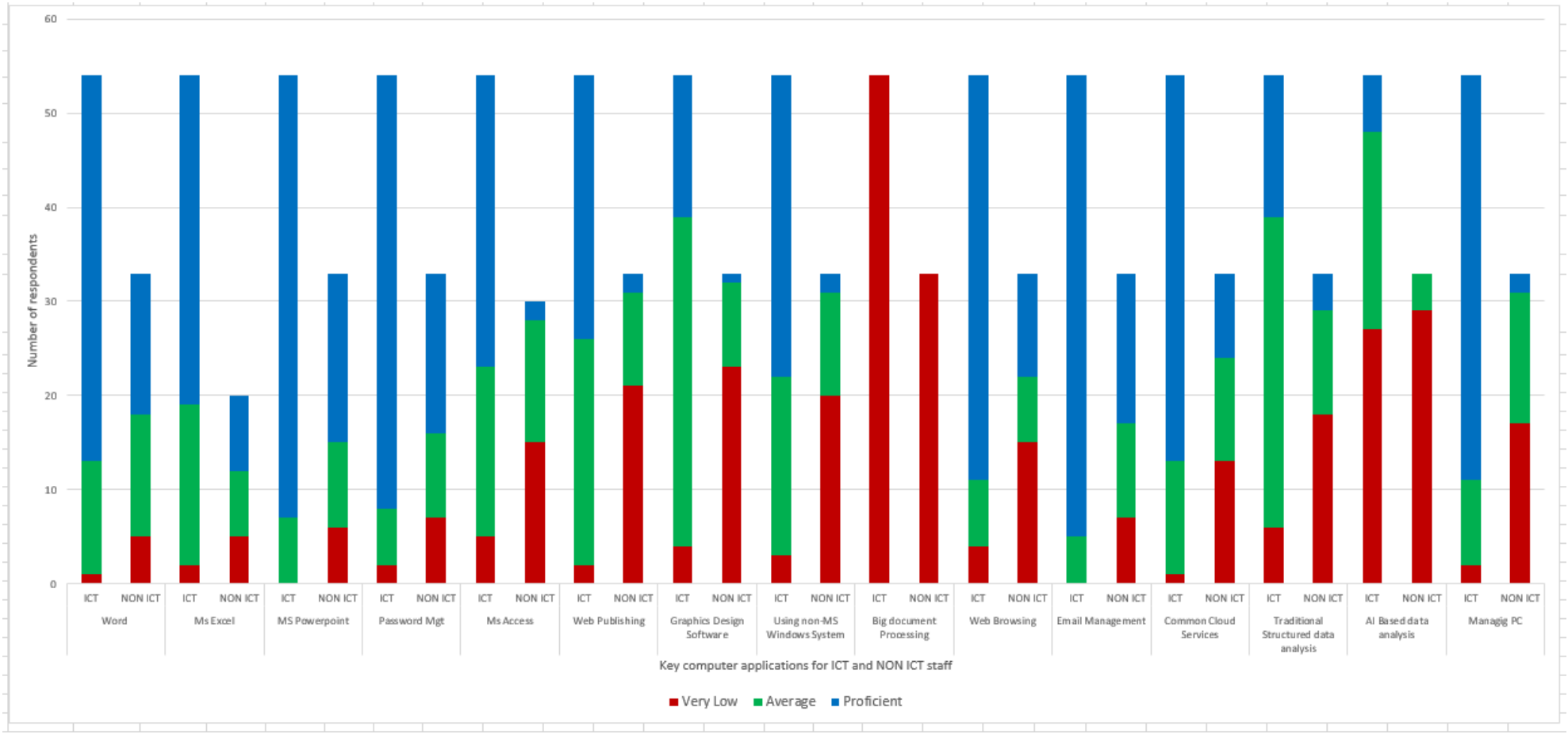


Figure 16: Proficiency in key computer applications by staff in RCIP MDAs

3.2 TO-BE (Desired) State for RCIP Implementing Agencies and Target Sectors

This section presents the desired state of ICT skills and Training needs. In sub-section 3.2.1, results of the international best practices and skills mapping are presented and discussed. Sub-section 3.2.2 presents the desired ICT skills and knowledge in the target MDA from the lens of stakeholders and international best practices. Sub-section 3.2.3 discusses the desired employee behaviors as far as use of ICT's is concerned. Sub-section 3.2.4 presents the desired/ideal practices of recruitment and management of ICT professionals. Sub-section 3.2.5 presents and discusses supply side analysis.

3.2.1 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:

- 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
- Political stability rank
- Level of literacy
- Recruitment and management of ICT professionals in Government
- Legal and regulatory environment
- Maturity of the fourth estate (literacy levels, Media, Diversity, and Content Manipulation)
- Approach to digital skilling in government
- ICT Skills supply side
- Stakeholder participation in curriculum development
- Pedagogical approaches used
- Status of eLearning
- Funding for ICT skills development

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

Category one: Internationally recognized leading countries in e-Government and ICT development have been highlighted and discussed as shown in **Tables 7 – 9** 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 laws pertaining to specific industry sectors. - The general data protection Law: the collection and processing of personal data is governed by the Personal Information Protection Act 2011 *(that has just recently been amended and effected on 5th May 2020)* - Most notably for special laws in the Use and Protection of Credit Information Act 2009; regulating handling of personal data. Data protection and regulatory authorities have also issued various guidelines related to the protection of personal data.	Assurance of privacy and data protection, enhances uptake for ICT services by the citizens
Global ICT Development Index (IDI),	As of 2017, South Korea ranked 2nd 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	The higher access to internet is directly linked to ICT skills development

Elements	Status	Observations and Remarks
	Broadband Convergence network (BCN) in 2004 that even connects the remotest areas.	
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 2nd among the 17 economies in South East Asia, East Asia and Oceania and ranked 10th 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.	Innovation and a robust support towards research and development have boosted ICT in South Korea. 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
E-Government Development Index (EDI) rank	South Korea has the most effective e-governance in Asia and ranked 2nd out of the 193 UN member states; at a e-governance development index of 0.956 (right after Denmark that ranked 1st with an index of 0.976)	The ability to provide government services through the internet presents a 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 (*including 90,000 jobs in business start-ups*) in different ICT themes and innovations and will also drive the national informatization project that	This is a priority in the ICT sector planning and adequate resources have been allocated to this; a key push to its success.

Elements	Status	Observations and Remarks
	is introducing technology in a variety of sectors (agriculture, traditional markets and in small and medium sized businesses[2].	
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[3]. Broadcasters have to promote public interest. The "media law" consists of two structures: Business regulation and content related regulation. They emphasized fairness among the broadcasters and freedom of expression for each.	There is freedom for expression by the Fourth Estate but strict laws about how content is relayed to the public
Approach to digital skilling in government	Schools have integrated ICT at all levels of the school system to foster "21st 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	Generally, curriculum development on South Korea is a collaborative	Each of the stakeholders engaged in curriculum

[2] "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

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

Elements	Status	Observations and Remarks
curriculum development	process that involves are critical stakeholders including; Academia, private sector and government. The programmes are aligned to industry demands and government development agenda.	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: - The first master plan (1996-2000); focused on establishment of a world class ICT infrastructure in elementary and secondary schools - 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. - The third and most recent master plan (2006-2010) has been focused on the creation of sustainable learning Yenvironments with U-learning and future education through more flexible and secure educational services such as the development of digital text books[4]	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.
Status of eLearning	As a result of policy change and increased resource outputs, the first stage towards *Developing ICT use in Education* 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-	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.

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

Elements	Status	Observations and Remarks
	learning projects, such as EBSi or Cyber Home Learning System (CHLS) – hence a sound environment for effective e-learning implementation[5]	
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 7: International benchmarking findings for South Korea

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.

[5] 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.

b) Estonia

Elements	Status	Observations and Remarks
Per capita 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 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	"The 2020 ranking of the 193 UN Member States in terms of digital	Estonia understands the advantages that go hand in

Elements	Status	Observations and Remarks
Index (EDI) rank	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"[6]	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 regulatory environment (key laws and regulator reputation)	The main regulatory bodies for the ICT sector are the Technical Regulatory Authority (TRA) and the Competition Authority.	Estonian law today is 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	

[6] https://www.un.org/development/desa/publications/publication/2020- united-nations-e-government-survey

Elements	Status	Observations and Remarks
	and forecasting skill demands. The government also launched a lifelong learning strategy (*The Estonian Lifelong Learning Strategy 2020*) to "provide all Estonian people with learning opportunities that are tailored to their needs and capabilities throughout their whole lifespan"[7].	
ICT Skills supply side	Admission to appropriate specialties in universities has been extended to decrease the labour shortage in the ICT sector. Programmes 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 Parliament sets national standards and establishes principles of education funding, state supervision and quality assessment. While most pre-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 programmes 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.	Each of the stakeholders engaged in curriculum development are working towards ensuring Estonia's 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.	Having a Government managed lifelong strategy ensures ICT is constantly being integrated in the education system; with a high

[7] OECD Skills Strategy 2019; Skills to Shape A Better Future, 2019 - Estonia

Elements	Status	Observations and Remarks
	In 2001, Estonia was one of the first countries to classify internet access as a human right.	affinity for innovation
Status of eLearning	Estonian Schools routinely use digital study materials including a platform of digital books called *Opiq* and electronic school management systems such as *eKool,* 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 8: 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 lifespan"[8]. 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

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

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 capita income	Australia (as of 2021) has been ranked the 12th largest national economy by GDP[9] and the 18th 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 Index (IDI)	On the global connectivity index, Australia stands at position 14 of the top 30 countries as ranked by the ICT Development Index in 2017[10] with a value of 8.24	
Access to internet *(Internet penetration level)*	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. The number of internet subscribers is slowing down from recent years suggesting the market is close to saturation. However, the amount of data	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. However, plans need to be put in place to attract more subscribers for the internet.

9 "GDP ranking". *World Bank Open Data*. World Bank. 25 April 2019. Retrieved 13 May 2019.

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

Elements	Status	Observations and Remarks
	current users are consuming continues to outgrow the number of subscribers[11].	
Percentage of population using the top 5 social media platforms	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. Social media penetration is at 71%. For each Australian social media user, 1 in every 3 minutes is spent on social media pages. Every month (as of January 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%)	Australians are active users of social medial with almost half the population having a Facebook account.
Global Innovation Index (GII) rank	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. 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.	Australia's political and regulatory environment is strong and readily willing to work on the existing shortcomings. 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).
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)[12].	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

[11] Australian Internet Statistics, 2021; Prosperity Media Australian Internet Statistics [Updated 2021] - Prosperity Media

[12] www.statista.com/statistics

Elements	Status	Observations and Remarks
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[13]. 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[14].	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[15].	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 reputation)	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 currently the same person as the privacy commissioner) and both are in the Office of the Australian Information Commissioner (OAIC).	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 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[16]. The media are a key element in	The media plays a critical role in production and distribution of content which is key in stimulating digital literacy and skills development.

[13] www.theglobaleconomy.com/Australia/wb_political_stability/
[14] 10 Most Politically Stable Countries Ranked by Perception by Kaia Hubbar; April 13th 2021
[15] The Survey of Adult Skills "Education GPS, *OECD*, 02/06/2021, 12:19:37 http://gpseducation.oecd.org"
[16] Two Cultures: Parliament and Media by Julianne Schultz, December 2002

Elements	Status	Observations and Remarks
	showcasing parliamentary debates and proceedings and have the mandate to do this.	
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 programmes[17] 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[18] 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. Technology use and application skills have been ranked 4th (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	There is a general appreciation of the need to have a well skilled workforces as Australia's digitalization is fast growing.
Higher education system status in Australia		
Elements	**Status**	**Observations and Remarks**
Stakeholder participation in	The Australian Curriculum is developed by Australian government (Education	Stakeholders in various themes are well represented

[17] Victor Gekara et. al, 2019: Skilling the Australian Workforce for the Digital Economy, NCVER, Aldelaide
[18] Cross sector projects | Australian Industry Skills Committee (aisc.net.au)

Elements	Status	Observations and Remarks
curriculum development	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. Curriculum and teacher reference groups are formed during curriculum reviews and tasked with providing feedback.	in the processes of planning and budgeting and implementation of ICT curriculums.
Pedagogical approaches used	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. 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: - 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.
Status of eLearning	More institutions in Australia are offering online courses with an increase in the number of intakes. 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	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

Elements	Status	Observations and Remarks
	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 Australia government has developed strategies and policies that back-up and support e-learning[19].	
Funding for ICT skills development	Funding and grants are managed under the Department of Education Skills and Employment. The Australian budget 2020/21, has laid out *the commitment to fund skills development in schools and higher institutions of learning and ensuring the Australian workforce is well equipped for ICT development*.	Commitment by government to fund the ICT skills development ensures sustainability of the ICT programmes in institutions of higher learning.

Table 9: 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.

Category two: **Tables 10 – 12** highlight findings from sub-Saharan countries that are economically and socially comparable to Uganda, but have been documented as performing well on ICT development.

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

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 the 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 multi-national 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: - 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 (2.36%)	There is a clear enjoyment of digital rights

Elements	Status	Observations and Remarks
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, and Content*	Under Mauritian Law, press freedom gives journalists a right to obtain information from private sources on a voluntary basis only. The press cannot compel citizens to	Media freedom in Mauritius, experiences some levels of restrictions. Freedom of expression is governed by a law which requires the citizens to

Elements	Status	Observations and Remarks
***Manipulation*)**	release information about themselves which they are unwilling to disclose. The *Mauritius* Broadcasting Corporation (MBC) is the national public broadcaster that provides 17 *television channels* in *Mauritius*, 4 in Rodrigues and 2 in Agaléga and 7 *radios*	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 programmes. In addition, 192 Bachelor programmes at 31 universities, 65 Master programmes at 18 universities and 4 PhD programmes 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	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

Elements	Status	Observations and Remarks
	necessary ingredients in fostering e-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	ICT infrastructure in the 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 10: 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	The existence of the Kenyan Data Protection Bill permits effective application of ways to protect data

Elements	Status	Observations and Remarks
	or consent from the data subject. Other 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 multi-national 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	Kenyans 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 Snap Chat 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	Kenya's gradual growth in literacy rates facilitates uptake,

Elements	Status	Observations and Remarks
	the male literacy rate is 84.99%, it is 78.19% for females. In comparison with other countries Kenya is number 106º in the ranking of literacy rate. Kenya's literacy rate has increased in recent years.	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	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 numbers 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 - 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
Elements	**Status**	**Observations and Remarks**
Stakeholder participation in curriculum development	In Kenya, the 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 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 11: 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 capita 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
	Ghanaian 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 enjoys 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 Ghanaian Curriculum is developed by Ghanaian government (Education Council). Reviews of the curriculum involve extensive consultation and engagement with key stakeholders (subject matter experts including teachers, school leaders, curriculum	Stakeholders in various themes are well represented in the processes of planning and budgeting and implementation of ICT curriculums.

Elements	Status	Observations and Remarks
	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. 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: - 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 Ghanaian 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[20].	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 Ghanaian Government has *committed to funding skills development*	Commitment by the government of Ghana to fund the ICT skills development ensures sustainability of the ICT programmes in

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

Elements	Status	Observations and Remarks
	in schools and higher institutions of learning and ensuring the Ghana workforce is well equipped for ICT development.	institutions of higher learning.

Table 12: International benchmarking findings for Ghana

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 capita income means Ghanaians 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 **Table 13** below:

Elements	Status	Observations and Remarks
Per capita income	Stands at 860.00 USD by Nov, 2020 with one of top ten fastest growing economies in Africa at an average annual rate of 6.3%	Having one of the fastest growing economies presents a promising future where Ugandan citizens will be able to spend more in internet and ICT services. 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)
Data protection and privacy ***(Helps with enforcement of key ICT security behaviors)***	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.	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. Ensured data privacy, lays a foundation for cyber security and thus elicits confidence of the citizens in ICTS. The ICT Sector needs to tap into this advantage
Global ICT Development Index (IDI),	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. On the global connectivity index, Uganda stands at 77 position of the 79 countries profiles, behind Kenya at 70 and Ghana at position 72.	Uganda has one of the fastest expanding ICT sectors, signaling the increasing access to the internet and associated services. For MoICT & NG and NITA-U expansion of the ICT services to meet this rapid growth is paramount to avoid being overtaken by events.
Access to internet ***(Internet penetration level)***	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	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.

Elements	Status	Observations and Remarks
	of the total population that uses the internet. 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 international bandwidth	There is need for the ICT sector to keep up to its task to avoid the risk of being overtaken by events
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-U, 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	The disparity in literacy rates presents a critical challenge

Elements	Status	Observations and Remarks
	76.53% with the male literacy rate at 82.66% and females at 70.48%.	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 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. Management of the ICT professionals is housed in the MoICT & NG	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 recruitment processes to ensure uniform standards across the board.
Legal and regulatory environment	The main regulatory bodies for the ICT sector are the Uganda Communication Commission and NITA-U.	The legal regulatory framework is well articulated. The responsible entities (UCC and NITA-U) need to strengthen the enforcement muscle
Maturity of the fourth estate, literacy levels (*Media, Diversity, and Content Manipulation*)	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.	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
Approach to digital skilling in government	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.	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	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	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

Elements	Status	Observations and Remarks
	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 form these institutions.	of higher learning. There is need for convergence at curriculum design.
Higher education system status in Uganda		
Elements	**Status**	**Observations and Remarks**
Stakeholder participation in curriculum development	National Curriculum Development Centre (NCDC) under Ministry of Education and Sports 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. Uganda National Examinations Board (UNEB) is responsible for the assessment and evaluation for achievements of learning institutions.	ICT requires a multi-stakeholder governance framework and not only to be left to the Ministry of Education to manage. There is need for the employing industry to play a pivotal role in curriculum development process for higher institutions of learning.
Pedagogical approaches used	The use of ICT has been taking place in higher institutions of learning and secondary schools so far. Equipping Ugandans with technological skills is considered as a basic need in Education by the current government. 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 drive[21] Also, digital competency; especially	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.

[21] The Republic of Uganda, 2012

Elements	Status	Observations and Remarks
	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 repetition[22].	
Status of eLearning	The Uganda government approved a policy that integrates ICT into the education curriculum for primary and secondary schools. From a national point of view, current e-learning developments are in their infancy stages due to limited ICT infrastructure and lack of resources that have an impact on e-learning[23].	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.
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 *National Education Management Information System (NEMIS)* 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 13: 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

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

[23] Kahiigi, Evelyn & Ekenberg, Love & Hanson, Henrik & Danielson, Mats & Tusubira, 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.

access to the internet and associated services, critical to the full operationalization of e-government and enjoyment of digital rights.

A few challenges, however were sieved out that 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.

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 ensure 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 14 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
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

Country	Good Practice	Lessons Learned
	Total promotion of internet access as a human right	-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.
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.

Country	Good Practice	Lessons Learned
		-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 14: A summary of International best practices and lessons learnt for Uganda

3.2.2 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 17** below).

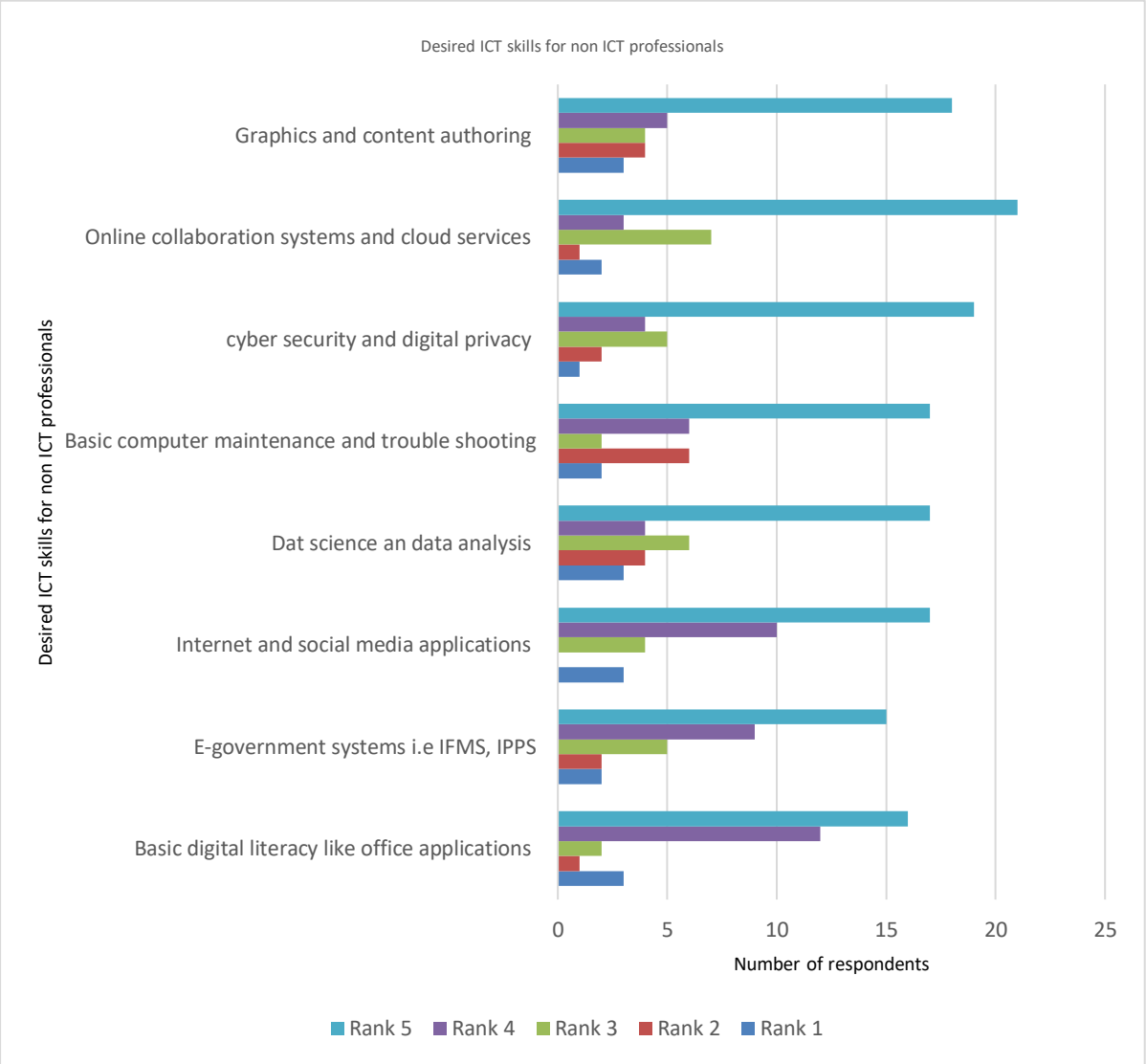


Figure 17: Desired ICT skills for non-ICT professionals

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 18** 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"*

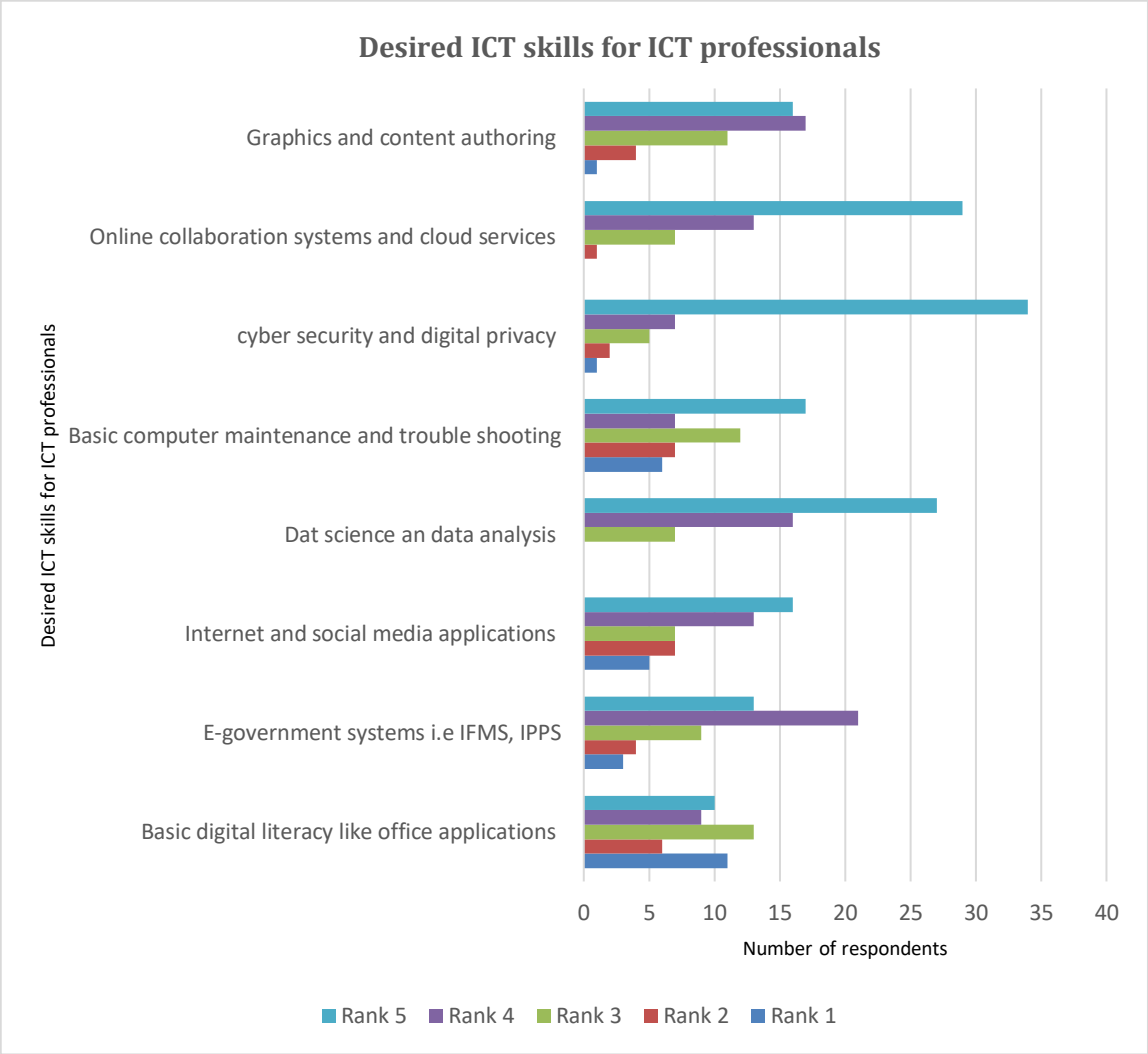


Figure 18: Desired ICT skills for ICT professionals

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 programmes 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)

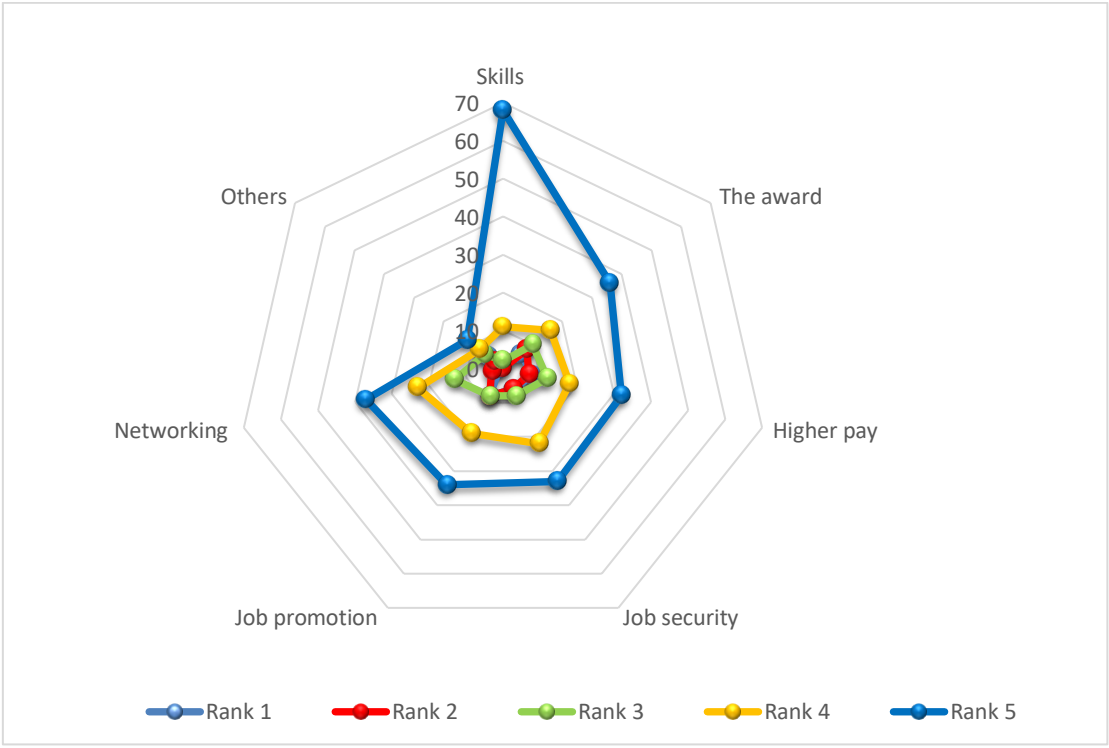


Figure 19: Factors that motivate employees to acquire digital skills

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*).

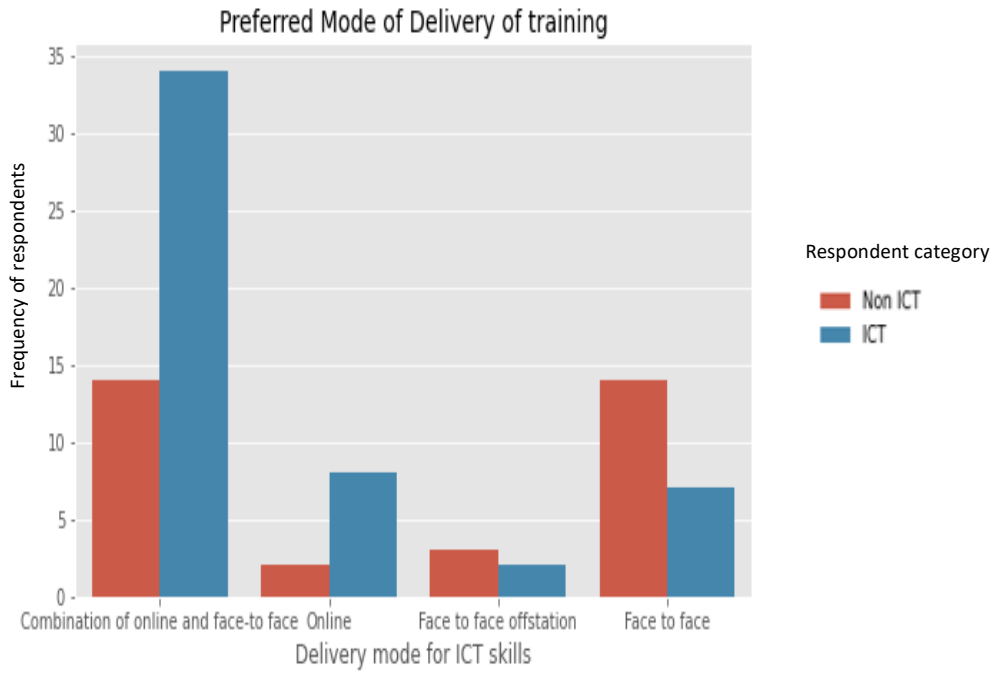


Figure 20: Preferred mode of delivery of digital skills training by staff in MDAs

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 21** below:

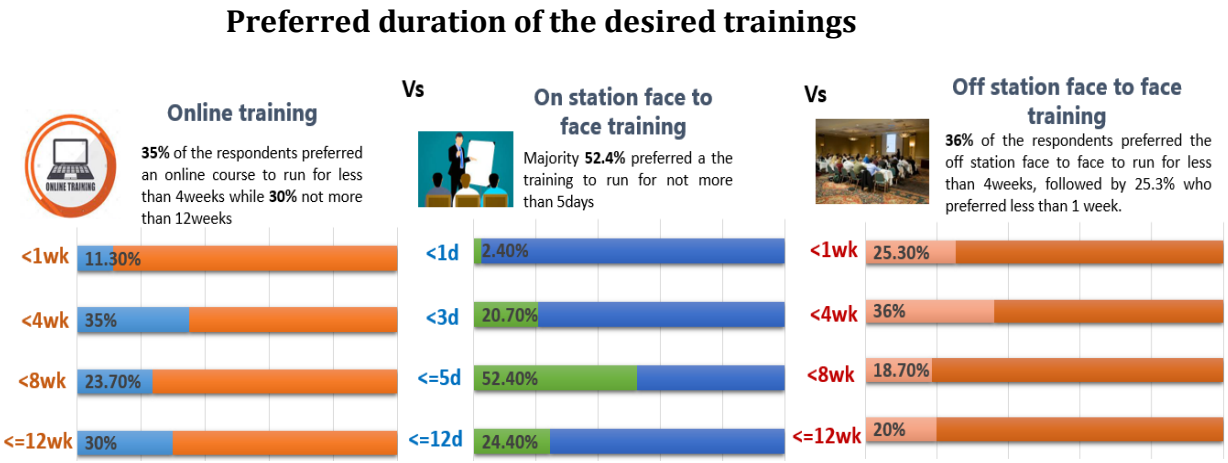


Figure 21: Preferred duration of digital skills training programmes by staff in MDAs

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 22** below:

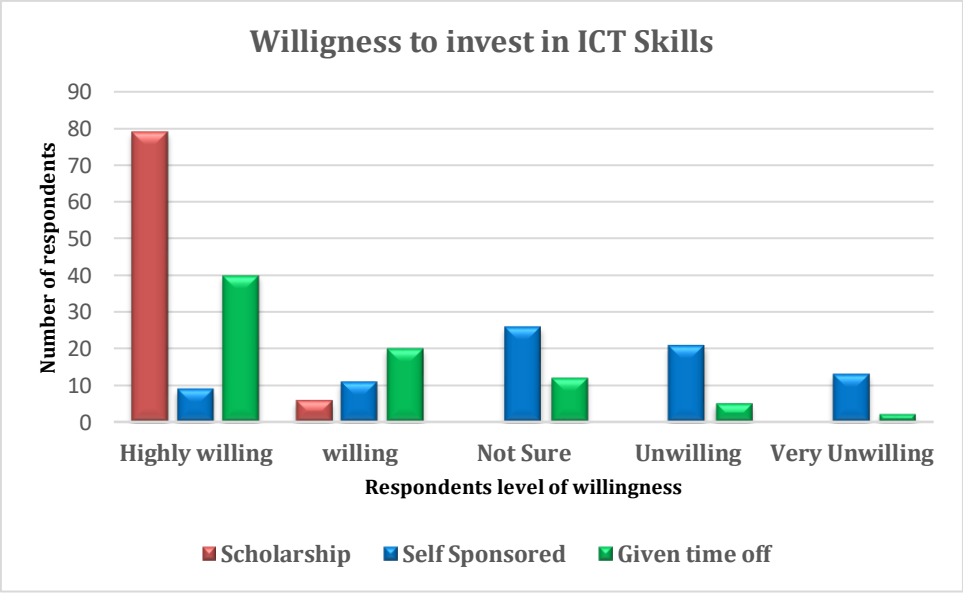


Figure 22: Willingness to invest in digital skills development by staff of MDAs

3.2.3 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 23** below:

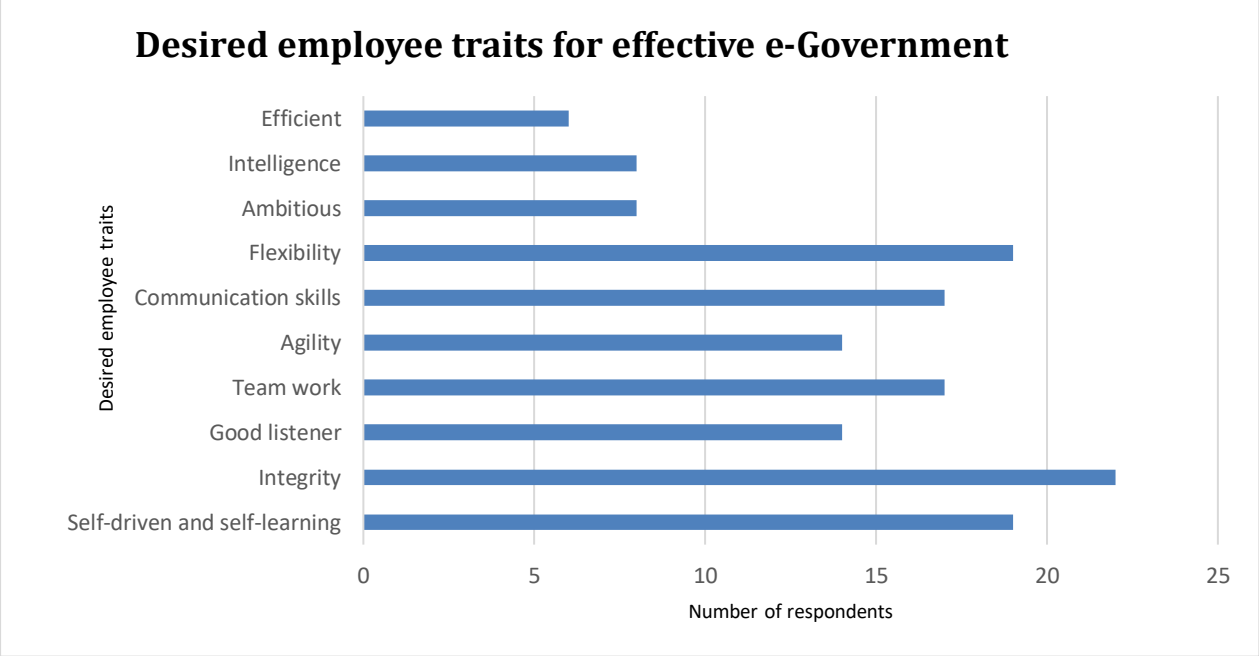


Figure 23: Desired Employee traits for effective e-Government

The word cloud below summarizes all the above responses (**Figure 24**) 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 24: Word Cloud of Responses

3.2.4 Recruitment and Management of ICT Professionals

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. Public Service Commission, Education Service Commission, Health Service Commission Judicial Service Commission, Uganda Police Authority and Uganda 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 25** 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 regard to how ICT professionals should be managed, a big number (44%) of respondents preferred that each MDA manages its own staff with guidance from MoICT & NG and MoPS, followed by MoICT and NG (36%) and lastly, MoPS (19%) (**Figure 26**).

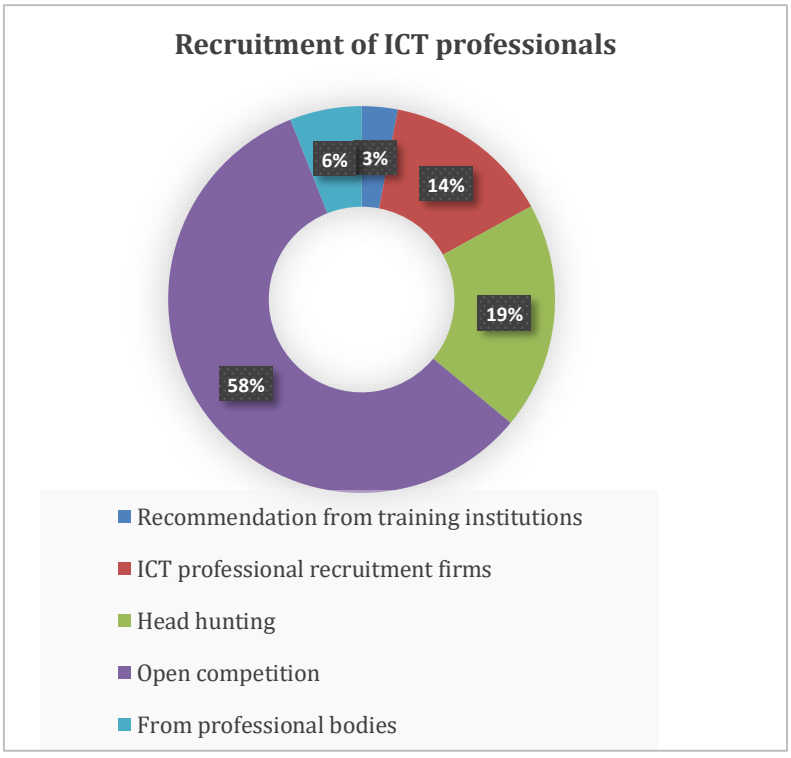


Figure 25: How ICT professionals in MDAs should be recruited

The **Figure 26** below shows the results of respondents for ICT professional management:

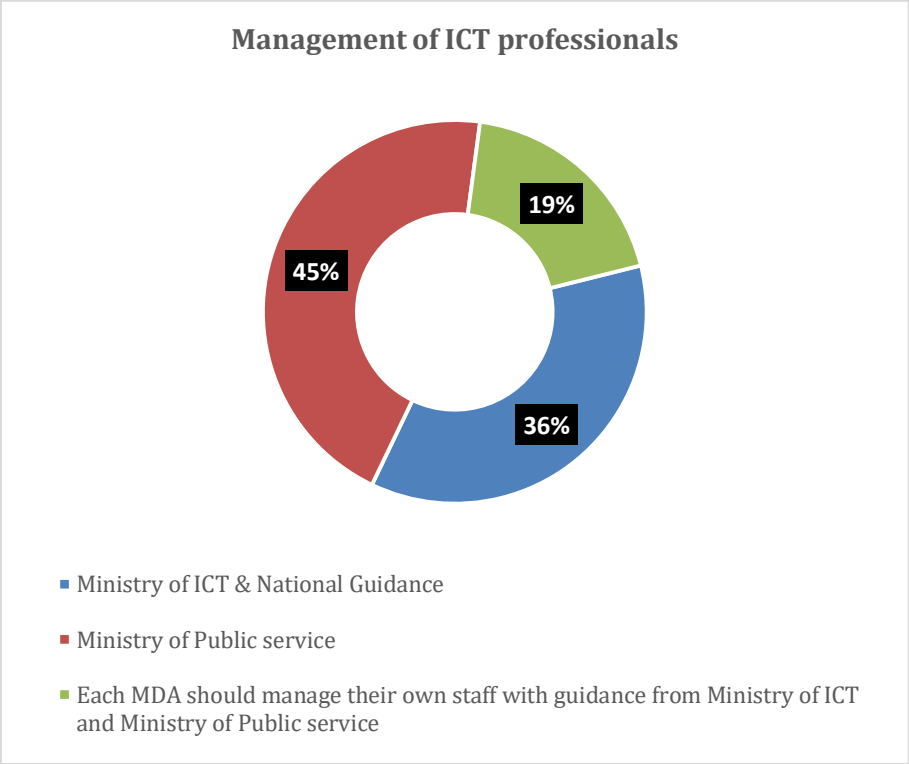


Figure 26: How ICT professionals should be managed

3.2.5 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 27** 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"*

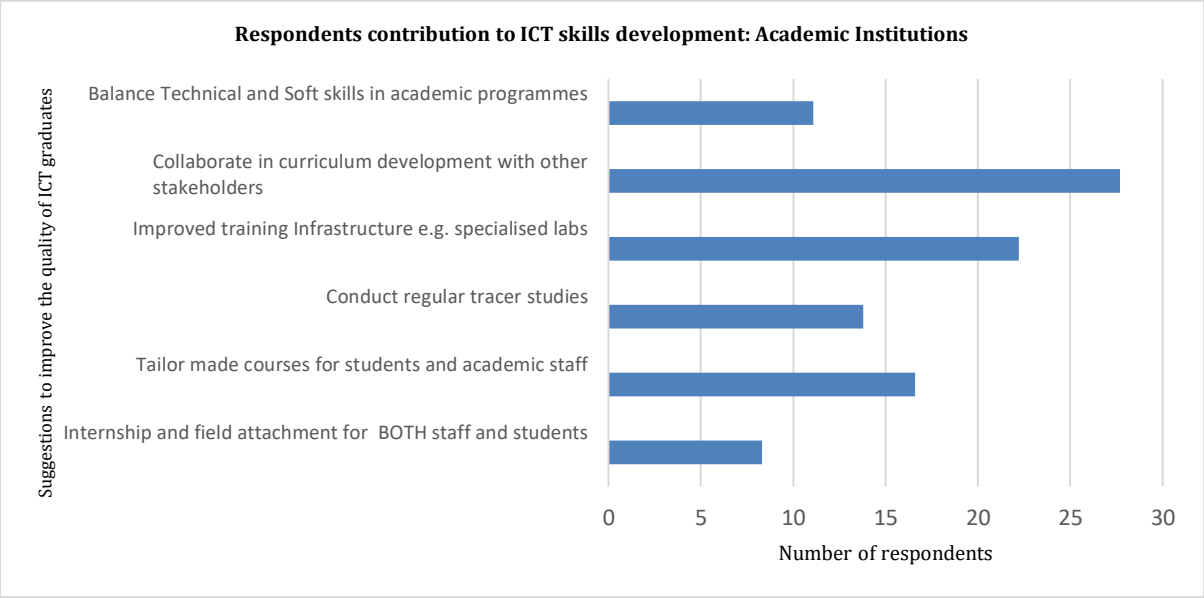


Figure 27: *Suggested actions Academia should do to improve the quality of ICT graduates*

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 28** below.

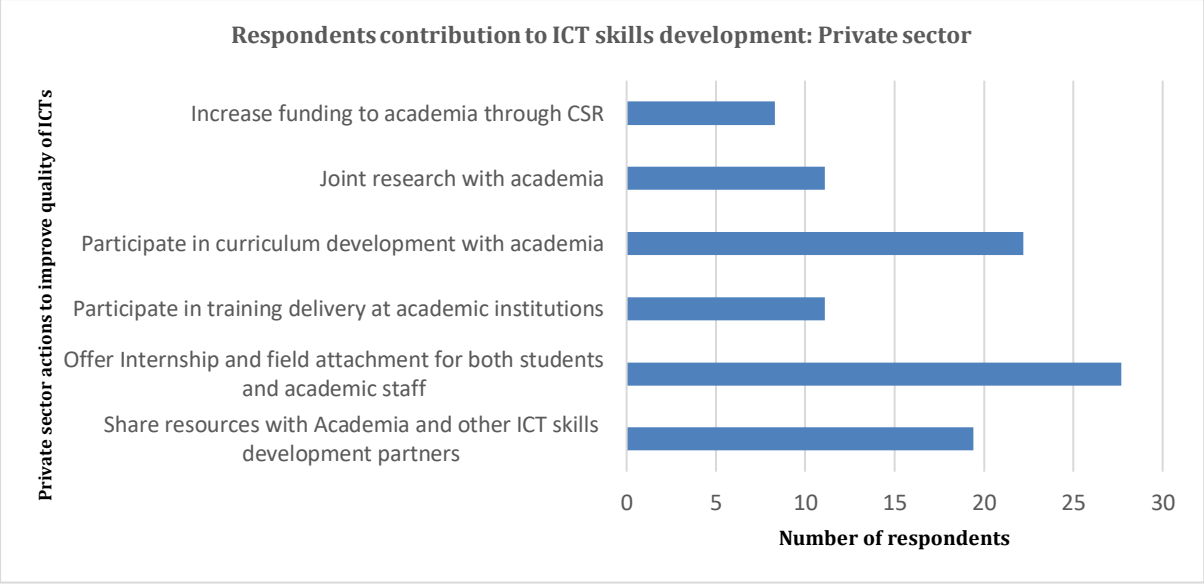


Figure 28: *Proposed Private Sector Actions to improve quality of ICTs*

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.

3.3 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 calibre, and level of stakeholder engagement in programme design and delivery modes. The details are discussed in the next sections.

3.3.1 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 Sciences (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, undergraduate and postgraduate). In the last 12 months alone COCIS through CiPSD has trained over 5,000 individuals through Huawei, CISCO and MasterCard partnerships. **Figure 29** below shows an advert of some of the courses at CoCIS.

Figure 29: 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 15 and Figure 30 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 15: Number of ICT graduates at CoCIS from 2015-2019
(***Source:*** Makerere University Annual Reports)

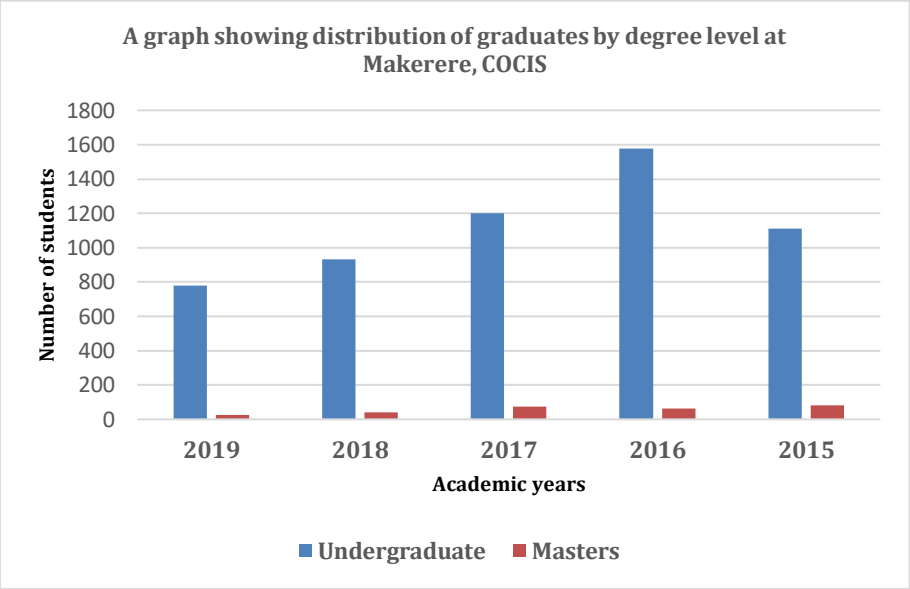


Figure 30: Graduates from Makerere CoCIS, 2015-2019

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 programmes, 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 programmes 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 programmes 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 programmes and according to the Dean, the FCI graduates about 300 students annually at all levels.

It was revealed that FCI programmes 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 programmes 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.

3.3.2 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 31** below summarizes the key practices captured.

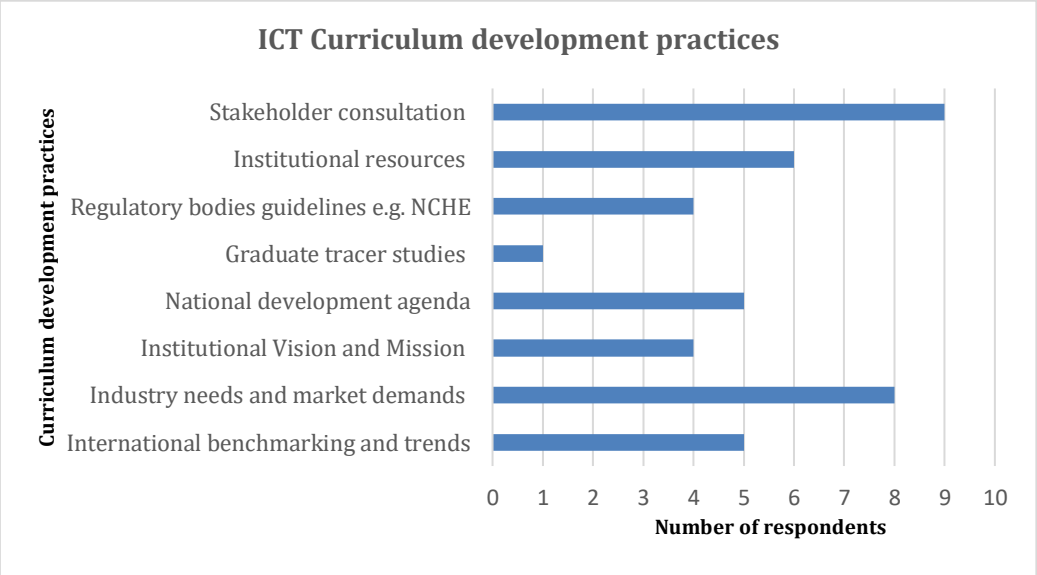


Figure 31: Key ICT curriculum development practices

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.

3.3.3 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 degree 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 16** below summarizes programmes offered at all the aforementioned institutions in section **3.3.2** above.

No.	Institution	Certificate Programmes	Diploma Programmes	Degree Programmes	Postgraduate Programmes
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) Telecommunications Engineering (TE)	Software Engineering	
3	Aptech Computer Training	National Certificate in Information and Communication Technology, ACSE (Advanced Certificate in Software Engineering), CISSP - Certified Information	ADSE (Advanced Diploma in Software Engineering) HDSE (Higher Diploma in Software Engineering)		

No.	Institution	Certificate Programmes	Diploma Programmes	Degree Programmes	Postgraduate Programmes
		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 & Animation), CIM (Certificate in Multimedia)	HDIM (Higher Diploma 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 Rechnology		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

No.	Institution	Certificate Programmes	Diploma Programmes	Degree Programmes	Postgraduate Programmes
					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)
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		Bachelor of Information Systems	Postgraduate Certificate in Applied ICT & Leadership PG Diploma in Technology Innovation PG Certificate in Applied ICT & Leadership

No.	Institution	Certificate Programmes	Diploma Programmes	Degree Programmes	Postgraduate Programmes
		Records Management and Information Systems in Health Introduction to Computer Skills			
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 CISCO Certified Network Associate (CCNA) CISCO Certified Network Associate Security (CCNAS)	Diploma in Computer Forensics. Diploma in Information technology Diploma in Information Technology	Bachelor of Information Technology and Computing, Bachelor of Information Systems, Bachelor of Library and Information Science	Master of Science in Information Technology Post Graduate Diploma in Information Technology

No.	Institution	Certificate Programmes	Diploma Programmes	Degree Programmes	Postgraduate Programmes
		Linux Professional Institute Certificate (LPIC			
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 Graphics 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
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

No.	Institution	Certificate Programmes	Diploma Programmes	Degree Programmes	Postgraduate Programmes
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 Graphics 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 16: A summary of ICT programmes offered at the Institutions consulted

3.3.4 Models of ICT Academic Programme 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 32** below captures views of the key informants from the ICT skills supply side on ICT academic programme delivery.

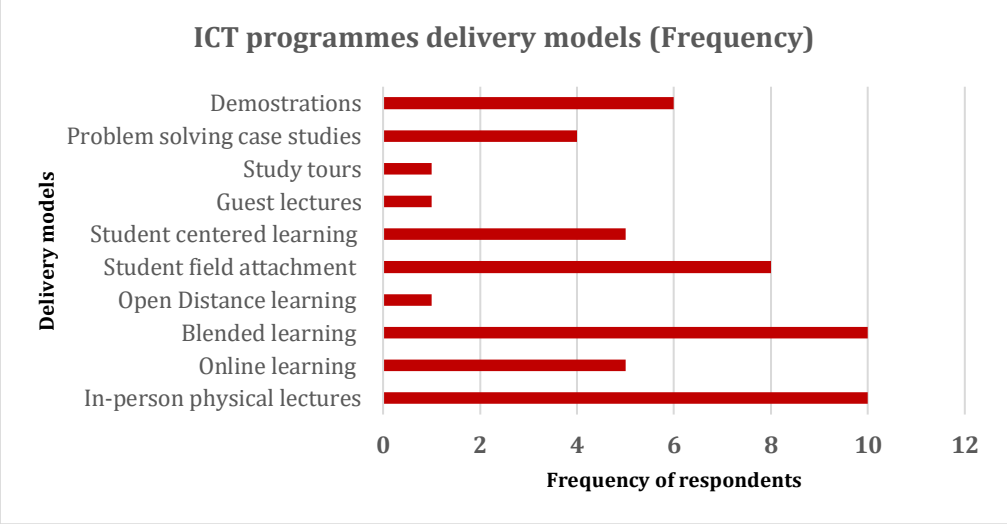


Figure 32: Models of delivery of ICT academic programmes

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"*

3.3.5 Calibre 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 calibre 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"*

3.3.6 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 33** below:

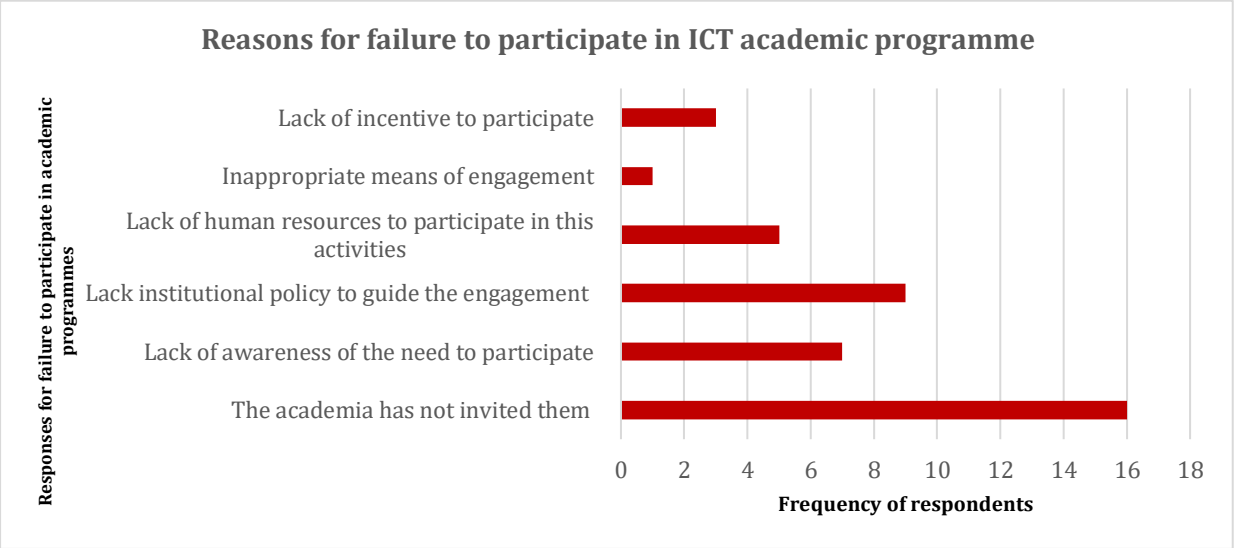


Figure 33: Reasons for low MDA participation in ICT programme delivery and design

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-activities."*

3.3.7 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 3**4 below highlights the status of ICT skills providers in the country.

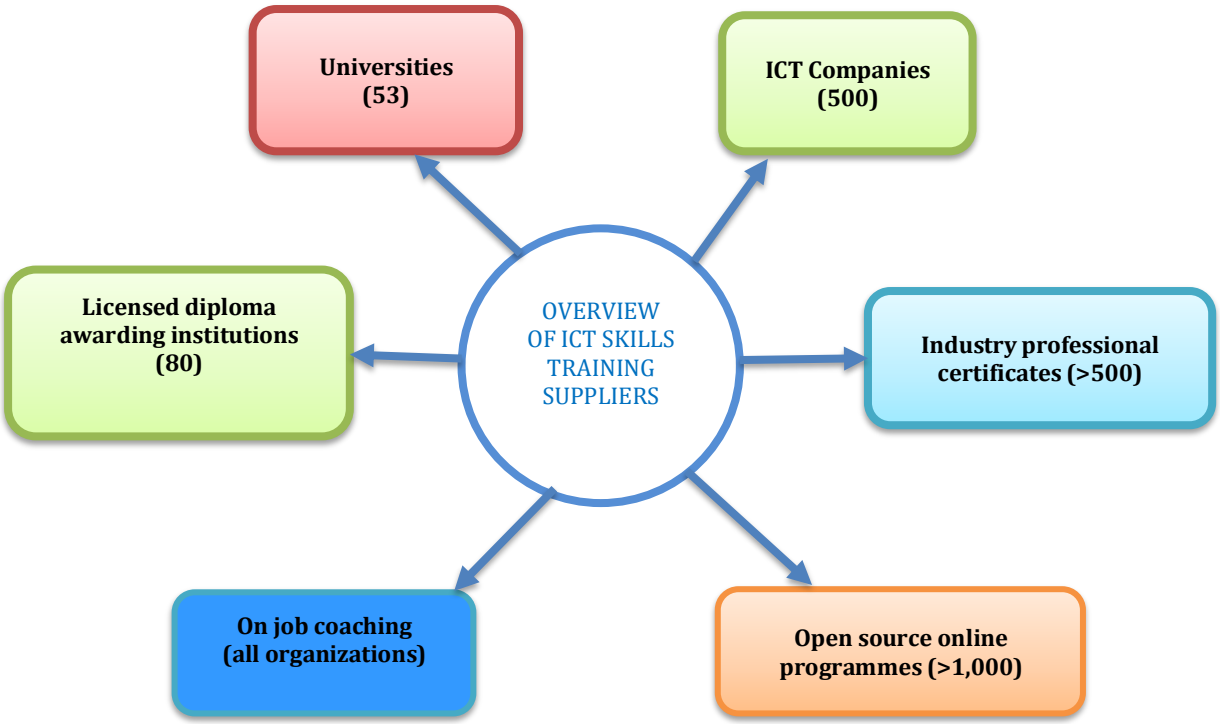


Figure 34: ICT skills service providers

3.3.8 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; as illustrated in **Figure 35** below:

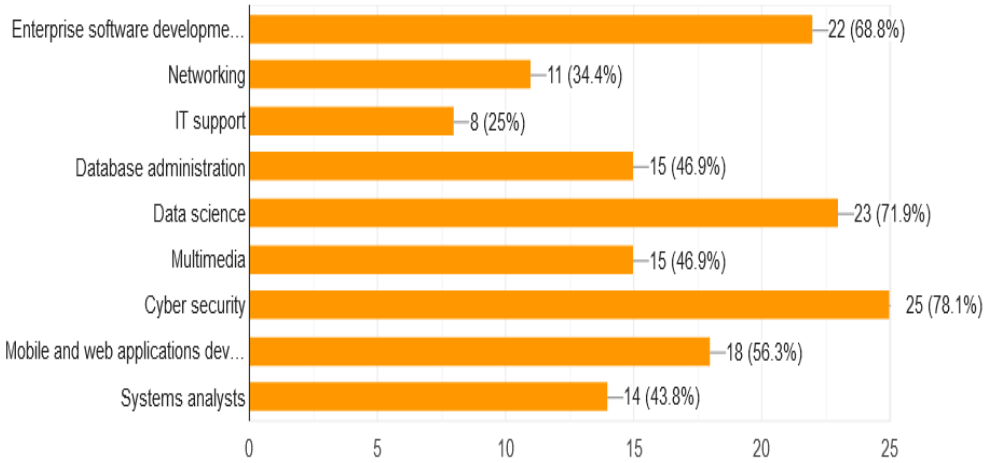
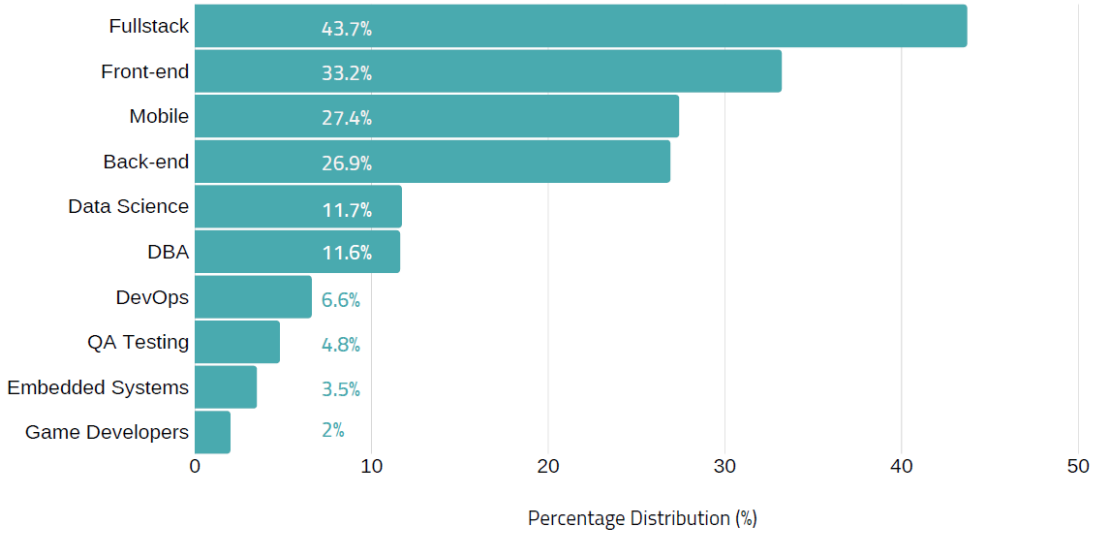


Figure 35: ICT skills in short supply from Stakeholders' perspective

These results are comparable to those from the Andela Software Developer Survey of 2019 (**Figure 36** below):

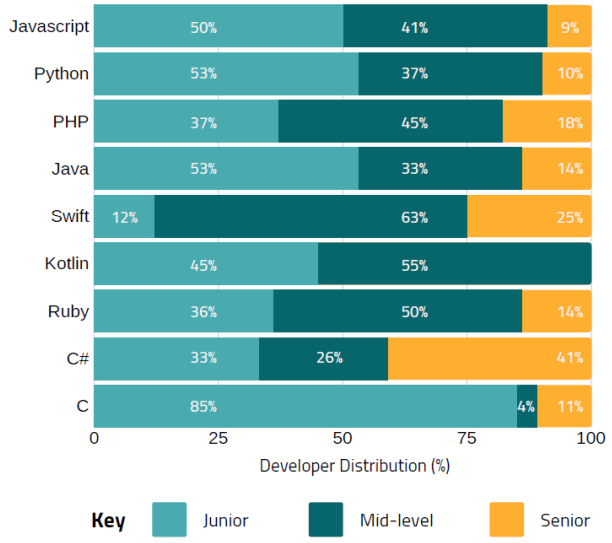
Figure 36: Software Developer Areas of Specialization



***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 37** below the Andela study indicates that most junior software developers use scripting languages and senior software developer use enterprise languages like C#.

Figure 37: Software Developer Areas of Specialization 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 38**).

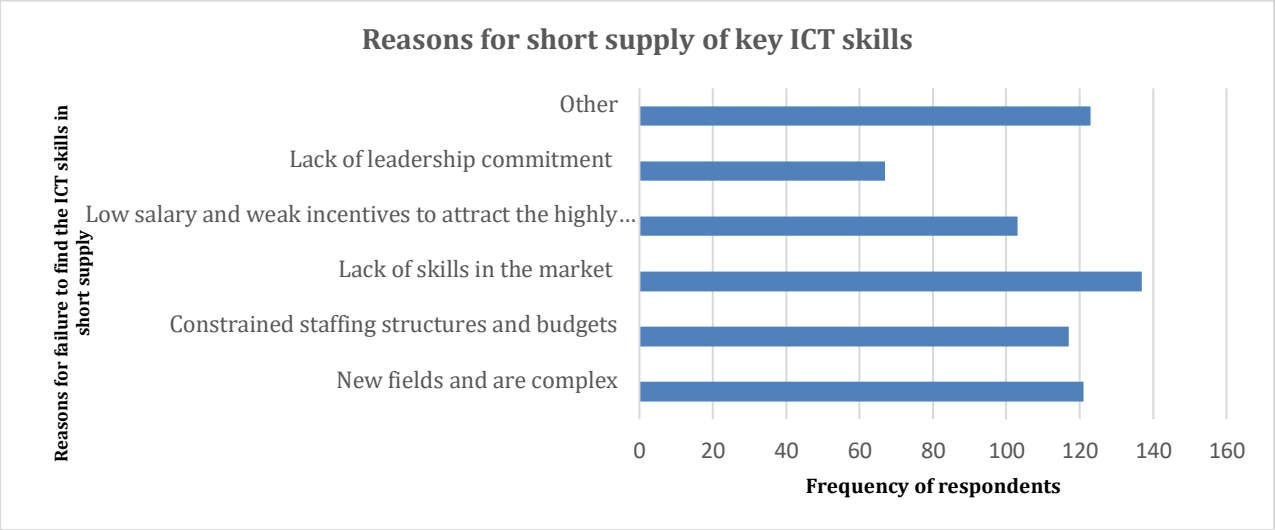


Figure 38: Reasons for failure to find the stated ICT skills

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"

3.4 ICT Skills Supply versus Demand

This section presents the analysis of ICT skills and training needs gaps in the RCIP target sectors and agencies. In section 3.4.1 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 3.4.2 discusses current skills verses emerging demands, section 3.4.3 presents identified gaps in ICT staff recruitment processes, and section 3.4.4 presents the existing gaps in ICT skills development in target MDAs.

3.4.1 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 17 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 17: ICT Staffing Gaps on Target MDAs

Given the current establishments as shown in **Table 17** 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 18** 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 18: 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 19** below summarizes the results.

Staff Category	Desired behaviors
ICT Professional	- Self-driven learning - Cyber security enhancing practices - Excellent communication skills - Flexibility and agility - Team work and integrity - Stable temperament - Humility
Non-ICT staff	- Self-led learning - Privacy enhancing practices - Data protection and backup - Humility

Table 19: Desire in target MDAs

3.4.2 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 20** 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	- 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	- 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	- User support - Systems administration - Network administration - Programming - Basic graphics - Database systems - Anti-virus	- 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
	– Basic hardware trouble shooting	– 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 20: 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.

3.4.3 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."*

3.4.4 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 39** below:

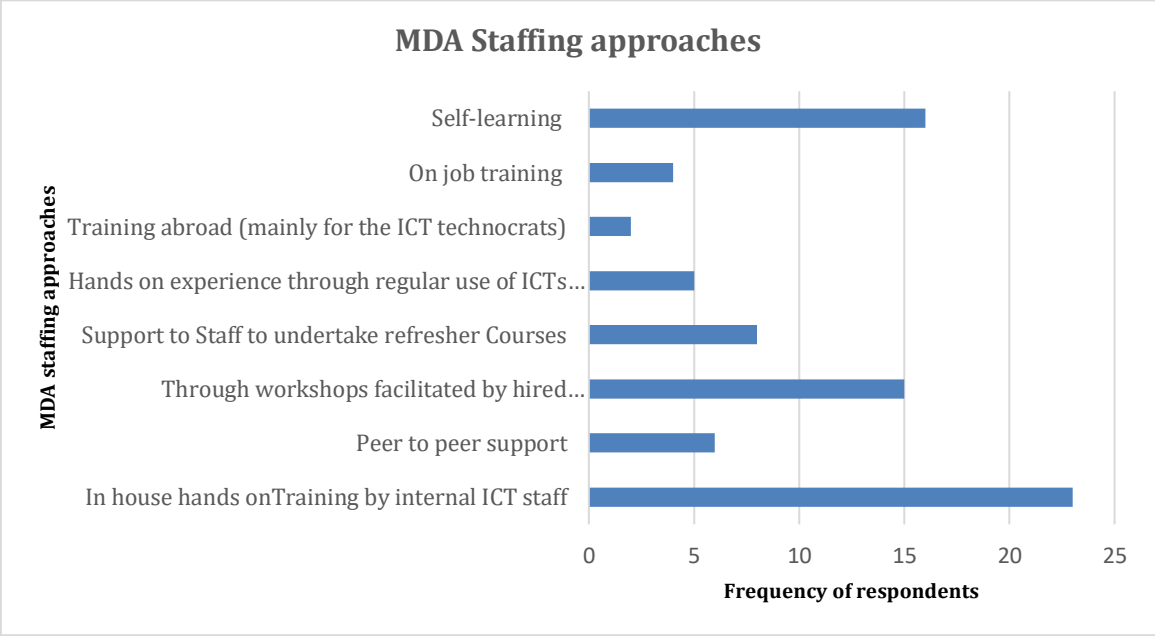


Figure 39: Staff training approaches in the target MDAs

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 relaying 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:

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

- Job shadowing
- Job rotation
- Computer or online-based **training** modules
- Peer to peer support
- Workshops facilitated by expert consultants
- Refresher Courses
- 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.

3.5 Gaps that might not be addressed through ICT Skills and Training Interventions (e.g. policies, laws and regulations)

This section highlights gaps that were identified by the Consultant that would not fully be addressed through ICT Skills and Training Interventions.

i) Regularization of ICT function in all MDA's, their need to ensure recruitment and management of ICT professionals across MDAs is harmonized. 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) 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 NDPIII.

iii) A number of stakeholders either did not have critical documents or were not willing to provide them. These key documents include: annual reports, staff establishment plans, human capacity development programmes among others.

iv) 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

v) The government should consider a tax waiver on ICT devices and internet purchase by government employees as a means of promoting e-government agenda.

vi) Most institutions did not have updated websites, this constrains the open government initiative and access to information act.

4.0 ICT SKILLS AND TRAINING NEEDS ASSESSMENT (STNA) CONCLUSIONS AND RECOMMENDATIONS

This section provides strategic conclusions and recommendations drawn from stakeholder consultation, ICT STNA and ICT STAP phases of the assignment.

4.1 Conclusions

Arising out of the stakeholders' consultation and ICT STNA processes the following are conclusions drawn to the attention of the client:

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 (in **Table 21** below), which directly respond to issues highlighted in the conclusions above, have been drawn. To guide planning and implementation, a priority column has been added to the attention of the respective actors:

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, MoPS and MoICT & NG	High
2	Outdated ICT Cadre Schemes of Service	MoICT & NG, in collaboration with MoPS, 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.	MoPS 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	MoPS 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	MoICT & NG & other MDAs	High

No	Issues to address	Action/Recommendation	Actor	Priority
		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.		
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
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	Ring-fencing 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 other 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

No	Issues to address	Action/Recommendation	Actor	Priority
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.	National Curriculum Development Centre, Ministry of Education and Sports	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
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.	MoICT & NG and other MDAs	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

No	Issues to address	Action/Recommendation	Actor	Priority
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 theorical 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 engagement of students in their respective fields of study.	All academic training institutions	High
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	All appointing authorities	High

No	Issues to address	Action/Recommendation	Actor	Priority
		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.		
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
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.	MoICT & NG and other MDAs	High

Table 21: Key Recommendations and Key Actors

5.0 ICT SKILLS AND TRAINING ACTION PLAN (STAP)

This section details the key drivers of change serving as the thrust for the development of ICT STAP. It further details the strategic objectives, strategies and the strategic actions that once implemented will significantly address the gaps identified during the assessment of the current and desired state of ICT skills and training in RCIP implementing agencies and target sectors.

5.1 Key Drivers of Change

There are many drivers influencing change in the ICT sector. Some of these changes are caused by increasing and youthful population (with 77% of Uganda's population being under 25 years of age), which will generate a need for better ICT infrastructure and enhanced public services. Other drivers are linked to the availability of better public services and opportunity, created by advances in technology, to transform public services to be more citizen-focused. Collectively, they are making the public sector environment fluid and forcing it to evolve. Some of these key drivers of change are stated below:

a) **Leadership, governance, coordination and partnerships:** the rapid development of the ICT sector is in apart attributed to a strong political will by the present the champion the use of ICT as an engine for social transformation of the country. Furthermore, the prevailing political stability, good governance reforms and the attractive business and investment policy and legal regimes have stimulated the development of local ICT innovations, besides attracting both local and international partners.

b) **Cyber security awareness:** The increasing adoption of ICT services in the country has led to the increasing awareness of threats associated with the deployment and consumption of ICT services. This awareness is driving the demand for skills in ensuring online privacy and protection of critical data.

c) **Internet accessibility and availability of data**: As observed in the 2020 September report, the internet penetration stood at 49% of the population most of which are the professional workforce. Furthermore, the continued expansion of the National Backbone Infrastructure (NBI) by NITA-U is enabling more people access ICT services hence stimulating demand for ICT skills.

d) **Universal Access (bridging digital divide):** the government's policy on universal access is stimulating the growing demand for ICT services and the associated skills.

e) **Human capacity investment**: the liberalization of the economy especially the educational sector what resulted into a rapid expansion of institutions of higher learning with the associated increase in ICT skills demand.

5.2 Strategic Objectives, Strategies and Actions

Table 22 below links the six (6) strategic objectives of ICT STAP with their respective strategies and strategic actions.

Strategic Objective	Strategies	Strategic Actions
SO 1: Enhance usage of ICT in national development and service delivery	Lower barriers to ICT access	Integrate digital literacy at all levels of formal and civic education
		Waiver taxes on ICT devices and internet purchase by government employees
		Provide the basic enabling ICT facilities especially, computers and internet, to all government employees, with special attention to those in JLOS.
	Universal access to bridge rural-urban divide in access to ICT infrastructure and facilities	Extend broadband ICT infrastructure coverage countrywide in partnership with the private sector and all Government entities and implement last mile connectivity to key areas (Districts, sub-counties, schools, hospitals, post offices, tourism sites, police, LGs etc.)
		Establish and enhance national common core infrastructure (data centres, high power computing centres, specialized labs)
		Finance universal access
	Enhancing Electronic security	Develop and implement the Data Protection and Privacy Programme to strengthen Cyber Security in the country
	Enhancing excellent ICT leadership and championship at national level to provide oversight, inspiration and political goodwill	Conduct 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.
SO 2: Promote ICT research and innovations	Continuous benchmarking and learning	Regularly conduct research about best practices in other countries and apply them in the Ugandan context.
		Establish bilateral collaborations with countries that are internationally recognized as leading in ICT development to benefit from knowledge exchange and learning.
SO 3: Increase quality and quantity of the ICT human resource capital	Mandatory ICT Continuing Professional Development (CPD)	Develop annual ICT skills development work plans
		Integrate e-government in digital literacy circular
		Operationalize online training programmes for various government agencies in areas where capacity gaps have been identified.

Strategic Objective	Strategies	Strategic Actions
		Ring-fence staff training budgets from budgetary cuts since this affects staff productivity.
		Complete a minimum of 40 hours of ICT CPD annually, which must be monitored by a competent authority. i.e. establish an online tracking portal for this CPD on each individual staff.
	Establishing centres of excellence and community-based knowledge and information centres	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, and digital forensics labs, among others.
		Establish community-based knowledge and information centers to promote ICT skills development for civil servants and general public.
	Enhance the quality of academic staff	Provide academic staff with 10-20 percent time for their attachment to industry to enable them acquire critical industrial skills and experience that are key in delivery of ICT training.
		Encourage their staff to acquire industrial certification to improve their knowledge and skills of developing and delivering market demanded training content.
	Improve the ICT Curriculum and quality of training	Operationalize the 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.
		Improve management and supervision of student field attachment to ensure meaningful engagement of students in their respective fields of study.
		All training institutions of various ICT programmes have appropriate ICT infrastructure such as specialized laboratories to deliver the proposed programmes before approval. All accredited academic programmes MUST have a mandatory curriculum review to ascertain the functionality of the infrastructure to support continued teaching of the approved curriculum, given

Strategic Objective	Strategies	Strategic Actions
		the fact that most ICT equipment has a 3-year lifespan
		Alignment between the practical skillset needed by the employment industry and the curriculum delivered in institutions of higher learning is very critical.
SO 4: Strengthen the policy, legal and regulatory framework	Develop a National Digital Literacy Skills Framework	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.
		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.
	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
SO 5: Produce appropriate knowledgeable, skilled and ethical labour force	Establish a functional labour market	a. Establish a functional labour market information system b. Develop and implement an apprenticeship and job placement policy and programme c. Extend internship programme to out-of-school youths d. Conduct regular tracer studies
	Accelerate the acquisition of urgently needed ICT skills in key growth areas of the economy	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.
	Embedding behavioural competencies in ICT recruitment and selection framework	Special emphasis on behavioral competencies, such as emotional self-awareness, teamwork, ethics and integrity and networking, in addition to the technical ICT competencies must considered in recruitment of staff.
SO 6: Streamline Government structures and	Streamlining recruitment and management of ICT professionals	ICT Professionals' recruitment should be done through Competency based recruitment approach with offers better

Strategic Objective	Strategies	Strategic Actions
systems for efficient and effective service delivery		outcomes *(as demonstrated by experiences in Australia and Estonia)*
		Uupdate the ICT Cadre Scheme of Service to reflect new skills and person specifications for the different positions in line with the e-government framework.
		Regularize ICT establishments in MDAs in line with the ICT Cadre Schemes of Service
	Nurturing ICT leadership among Accounting Officers and leaders of MDAs	MoICT & NG and her agencies to 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 shall be exposed to minimum of 40 hours of ICT training in a year.
	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)* shall consider enriching the current traditional (open competition) recruitment and selection approach with competency-based procedures. Computer-based recruitment and selection and practical (simulated) interviews shall be used.
	Operationalising ICT function in every department of government	Every public service entity (unit of government) shall have a fully operational ICT Unit or function.

Table 22: Strategies, Strategic Objectives and Strategic Actions of this ICT STAP

6.0 ICT STAP IMPLEMENTATION

This section expounds on the dynamics around implementation of the ICT STAP Strategic Actions and the time-frame in which they will be implemented. These actions have been tagged to actors within the RCIP Implementing agencies and target sectors. Costs for each of the actions has been considered to allow for efficient budgeting, planning and resource mobilization.

6.1 Implementation of ICT Skills and Training Strategic Actions

The proposed strategic actions of this ICT STAP are designed to be executed within 5 years. The schedule of these actions has been informed by the level of need, the urgency of need to ensure that the strategic gaps in the RCIP implementing agencies and target sectors are fixed.

The activities in this Action Plan have been categorized in terms of short, medium and long term to guide the implementation process:

i) Short term: Activities implementable within 1 year

ii) Medium term: Activities implementable between 1-5 years

iii) Long term: Activities implementable 5 years out

Table 23 below showcases in detail the implementation activities and timelines for these over a period of 5 years.

Strategic Objective	Strategic Actions	Prioritisation			Actors
		S	M	L	
SO 1: Enhance usage of ICT in national development and service delivery	Integrate digital literacy at all levels of formal and civic education			x	MoES, MoICT & NG, All Academic Institutions and CSOs
	Waiver taxes on ICT devices and internet purchase by government employees		x		MoFPED and MoICT & NG
	Provide the basic enabling ICT facilities especially, computers and internet, to all government employees, with special attention to those in JLOS.		x		MoICT & NG and all MDAs
	Extend broadband ICT infrastructure coverage countrywide in partnership with the private sector and all Government entities and implement last mile connectivity to key areas (Districts, sub-counties, schools, hospitals, post offices, tourism sites, police, LGs etc.)		x		MoICT & NG, UCC, Telecom Operators and NITA-U
	Establish and enhance national common core infrastructure (data centres, high power computing centres, specialized labs)		x		MoICT & NG, NITA-U and Telecom Operators

Strategic Objective	Strategic Actions	Prioritisation			Actors
	Finance universal access	x			UCC, MoFPED
	Develop and implement the Data Protection and Privacy Programme to strengthen Cyber Security in the country	x			NITA-U
	Conduct 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.	x			MoICT & NG, UICT, NITA-U
SO 2: Promote ICT research and innovations	Regularly conduct research about best practices in other countries and apply them in the Ugandan context.	x			All MDAs
	Establish bilateral collaborations with countries that are internationally recognized as leading in ICT development to benefit from knowledge exchange and learning.	x			MoICT & NG
SO 3: Increase quality and quantity of the ICT human resource capital	Develop annual ICT skills development work plans	x			All MDAs
	Integrate e-government in digital literacy circular			x	NCDC, NCHE and all Academic training Institutions
	Establish online training programmes for various government agencies in areas where capacity gaps have been identified.	x			MoICT & NG, NITA-U and UICT.
	Ring-fence staff training budgets from budgetary cuts since this affects staff productivity.		x		All MDAs
	Complete a minimum of 40 hours of ICT CPD annually, which must be monitored by a competent authority. i.e. establish an online tracking portal for this CPD on each individual staff.		x		All staff on MDAs, NITA-U and all MDAs
	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, and digital forensics labs, among others.		x		MoICT & NG and all Academic Institutions
	Establish community-based knowledge and information centers to promote ICT skills development for civil servants and general public.		x		MoICT & NG, NITA-U, UCC and UICT
	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.		x		All Academic Institutions of Higher Learning

Strategic Objective	Strategic Actions	Prioritisation			Actors
	Encourage their staff to acquire industrial certification to improve their knowledge and skills of developing and delivering market demanded training content.	x			All Academic Institutions of Higher Learning
	Operationalize the 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.		x		All Academic Institutions of Higher Learning
	Improve management and supervision of student field attachment to ensure meaningful engagement of students in their respective fields of study.	x			All Academic Institutions of Higher Learning
	All training institutions of various ICT programmes to have appropriate ICT infrastructure such as specialized laboratories to deliver the proposed programmes before approval. All accredited academic programmes MUST have a 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	x			NCHE
	Alignment between the practical skillset needed by the employment industry and the curriculum delivered in institutions of higher learning is very critical.	x			All Academic Institutions of Higher Learning
SO 4: Strengthen the policy, legal and regulatory framework	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.		x		NITA-U
	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.		x		NCDC, MoICT & NG
	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.		x		All Academic Institutions of Higher Learning, NCHE and MoICT & NG

Strategic Objective	Strategic Actions	Prioritisation			Actors
SO 5: Produce appropriate knowledgeable, skilled and ethical labour force	Establish a functional labour market information system		**x**		NITA-U, MoGLSD, MoTIC, MoLG, NCHE
	Develop and implement an internship, apprenticeship and job placement policies and programmes		**x**		MoGLSD, MoES, MoICT & NG, MoPS
	Conduct regular tracer studies		**x**		All Academic Institutions of Higher Learning, MoICT & NG, MoGLSD and MoES
	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.		**x**		All MDAs and appointing authorities
	Special emphasis on behavioral competencies, such as emotional self-awareness, teamwork, ethics and integrity and networking, in addition to the technical ICT competencies must considered in recruitment of staff.		**x**		All MDAs and appointing authorities
SO 6: Streamline Government structures and systems for efficient and effective service delivery	ICT Professionals' recruitment should be done through Competency based recruitment approach with offers better outcomes *(as demonstrated by experiences in Australia and Estonia)*		**x**		MoPS, MoICT & NG and appointing authorities
	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.	**x**			MoICT & NG and MoPS
	Regularize ICT establishments in MDAs in line with the ICT Cadre Schemes of Service		**x**		MoICT & NG and MoPS
	MoICT & NG and her agencies to 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 shall be exposed to minimum of 40 hours of ICT training in a year.	**x**			MoICT & NG, UICT and NITA-U
	In recruiting ICT professionals, the appointing authorities in the Uganda Public Service *(PSC, ESC, HSC, JSC, DSCs, Police Authority and Prisons Authority)* shall consider enriching the current traditional (open competition) recruitment and selection approach with competency-based procedures. Computer-based recruitment and	**x**			All appointing authorities

Strategic Objective	Strategic Actions	Prioritisation			Actors
	selection and practical (simulated) interviews shall be used.				
	Every public service entity (unit of government) shall have a fully operational ICT Unit or function.		**x**		MoPS and MoICT & NG

Table 23: Implementation Plan for the Strategic Actions over a 5-year timeline

6.2 Financing Plan for ICT STAP

The implementation and roll out of the ICT STAP will follow an accelerated financial plan and a strong resource mobilization strategy for functionalizing of the Uganda ICT function and delivery of a high quality and capable ICT workforce for the RCIP implementing agencies and target sectors.

To achieve this, the MoICT & NG as the overall coordinator of this ICT STAP will need to continually engage with key implementing stakeholders e.g. MDAs, Academia, development partners, and the private sector, to ensure access to appropriate resources.

The sections ahead related to the financial plan for this ICT STAP will:

i) provide an idea of what it will cost to have the Action Plan implemented,

ii) provide an idea of cost drivers, and

iii) shed light on which periods along the life cycle will require more funding for activities within the overall budget.

6.2.1 Budget per Year and Business Objective

The costing and budgeting for the ICT STAP was guided by the objectives of the MoICT & NG as well as the NDPIII and the specific costing was done on the strategic actions. Every Ugandan shilling is tagged and attached to ensure each output is achieved for the proposed strategic actions.

The total budget for the 5 years to fund all the proposed actions totals to **UGX 80,540 billion** with the bulk of the funding going towards enhanced usage of ICT in national development and service delivery. **Table 24** below indicates how funding will be utilized to achieving this ICT STAP's strategic objectives.

Note: *Amounts have been quoted in Millions of Uganda shillings (Amounts are in Ugx Mn)*

Strategic Objective	Year 1	Year 2 - 3	Year 3 - 4	Year 4 - 5	Total Cost *(Mn UGX)*
Enhance usage of ICT in national development and service delivery	36,800	6,550	5,950	8,850	**58,150**
Promote ICT research and innovations	200	300	300	0	**800**
Increase quality and quantity of the ICT human resource capital	2,000	1,950	1,040	650	**5,640**
Strengthen the policy, legal and regulatory framework	0	1,250	0	0	**1,250**
Produce appropriate knowledgeable, skilled and ethical labour force	1,150	2,050	1,450	1,700	**6,350**
Streamline Government structures and systems for efficient and effective service delivery	2,000	2,350	2,000	2,000	**8,350**
TOTAL	**42,150**	**14,450**	**10,740**	**13,200**	**80,540**

Table 24: Funding Plan for ICT STAP Implementation

6.2.2 Key Budget Drivers

Table 25 below details the detailed allocation of funds per strategic action. The costs contained herein are estimates and should be validated through the procurement processes with the sector. The key cost drivers of the funds have also been indicated.

Strategic Objective	Strategic Actions	Key Cost Driver	Year 1	Year 2 - 3	Year 3 - 4	Year 4 - 5	Total Cost (UGX)
SO 1: Enhance usage of ICT in national development and service delivery	Integrate digital literacy at all levels of formal and civic education	*Consultant to conduct a comprehensive Formal Education Curriculum review*	0	50	50	50	**1,500**
		Consultant to develop an Integrated Civic Education Curriculum	0	300	200	0	**500**
		Stakeholder engagement, Curriculum production and dissemination	300	200	200	300	**1,000**
	Waiver taxes on ICT devices and internet purchase by government employees as a means of promoting e-government agenda.	*Study on the impact of the Waiver*	200	0	0	0	**200**
	Provide the basic enabling ICT facilities especially, computers and internet, to all government employees, with special attention to those in JLOS.	*ICT equipment procurement*	15,000	0	0	0	**15,000**

Strategic Objective	Strategic Actions	Key Cost Driver	Year 1	Year 2 - 3	Year 3 - 4	Year 4 - 5	Total Cost (UGX)
	Extend broadband ICT infrastructure coverage countrywide in partnership with the private sector and all Government entities and implement last mile connectivity to key areas *(Districts, sub-counties, schools, hospitals, post offices, tourism sites, police, LGs etc.)*	*ICT Infrastructure Procurement and installation*	6,000	4,000	4,000	6,000	**20,000**
	Establish and enhance national common core infrastructure *(regional data centres, high power computing centres, specialized labs)*	*Development of a Framework for operationalizing shared infrastructure*	300	0	0	0	**300**
		Procurement of equipment for 4 regional and 1 national level hubs	1,500	2,000	1,500	2,500	**7,500**
SO 2: Promote ICT research and innovations	Regularly conduct research about best practices in other countries and apply them in the Ugandan context.	*Trainings on Research and Knowledge management and development of a KM&R framework*	0	300	300	0	**600**
	Establish bilateral collaborations with countries that are internationally recognized as leading in ICT development to benefit from knowledge exchange and learning.	*Benchmarking engagements / trips*	200	0	0	0	**200**
SO 3: Increase quality and quantity of the ICT human resource capital	Develop annual ICT skills development work plans	*ICT Skills Work Plan development*	0	300	0	0	**300**
	Integrate e-government in digital literacy circular	*Conduct a comprehensive circular audit (same as in SO 1 above)*	0	0	0	0	0
	Establish online training programmes for various government agencies in areas where capacity gaps have been identified	*Cost of developing and facilitating online courses (including content authoring)*	200	150	300	250	**900**
	Ring-fence staff training budgets from budgetary cuts since this affects staff productivity.	*In-house activity*	0	0	0	0	**0**
	Complete a minimum of 40 hours of ICT CPD annually, which must be monitored by a competent authority. I.e. establish an online tracking	*Training cost of ICT Professionals*	200	200	240	200	**840**
		Setup of online tracking portal	0	200	0	0	**200**

Strategic Objective	Strategic Actions	Key Cost Driver	Year 1	Year 2 - 3	Year 3 - 4	Year 4 - 5	Total Cost (UGX)
	portal for this CPD on each individual staff.						
	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, and digital forensics labs, among others.	*Feasibility study for establishment of Centres of Excellence and Community-based Knowledge Information Centres*	0	400	0	0	**400**
	Establish community-based knowledge and information centers to promote ICT skills development for civil servants and general public.	*Procurement of equipment*	500	500	500	0	**1,500**
	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.	*Capacity Building Fund*	0	0	0	0	**0**
	Encourage Academic Institution Staff to acquire industrial certification to improve their knowledge and skills of developing and delivering market demanded training content.	*Capacity Building Fund*	100	200	0	200	**0**
	Operationalize the 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.	*Same Consultant that will conduct a comprehensive Education circular audit*	0	0	0	0	**0**
	Improve management and supervision of student field attachment to ensure meaningful engagement of students in their respective fields of study.	*In-house planning activity*	0	0	0	0	**0**
	All training institutions of various ICT programmes to have appropriate ICT infrastructure such as specialized laboratories to deliver the proposed programmes before approval.	*ICT Infrastructure development in Higher Institutions of Learning*	1,000	0	0	0	**1,000**

Strategic Objective	Strategic Actions	Key Cost Driver	Year 1	Year 2 - 3	Year 3 - 4	Year 4 - 5	Total Cost (UGX)
	All accredited academic programmes MUST have a 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	*In-house activity by NCHE*	0	0	0	0	**0**
	Alignment between the practical skillset needed by the employment industry and the curriculum delivered in institutions of higher learning is very critical.	*Same Consultant that will conduct a comprehensive Education circular audit*	0	0	0	0	**0**
SO 4: Strengthen the policy, legal and regulatory framework	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.	*Development of National Digital Literacy Skills Framework*	0	500	0	0	**500**
	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.	*Facilitation to NCDC to conduct the Exercise*	0	500	0	0	**500**
	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.	*ICT Professionals Development Policy*	0	250	0	0	**250**
SO 5: Produce appropriate knowledgeable, skilled and ethical labour force	Establish a functional labour market information system	*Development of a Labour Market Information System*	0	0	350	0	**350**
	Develop and implement an internship, apprenticeship and job placement policies	*Development of internship, apprenticeship*	0	350	0	0	**350**

Strategic Objective	Strategic Actions	Key Cost Driver	Year 1	Year 2 - 3	Year 3 - 4	Year 4 - 5	Total Cost (UGX)
		and job placement policies					
		Implementation of internship, apprenticeship and job placement policies	1,000	1,500	1,000	1,500	**5,000**
	Conduct regular tracer studies	*Conducting Tracer studies on ICT skilling and Labourforce*	150	200	100	200	**750**
	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.	*In-house activity*	0	0	0	0	**0**
	Special emphasis on behavioral competencies, such as emotional self-awareness, teamwork, ethics and integrity and networking, in addition to the technical ICT competencies must considered in recruitment of staff.	*In-house activity*	0	0	0	0	**0**
SO 6: Streamline Government structures and systems for efficient and effective service delivery	ICT Professionals' recruitment should be done through Competency based recruitment approach with offers better outcomes *(as demonstrated by experiences in Australia and Estonia)*	*Recruitment dynamics catered for by Consultants above (SO5 second line)*	0	0	0	0	**0**
	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.	*Review and Update of the ICT Cadre Scheme of Services*	0	350	0	0	**350**
	Regularize ICT establishments in MDAs in line with the ICT Cadre Schemes of Service.	*In-house activity*	0	0	0	0	**0**
	MoICT & NG and her agencies to 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 shall be exposed to minimum	*Capacity Building Fund*	0	0	0	0	**0**

Strategic Objective	Strategic Actions	Key Cost Driver	Year 1	Year 2 - 3	Year 3 - 4	Year 4 - 5	Total Cost (UGX)
	of 40 hours of ICT training in a year.						
	In recruiting ICT professionals, the appointing authorities in the Uganda Public Service *(PSC, ESC, HSC, JSC, DSCs, Police Authority and Prisons Authority)* shall consider enriching the current traditional (open competition) recruitment and selection approach with competency-based procedures. Computer-based recruitment and selection and practical (simulated) interviews shall be used.	*In-house activity by recruiting agencies*	0	0	0	0	**0**
	Every public service entity (unit of government) shall have a fully operational ICT Unit or function	*The Wage Bill*	2,000	2,000	2,000	2,000	**8,000**
	TOTAL COST		**42,150**	**14,450**	**10,740**	**13,200**	**80,540**

Table 25: Detailed Allocation of Funds per Strategic Action over the next 5 Years

7.0 MONITORING EVALUATION AND LEARNING FRAMEWORK FOR ICT STAP IMPLEMENTATION

The push and inclusion of this Monitoring, Evaluation and Learning (ME&L) Framework for this ICT STAP was based on a number of factors, whose ultimate aim is to improve quality, performance, and learning across the RCIP implementing agencies and target sectors. These included:

i) Strengthening the stakeholders' internal and external accountability requirements regarding the operationalization and implementation of this ICT STAP.

ii) Providing a clear framework and system to assess the extent to which activities in this ICT STAP will enable the RCIP implementing agencies and target sectors contribute to the improvement of the ICT function in Uganda.

In light of the above, this ME&L framework has been put in place to provide guidance to tracking of achievement of results and also to ensure effective learning along the life cycle of the ICT STAP. This overall will ensure achievement of the intended outcomes and positively impact on the evidence-based decision-making process.

The Monitoring, Evaluation and Learning framework for this ICT STAP is demonstrated in **Figure 40** below:

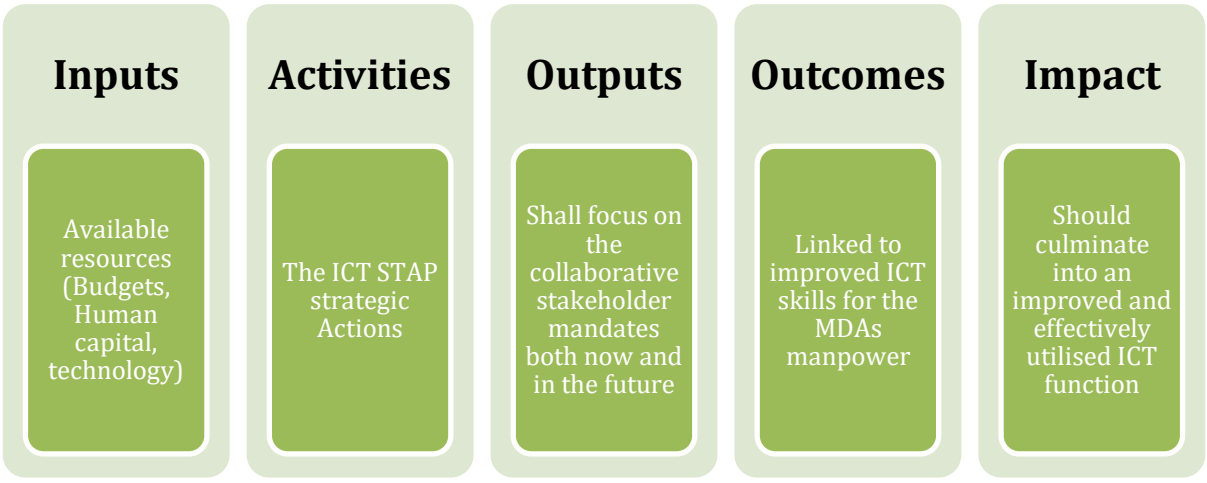


Figure 40: Results Chain for ICT STAP Implementation

7.1 Guiding Principles for ICT STAP ME&L Framework

The following key principles reinforce the ICT STAP's ME&L framework:

a) Ownership: For acceptability and sustainable implementation of this ICT STAP, ownership by the key stakeholders is key in developing the strategic actions to be able to achieve the planned results. The key considerations for ownership in this

regard have been; the degree to which the stakeholders understand the objectives of this ICT STAP and their deep involvement and understanding of its design.

b) **Engagement of stakeholders:** At all stages of development of this ICT STAP; including the ME&L framework it has been vital to engage the key stakeholders with an aim of ensuring buy-in and commitment and motivate the implementation process. Furthermore, this ME&L gives due clarity to the stakeholders on how the outputs and outcomes will ensure an effective ICT function for Uganda.

c) **Focus on Results:** The ME&L framework has been designed basing on a results-based management approach; focusing on measuring achievement of results to capitalize on learning process all-the-while ensuring accountability for results and overall effectiveness.

d) **Taking a holistic systems perspective on skills development:** The key objective for development of this ICT STAP is to encompass all government of Uganda MDAs and hence should be able to feed into all the planning processes to ensure the ICT function is well established.

e) **Practical and cost-effective processes:** Cost effectiveness will be evidenced by successful outcomes and practical and analytical outputs. This ICT STAP's activities have been planned to be efficiently and effectively resourced all the while ensuring the set objectives are being met.

f) **Ensuring evidence-based practices:** For this ICT STAP, the importance of standardized and consistent data collection and reporting actions; as well as information and knowledge capture and synthesis, will go a long way in providing validated evidence of achievement.

7.2 ME&L Framework for the ICT STAP

This ICT STAP monitoring, evaluation and learning framework has been informed by the ICT STNA findings and the NDP III as highlighted in **Table 26** below:

Strategic Objective	Strategic actions	Key Performance Indicator	Outcome
SO 1: Enhance usage of ICT in national development and service delivery	Integrate digital literacy at all levels of formal and civil education	Digital literacy programmes included in all circular for formal and civil education institutions	Improved digital literacy for ICT and Non-ICT technocrats to be employed in MDAs
	Waiver taxes on ICT devices and internet purchase by government employees as a means of promoting e-government agenda.	Re-negotiated and amended tax rates (drop from 30% VAT inclusive to 10%)	Increase in number of government employees purchasing and utilizing internet and ICT devices

Strategic Objective	Strategic actions	Key Performance Indicator	Outcome
	Provide the basic enabling ICT facilities especially, computers and internet, to all government employees, with special attention to those in JLOS.	Approval and procurement of ICT enabling facilities in all MDAs.	Increase in number of government employees purchasing and utilizing internet and ICT devices
	Extend broadband ICT infrastructure coverage countrywide in partnership with the private sector and all Government entities and implement last mile connectivity to key areas (Districts, sub-counties, schools, hospitals, post offices, tourism sites, police, LGs etc.)	80% procurement and installation of ICT infrastructure in each of the 4 regions in Uganda	Increased ICT penetration
	Establish and enhance national common core infrastructure (data centres, high power computing centres, specialized labs)	Approved procurement and installation of ICT common core infrastructure in each of the 4 regions in Uganda	Improved ICT broadband coverage and access across Uganda
SO 2: Promote ICT research and innovations	Regularly conduct research about best practices in other countries and apply them in the Ugandan context.	Approved budget-line for at least 2-3 implementation and bench-marking research activities each FY.	Improved ICT function evidence-based decision-making and innovating
	Establish bilateral collaborations with countries that are internationally recognized as leading in ICT development to benefit from knowledge exchange and learning.	1-2 approved and implemented ICT function bi-lateral bench-marking and learning events	Improved ICT function evidence-based decision-making and innovating
SO 3: Increase quality and quantity of the ICT human resource capital	Develop annual ICT skills development work plans	Approved costed annual ICT skills development work plans	Improved skills and functionality of ICT and Non-ICT professionals in the MDAs
	Integrate e-government in digital literacy circular	e-Government utilization and usage included in all digital literacy programmes for formal and civil education curricula	Improved e-government service utilization by human resource in all MDAs
	Establish online training programmes for various government agencies in areas where capacity gaps have been identified	Include online training programmes in the formal and civil education systems	Improved digital literacy for ICT and Non-ICT technocrats to be employed in MDAs
	Ring-fence staff training budgets from budgetary cuts since this affects staff productivity.	Approved annual ICT skills development costed work plans	Improved skills and functionality of ICT and Non-ICT professionals in the MDAs
	Complete a minimum of 40 hours of ICT CPD annually,	Indication of 4 hours of ICT Capacity	Improved skills and functionality of ICT and

Strategic Objective	Strategic actions	Key Performance Indicator	Outcome
	which must be monitored by a competent authority. i.e. establish an online tracking portal for this CPD on each individual staff.	Development every quarter by all staff in performance reviews.	Non-ICT professionals in the MDAs
	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, and digital forensics labs, among others.	5 ICT centers of excellence instituted and established at each of the 4 regions of Uganda and 1 at national level	Improved skills and functionality of ICT and Non-ICT professionals employed in Uganda
	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.	10-20% time allocated annually for industrial training for all ICT academic staff and students	Improved skills and experience for ICT academic staff for delivery of ICT training
	Encourage Academic Institution Staff to acquire industrial certification to improve their knowledge and skills of developing and delivering market demanded training content.	Certification for the 10-20% time allocated annually for industrial training for all ICT academic staff	Improved skills and experience for ICT academic staff for delivery of ICT training
	Operationalize the 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.to theoretical examinations.	One academic progression assessment review each FY	Improved digital literacy for ICT and Non-ICT technocrats to be employed in Uganda
	Improve management and supervision of student field attachment to ensure meaningful engagement of students in their respective fields of study.	10-20% time allocated annually for industrial training for all ICT students 100% effectively supervised	Improved digital literacy for ICT and Non-ICT technocrats to be employed in Uganda
	All training institutions of various ICT programmes to have appropriate ICT infrastructure such as specialized laboratories to deliver the proposed programmes before approval. All accredited academic programmes MUST have a mandatory curriculum review to ascertain the functionality of	Approved procurement, installation and a 3-year review of appropriate ICT infrastructure in academic institutions	Improved digital literacy for ICT and Non-ICT technocrats to be employed in Uganda

Strategic Objective	Strategic actions	Key Performance Indicator	Outcome
	the infrastructure to support continued teaching of the approved curriculum, given the fact that most ICT equipment has a 3-year lifespan		
	Alignment between the practical skillset needed by the employment industry and the curriculum delivered in institutions of higher learning is very critical.	3-year stakeholder review of all digital literacy programmes included in all circular for formal and civil education institutions	Improved digital literacy for ICT and Non-ICT technocrats to be employed in Uganda
SO 4: Strengthen the policy, legal and regulatory framework	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.	1 approved National Digital Literacy Skills Framework	Enabled and improved ICT function evidence-based decision-making and innovating
	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.	Digital literacy programmes reviewed and included in all circular for both Ordinary Level and Advanced Levels	Improved digital literacy for ICT and Non-ICT technocrats to be employed in Uganda
	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.	1 annual stakeholder review of all digital literacy programmes included in all circular for formal and civil education institutions	Improved digital literacy for ICT and Non-ICT technocrats to be employed in Uganda
SO 5: Produce appropriate knowledgeable, skilled and ethical labour force	Establish a functional labour market information system	1 Labour Market Information System	Capacity to track skilling across all MDAs
	Develop and implement an internship, apprenticeship and job placement policies and programmes	1 Internship, apprenticeship and job placement policy developed and implemented across all MDAs	An ICT knowledgeable, skilled and ethical labour-force across all MDAs
	Conduct regular tracer studies	1 tracer study every year	Improved and informed decision-making by ICT leadership
	Recruitment of ICT professionals should adhere to the institutional strategic and annual manpower plans as	All ICT and Non-ICT professionals' recruitments linked to	Standardised recruitment procedures for ICT and non-ICT workforce in Uganda

Strategic Objective	Strategic actions	Key Performance Indicator	Outcome
	opposed to the current reactionary approach based on urgent demanding situations.	ICT Cadre Scheme of Service	
	Special emphasis on behavioral competencies, such as emotional self-awareness, teamwork, ethics and integrity and networking, in addition to the technical ICT competencies must considered in recruitment of staff.	All ICT and Non-ICT professionals' recruitments linked to ICT Cadre Scheme of Service	Standardised recruitment procedures for ICT and non-ICT workforce in Uganda
SO 6: Streamline Government structures and systems for efficient and effective service delivery	ICT Professionals' recruitment should be done through Competency based recruitment approach with offers better outcomes *(as demonstrated by experiences in Australia and Estonia)*	Reviewed recruitment management process to a competence-based approach	Standardised recruitment procedures for ICT and non-ICT workforce in Uganda
	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.	A 3-year stakeholder review of the ICT cadre system	Improved and functional ICT workforce in Uganda
	Regularize ICT establishments in MDAs in line with the ICT Cadre Schemes of Service.	1 stakeholder review and streamline of ICT establishments to the ICT Cadre Scheme of Service for all MDAs	Improved and functional ICT workforce in Uganda
	MoICT & NG and her agencies to 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 shall be exposed to minimum of 40 hours of ICT training in a year.	Indication of 4 hours of ICT Capacity Development every quarter by all staff in performance reviews.	Improved skills, leadership and functionality of ICT and Non-ICT professionals in the MDAs
	In recruiting ICT professionals, the appointing authorities in the Uganda Public Service *(PSC, ESC, HSC, JSC, DSCs, Police Authority and Prisons Authority)* shall consider enriching the current traditional (open competition) recruitment and selection approach with competency-based procedures. Computer-based recruitment and selection and practical (simulated) interviews shall be used.	An operational computer-based recruitment and selection system in all MDAs	Standardised and open recruitment for ICT and non-ICT workforce in Uganda

Strategic Objective	Strategic actions	Key Performance Indicator	Outcome
	Every public service entity (unit of government) shall have a fully operational ICT Unit or function	Approved procurement and installation of e-governance structures in all MDAs	Fully functional ICT units in all MDAs

Table 26: ME&L Framework for ICT STAP

7.3 Reporting and Dissemination Plan for ME&L Products

Table 27 below will provide direction and guidance for data and information collection, analysis and reporting all required to assess implementation progress towards the realization of the objectives of the ICT STAP.

Monitoring and Evaluation Products	Target Recipients/Audience	Period/dates	Strategies for dissemination
Baseline Reports	All MDAs, MoICT &NG Agencies, Academic Institutions, Development and Implementing Partners	Within 6 months from implementation commencement	Results presentations and sharing of final report with stakeholders
Quarterly Progress reports	All MDAs, MoICT &NG Agencies, Academic Institutions, Development and Implementing Partners	Quarterly	Sharing of the final report with stakeholders
Regional Support Supervision and **Monitoring visits reports**	MoICT & NG, MoICT & NG Agencies, Development and Implementing Partners	After every support supervision and monitoring mission visit	Sharing of the final report with stakeholders
Biannual Review and Lessons Learnt Reports	All MDAs, MoICT &NG Agencies, Academic Institutions, Development and Implementing Partners	Biannual	Workshop presentations and report sharing
Knowledge products	MoICT & NG, MoICT & NG Agencies, Development and Implementing Partners	Quarterly	Workshop presentations and sharing of technical notes
Annual Review Reports	All MDAs, MoICT &NG Agencies, Academic Institutions, Development and Implementing Partners	Annual	Sharing of final report with stakeholders
End line Reports	All MDAs, MoICT &NG Agencies, Academic Institutions, Development and Implementing Partners	At review and end of first ICT STAP cycle	Presentation of results and sharing of final report with stakeholders

Table 27: Reporting and Dissemination Plan for ME&L Products

ANNEXES

Annex I: 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
	Head, ICT
National Medical Stores	Executive Director
Uganda National Health Research Organization	Director General
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

Institutions	Respondents
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
	Deputy Director

Institutions	Respondents
National Curriculum Development Centre	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 CISPD (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 II: ICT STNA Report Validation Workshop Participants

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Annex III: Key Documents Reviewed

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. Ministerial Policy Statement 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
47. Ministry of Public Service (2011). A report on Targeted Capacity Building for Leadership and Management and value Addition Skills for Public Servants for the Enhancement of Economic Value Addition 2021/11- 2012/13.
48. Policy Paper on the Transformation of the Uganda Public Service, 2011
49. National Local Government Capacity Building Policy (NLGCBP), 2013
50. Alison Gillwald, et al (2019): The State of ICT In Uganda: Research ICT Africa: Policy Paper Series No. 5 After Access: Paper No. 8
51. The Association of Chartered Certified Accountants (2016): 50 Key Drivers of Change in the Public Sector
52. Dr Dornela Oluoch (2016): Strategies of enhancing ICT use in the delivery of Management Services in Public Secondary Schools in Siaya County in Kenya: European Scientific Journal October 2016 edition
53. The Constitution of the Republic of Uganda (1995)
54. Digital Uganda Vision
55. Third National Development Plan (NDPIII) 2020/21 – 2024/25
56. The National Resistance Movement (NRM) Manifesto, 2016-2021

57. National Information and Communication Policy for Uganda, 2014
58. The National Broadband Policy (2018)
59. The National Broadband Strategy (2016-2020)
60. Education and Sports Sector Strategic Plan, 2017/18 – 2019/20
61. Job Descriptions and Persons Specifications for Information and Communication Technology (ICT) Officers and Communication Officers, 2017
62. Uganda Institute of Information and Communications Technology (UICT), Strategic Plan 2016-2021

Annex IV: 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, 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 e-Government regulated framework in Uganda*?
   This will involve analysing the policy, regulatory and legal framework of e-Government in Uganda and assess its completeness, effectiveness and adequacy.

4. *What is the coverage and utility of e-Government in Uganda*?
   This will involve analysing the expected extent or roll out of e-Government in Uganda compared to what is currently rolled out as well as the extent to which the existing e-Government platforms are being utilised by the intended stakeholders.

5. *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.

6. *What are the relevant comparative studies*?
   The document should assess the situation in other countries with nearly similar social economic conditions as Uganda but with a higher penetration and utility of e-Government. This will help benchmark and assess the success factors that can be adopted in Uganda.

7. *What are the capacity gaps and capacity development approaches?*
   This will make a holistic analysis of the gaps in capacity in Uganda as well as effective approaches to meet the gaps identified.

Annex V: Policy and Legal Framework Assessment Tool

Introduction

The tool will enable selection of the most relevant and appropriate laws or regulations and policies that relate to ICT Skills and needs analysis and ICT skills capacity building among government staff in MDAs. It will also examine the ICT supply side among vendors and entities to see whether the policy, legal and regulatory framework provides an enabling environment.

Details

Policy, Act or regulation (Name, Year)	Objectives or purpose	Coverage	Main provisions	Implementing agencies	Role for stakeholders	Comments
What is the title of the law or regulation or ACT? When was the Law inaugurated and enacted? Which entity super headed the enactment of the law (if known?)	What are the main purposes/objectives of these laws or policies? What cross references does the law refer to? Eg. it may be to expand on an ACT or policy etc.	What coverage does this policy, law, or regulation have in the ICT sector? What coverage does this policy, law, or regulation have across the ICT sector? What coverage does this policy, law, or regulation have across the country?	List down major issues of ICTs under investigation and examine how the policy or law or regulation addresses the issue under investigation within the provisions E.g, ICT literacy, ICT integration, gender issues on ICTs, Cyber security, Financing training etc	Which government institutions or MDAs are responsible for the implementation of policies, laws, and regulations on ICTs? Are there mechanisms for the coordination of policies and laws affecting the ICT sector? What are the processes for review and monitoring of the ICT	What stakeholders does the policy or law mention and what are their roles? Are the roles contradictory, overlapping or complimentary? Do the roles enable an environment for effectiveness and efficiency in dealing with ICTs?	What strengths and weaknesses can be discerned from the law/policy in promoting ICTs? What recommendations can be made from different dimensions?

			How are these issues defined by the law or policy? What specific references are made to the ICT issues we are addressing in the assignment? Briefly summarize each law or regulation or policy on how these are addressed	policy and legal issues or generally ICT issues?		

Annex VI: Stakeholder Mapping and Engagement Matrix

Entities	Institutions	Respondents	Name and Contact	Resp. Consultant
RCIP Implementing Agencies	MoICT & NG	Permanent Secretary Director Information and National Guidance Director ICT Services		Dr John Ngubiri
	National Information Technology Authority, Uganda	Executive Director Director Finance and Administration Director of E-Government Services Director Technical Services		Dr John Ngubiri
	PPDA	Director E-Government Procurement (E-Gp) Project-Head/Chair of Information, Communication and Technology Working Group Director Performance Monitoring Director Operations Director Capacity Building and Advisory Services		Dr John Ngubiri
Other ICT Support Institutions	Uganda Communications Commission	Executive Director Director Human Resources and Administration Director ICTs and Research Director Engineering and Communications Infrastructure		Dr John Ngubiri
	Uganda Broadcasting Corporation (UBC)	Executive Director Manager, Human Resource Head of ICT Research Development Head of E- Services Commissioner, Infrastructure planning and Technical support Commissioner, Communications Networks		Dr John Ngubiri
	The Vision Group	CEO		Dr John Ngubiri
	NBS TV and NTV Uganda	ED NBS Television ED NTV Uganda		Dr John Ngubiri
	Uganda Media Centre	Executive Director Manager		Dr John Ngubiri
	National ICT Initiatives	Programme Coordinator		Dr John Ngubiri

Entities	Institutions	Respondents	Name and Contact	Resp. Consultant
	Support Programme (NIISP)			
RCIP Target Sectors	**Health Sector**			
	National Drug Authority	Executive Director, Director Operations		Grace William Maiso
	National Medical Stores	Executive Director		Grace William Maiso
	Uganda National Health Research Organization	Director General		Grace William Maiso
	Uganda Aids Commission	Director General Director, Planning and Strategic Information Director, Policy, Research and Programming Director, Human Resource and Administration		Grace William Maiso
	Health Service Commission	Chairperson		Grace William Maiso
	Uganda Blood Bank Transfusion Services	Executive Director Director Operations		Grace William Maiso
	Uganda Virus Research Institute	Head of Institute Head, data management and biostatistics		Grace William Maiso
	National Referral Hospital Mulago	Executive Director Director, Human resource and Administration		Grace William Maiso
	Natural Chemotherapeutics Laboratory	Director of Research		Grace William Maiso
	Justice Law and Order Sector			
	Judiciary	Chief Registrar Ag Registrar Planning and Development Ag Registrar, Judicial Training Institute		Dr Drake Patrick Mirembe
	Uganda Prisons Service	Commissioner of prisons Directors of Prisons Commissioners of Prisons Under-secretary Finance and Administration		Dr Drake Patrick Mirembe
	Directorate of Public Prosecutions	Director of Public Prosecutions (DPP) Deputy Director of Public Prosecutions, Management and Support Services/Accounting Officer Deputy Director of Public Prosecutions, Inspections, Quality Assurance, Research and Training		Dr Drake Patrick Mirembe

Entities	Institutions	Respondents	Name and Contact	Resp. Consultant
		Deputy Director of Public Prosecutions, International Affairs		
	Uganda Police Force	Director, ICT Director Human Resource Development Director, Research planning and development Director Human resource management and administration Commandant police Senior command and staff college Commandant Police Training College		Dr Drake Patrick Mirembe
	Agriculture Sector			
	National Agricultural Research Organization	Deputy Director General, Technology, Innovations and Promotions Director Corporate Services Director Human Resource Management		Frederick Anyine
	National Agricultural Advisory Services	Manager Planning, Monitoring and Evaluation IT Systems Administrator Head Human Resources and Administration		Frederick Anyine
	Coordinating Office for Control of Trypanosomiasis in Uganda	Executive Director IT/Data Officer Operations Manager Manager Research and Development		Frederick Anyine
	National Animal Genetic Resources Centre and Data Bank	Head Data Bank Head Planning, M&E Head Finance and Administration		Frederick Anyine
	Uganda Coffee Development Authority	Managing Director Director Strategy and Business Development Director Development Services Manager M&E Data Officer		Frederick Anyine
	Cotton Development Organisation	Managing Director		Frederick Anyine
	Education Sector			

Entities	Institutions	Respondents	Name and Contact	Resp. Consultant
	National Council for Higher Education	Executive Director Director – Quality Assurance & Accreditation Director- Research, Development and Documentation		Joreme Ojulun
	National Curriculum Development Centre	Deputy Director Administrative Secretary Head of procurement and disposal Unit Head Department of ICT		Joreme Ojulun
	Directorate of Education Standards	Director		Joreme Ojulun
	Education Service Commission	Secretary		Joreme Ojulun
	Department of Business Technical Vocation Education and Training	Head of department		Joreme Ojulun
ICT Suppliers	Makerere University College of Computing and Information Sciences (COCIS)	Dean Director of CISPD (Center for Innovation and Professional Skills Development)		Dr John Ngubiri
	Mobile Telephone Network (MTN)	Executive Director Head of IT Operations		Dr Drake Patrick Mirembe
	Airtel	Executive Director Head of IT Operations		Dr Drake Patrick Mirembe
	ISBAT University,	Dean (ICT) -Director IT Department		Dr Drake Patrick Mirembe
	APTECH ICT Training Company	Executive Director Head of IT Operations		Dr Drake Patrick Mirembe
	Uganda institute of information and communication Technology	Principal Head Academic Programmes		Dr Drake Patrick Mirembe
	Mbarara University of Science and Technology	Dean, Faculty of Computing and Information Technology		Dr. Drake Patrick Mirembe
	Gulu University	Head of Department, Department of Computer Science		Dr. Drake Patrick Mirembe
	ICT Association of Uganda	Chairman		Dr. Drake Patrick Mirembe
	3 innovation Hubs	Leads		Dr. John Ngubiri

Annex VII: Institutional ICT Services Inventory Checklist

Staff by Occupation/level	**Training Need Identified**	**Local ICT Service Providers**		**Foreign ICT Service Providers**		**Alternative/Hybrid Model e.g. Consultants, TOT, etc**	
Management		Name	Cost of service	Name	Cost of service	Type – Workshop, TOT, secondment, Placement, Online course, consultant hire etc	Cost of service
ICT							

Annex VIII: Institutional ICT Skills and Training Needs Self-Assessment Tool

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 behaviors for various levels of responsibility. The tool seeks opinions of human resource managers and in the 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.*

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 mostly? (tick as many as you can)

1. General computer literacy
2. use of internet
3. use of email
4. hardware assembling
5. basic installations
6. networking
7. securing IT environment
8. writing official documents
9. teamwork

10. 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

10. 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					

11. 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			

12. 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)

13. 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

14. 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)

15. 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)

16. 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
(e) Others (specify)

17. 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 and knowledge**	**Desired ICT skills and knowledge (list all that apply)**	**Priorities**
Policy level (expected to have *basic digital literacy skills, policy awareness, strategic IT management*)	Permanent secretaries,			
	Commissions and boards			
MDA Top Management (expected to have *basic digital literacy skills, policy awareness, strategic IT management, technical skills on use of e-government services, etc*)	Executive Directors, Directors and Commissioners			
	Functional Line Managers			
Operational Functional Staff (Non-ICT) (expected to have *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*)	Finance and accounting			
	Procurement			
	Human resource			
	Other professionals aligned to the sector <Add rows as appropriate >			
	Public relations			
Senior ICT Staff (expected to have *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*)	Head of ICT			
	ICT section heads			
ICT Technical Staff (expected to have *basic digital literacy skills, policy*	Systems administrators			

Level of Responsibility in the MDA (desired level of skills and knowledge)	Line position	Current observable ICT skills and knowledge	Desired ICT skills and knowledge (list all that apply)	Priorities
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)	Networks engineers			
	Software developers			
	IT end user support staff			

18. 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

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Thank you for your participation in this Study

Annex IX: Individual ICT Skills and Training Needs Self-Assessment Tool for STNA

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 behaviours 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.

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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

1. Does your MDA have an ICT policy?
2. Do you use e-government services?
3. What e-government services do you use?
4. Does your MDA annual provide ICT training programmes to staff ?
5. Yes b) No
6. If yes in 4, above list at least 2 trainings you attended organized or supported by your MDA (title, date and award (if any))
7. 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 behaviour

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					

Skill	1	2	3	4	5
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

a)
b)
c)
d)

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					

Skill	1	2	3	4	5
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

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Thank you for participating in this Study

Annex X: Key Informant Interview (KII) 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 (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 behaviours in your sector and establish the desired; ICT skills, knowledge and behaviours for various levels of responsibility in the targeted MDA's. The tool seeks opinions of individuals at the levels of, key sector opinion leaders, Board Members, Permanent secretaries and Executive Directors of target MDAs.

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Part one: Respondent Profile Information

1. Name: ..... Gender: .....
2. Phone:..... E-mail: .....
3. MDA:..... Designation (Position) .....
4. Organization:…….. .....
5. Years of experience at senior management level in the sector:
6. Highest Academic qualifications: .....
7. Professional qualifications: .....
8. How do you rank your ICT skills proficiency on the scale of 1-10, with 10 being the highest?

   .....
9. Do you use internet applications and social media? which ones and briefly state your experiences?

.....

.....

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 cadre in the service of government (MDA's) 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. On the scale of 1-5 with 5 being the highest, rank the current level of ICT competences for the following levels of responsibility in your MDA/ Sector, and state the kind of ICT skills each level possesses.

    - Policy level (Ministers and board members for MDAs)
    - 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 MDA's conducted?
7. Do MDA's have a dedicated budget vote for ICT skills capacity building? provide more details
8. Currently how are MDA's 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 programmes 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 programmes 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 Behaviour in MDA's and how to deliver them

1. Which key skills and knowledge are currently and will continue to be demanded by MDA's like yours for ICT professionals?

2. Which key skills and knowledge are currently and will continue to be demanded by MDA's 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 MDA's 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 XI: 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.

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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. 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? What knowledge is this?

3. E-Government requires every stakeholder to be ICT literate. ICT literacy can be broad. What do you consider to be the critical ICT skill that workers should have? Which of the skills do you feel have a bigger level of deficiency?

4. Uganda is using e-Government Some other countries are better while others are worse. What would you consider the ideal state of Uganda's use of e-Government? What effort do you think Uganda should make to achieve the ideal state earliest?

5. Different countries have different workplace cultures. Looking at a workplace environment of a typical Ugandan MDG, what aspects do you think promote or derail the e-Government effort? For those which may derail, suggest progressive interventions should be employed?

6. 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 par**ticipating in this Study**