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Digital skills capacity building needs assessment for priority sectors in Uganda

THE REPUBLIC OF UGANDA
MINISTRY OF ICT & NATIONAL GUIDANCE

Digital skills capacity building needs assessment for priority sectors in Uganda

Acknowledgements

This report was developed by the Ministry of ICT and National Guidance and the International Telecommunication Union (ITU), with the support of Divisions and Services in ITU Headquarters and ITU Regional Office for Africa under the Technical Assistance and Training to Uganda on National ICT Development Strategy' (2021-2024) project. The project is a collaboration between the Government of Uganda and ITU, supported by the Global Development and South-South Cooperation Fund (GDSSCF) and the ITU ICT Development Fund (ICT-DF).

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Foreword

As Uganda charts its path towards becoming a digitally enabled society, we are reminded of the transformative potential of Information and Communication Technology (ICT). It is not just a driver of innovation but a cornerstone for economic growth, inclusion, and resilience. The **Digital skills capacity building needs assessment for priority sectors in Uganda** represents a vital milestone in this journey, offering insights into how we can empower our citizens and industries to thrive in an increasingly digital world.

This work comes at a time when our government is steadfast in its commitment to addressing the digital divide. From education to agriculture and healthcare, every sector depends on ICT to achieve its full potential. Yet, the lack of sufficient digital skills continues to hinder progress. This report reveals the extent of these gaps and provides a framework for targeted action, ensuring that digital literacy and advanced ICT skills become accessible to all Ugandans.

The findings of this assessment highlight the practical realities that must be considered. Building digital capacity is central to our goals of equity, national competitiveness, and regional integration. The proposed capacity-building action plan aligns seamlessly with Uganda's strategic priorities, including the Third National Development Plan (NDPIII), the Digital Uganda Vision, and the broader agenda of transforming Uganda into a knowledge-based economy.

I am particularly encouraged by the emphasis on collaboration, which is evident throughout this report. It underscores the value of partnerships between government, the private sector, academia, and international development partners like the International Telecommunication Union (ITU). Together, we must implement these recommendations with urgency and focus, ensuring that digital skills development remains high on our national agenda.

This report is not an endpoint but a call to action. I pledge to work closely with all stakeholders to translate these findings into impactful programs and policies that benefit every Ugandan. Let us seize this moment to ensure that Uganda's digital transformation is inclusive, sustainable, and far-reaching.

Hon. Dr. Chris Baryomunsi
Minister of ICT and National Guidance

Foreword

It is my pleasure to present this report under the project 'Technical Assistance and Training to Uganda on National ICT Development Strategy', a collaboration between the Government of Uganda and the International Telecommunication Union, supported by the Global Development and South-South Cooperation Fund and ITU's ICT Development Fund.

Through carefully co-crafted interventions in support of the country's vision to transform Uganda into a digitally enabled society that is innovative, productive and competitive, the project has applied a three-pronged approach focusing on the development of policy recommendations, enabling capacity development, and the implementation of pilot projects.

In recent years, Uganda has witnessed tremendous growth in its digital economy, reflecting broader trends across the Africa region and globally. The increased access to digital technologies, new opportunities that connectivity has brought, and the surge in digital services are fueling rapid advancements on how citizens engage with one another and with vital government services. These developments also bring new challenges, requiring policy-makers and regulators to rethink strategically and build enabling policy and regulatory frameworks that are future-ready and adaptable to this ever-changing landscape. Moreover, digital skills remain essential for citizens to meaningfully participate in the digital space and for professionals to fully leverage the potential of digital technologies in addressing socio-economic challenges. This has been a critical aspect of the implementation of the policy interventions within this project.

Co-created and initiated in support of Uganda's ambitious digital transformation journey, this project stands as an example of how focused and meaningful partnerships can lead to impactful change. We have witnessed the results of the policy interventions and the impact of the significant capacity development in the country. I believe the efforts will continue to impact Uganda's transformation for years to come.

I encourage ITU Member States across Africa and globally as well as development partners to join forces and invest in digital transformation for social and economic growth. The Telecommunication Development Bureau stands ready to continue supporting countries on their digital transformation journeys with impactful project implementation and partnerships that are essential for achieving universal and meaningful connectivity and digital transformation for all.

Dr. Cosmas Luckyson Zavazava
Director of the Telecommunication Development Bureau
International Telecommunication Union

Foreword

The completion of the **Digital skills capacity building needs assessment for priority sectors in Uganda** is the result of a collective effort that demonstrates the power of collaboration and technical expertise. This work provides critical insights into the skills gaps within Uganda's priority sectors, offering a pathway for enhancing our nation's digital readiness.

First and foremost, I wish to extend my gratitude to the International Telecommunication Union (ITU) for their invaluable support throughout this initiative. Their technical expertise and commitment to Uganda's digital transformation have been pivotal in shaping the assessment and its outcomes.

I want to acknowledge the dedication of the technical officers in the Ministry of ICT and National Guidance and Uganda Institute of Information and Communications Technology (UICT), who worked tirelessly to ensure the success of this assessment. Their expertise in data collection, stakeholder engagement, and analysis was instrumental in producing a comprehensive and actionable report.

Furthermore, I extend my gratitude to government agencies, private sector organizations, and civil society partners who participated in the assessment. Their insights enriched the findings and ensured that the proposed solutions are practical and relevant. The collaborative spirit demonstrated by all stakeholders is a testament to what we can achieve when we work together towards a shared vision.

As we move forward, this report provides a clear roadmap for addressing the digital skills gaps that hinder our progress. The proposed capacity-building initiatives will not only enhance individual competencies but also strengthen Uganda's institutional frameworks for sustainable digital growth. To all who contributed to this work, your efforts have laid the foundation for a digitally inclusive and competitive Uganda.

Let us now focus on translating these findings into actionable programs and policies that leave a lasting impact. Together, we can ensure that Uganda's digital transformation is both equitable and effective.

Dr. Amina Zawedde (PhD)
Permanent Secretary
Ministry of ICT and National Guidance
Government of Uganda

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Abbreviations

Abbreviation	Definition
AI	Artificial Intelligence
DUV	Digital Uganda Vision
e-CF	e-Competence Framework
EAC	East African Community
GDP	gross domestic product
HCD	human capital development
HR	human resources
ICT	information and communication technology
ILO	International Labour Organisation
IoT	Internet of Things
IS	information systems
IT	information technology
ITU	International Telecommunication Union
KII	key informant interview
MIT	Massachusetts Institute of Technology
NDP	National Development Plan
NIISP	National ICT Initiatives Support Programme
NITA-U	National Information Technology Agency – Uganda
STA	Skills and Training Assessment
UICT	Uganda Institute of Information Communications and Technology
UMI	Uganda Management Institute
UNCDF	United Nations Capital Development Fund
UNESCO	United Nations Education, Science and Culture Organization
UNICEF	United Nations Children's Fund

Key definitions

Term	Definition
ICT professional	An expert specialized in the comprehensive design, development, implementation, testing, deployment, maintenance, support, documentation, policy analysis and procurement of digital systems. While many hold formal degrees in computer science, software engineering, or related fields, the definition also includes those with certifications or self-taught expertise from platforms such as Google and Massachusetts Institute of Technology (MIT) open courseware.
Non-ICT professional	Someone leveraging digital systems to achieve objectives in fields such as health care, finance and education. While their expertise is not tech-centric, they routinely use ICT tools in their roles, interacting with technology as an integral part of their daily functions.
Foundational digital skills	Digital skills workers need to safely benefit from, participate in and contribute to the digital world.
Advanced digital skills	Digital skills that mainly ICT professionals should possess. The advanced digital skills competency framework used in this study is based on the European e-Competence Framework for ICT professionals in all industry sectors.

Executive summary

Introduction

Context

Globally, information and communication technology (ICT) is pivotal in driving socio-economic development. It acts as a catalyst, enhancer and enabler of transformation, significantly raising national productivity by enhancing the efficiency, effectiveness and global competitiveness of government, businesses and academia.[1] With the Government of Uganda's various initiatives aiming to boost digital skills nationwide, ICT is positioned as a crucial element for development.

However, the digital sector still faces challenges, including inadequate infrastructure, limited human resources capacity, insufficient funding, weak partnerships and low public awareness. Furthermore, the lack of digital skills is significantly hampering progress across all sectors in Uganda, and the challenge extends far beyond the traditional focus on the telecom and ICT sectors. For instance, the education sector is struggling to integrate technology effectively into teaching and learning processes. This limits the ability of educators to use digital tools to enhance the learning experience and deliver education remotely, especially during disruptions such as the COVID-19 pandemic. In agriculture, modern techniques such as precision farming rely heavily on digital tools and data analysis. Farmers without digital skills cannot take advantage of technologies that increase productivity and efficiency. These challenges are complex and require multilevel efforts to address them holistically. Therefore, this digital skills needs assessment will identify and address some of the barriers related to human resource capacity to support Uganda's continued transformation into a digitally enabled society that is innovative and competitive.

About the assessment

This assessment seeks to analyse the most significant gaps in digital skills acquisition within key priority sectors in Uganda and propose training initiatives to bridge these gaps. It complements previous studies conducted by the National Information Technology Authority – Uganda (NITA-U)[2] and the Uganda Institute of Information Communications and Technology (UICT),[3] which identified challenges such as unharmonized deployment of ICT staff and misalignment between ICT in education, digital skills training and industry needs.

This digital skills needs assessment aims to identify and address the barriers related to human resources (HR) capacity among the public and private sectors, forming a critical part of the Technical Assistance and Training to Uganda on the National ICT Development Strategy project. This project aims to contribute to a strengthened digital policy and regulatory environment to enable Uganda to continue its transformation into a digitally enabled society that is innovative and competitive. The project falls under the Digital Uganda Vision (DUV) framework and is

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1 National Planning Authority (2020). Third National Development Plan (NDP III) 2020/21–2024/25. Available at https://www.npa.go.ug/wp-content/uploads/2023/03/NDPIII-Finale_Compressed.pdf.

2 NITA-U (2021). ICT skills and training action plan for RCIP implementing agencies and target sectors. Available at https://empowerconsult.co.ug/wp-content/uploads/2023/06/NITA-U_ICT-Skills-and-Training-Action-Plan.pdf.

3 UICT (2022). Final ICT skills and training assessment report.

structured in accordance with Uganda's Digital Transformation Programme outlined in the Third National Development Plan (NDP III), and the Digital Transformation Roadmap and stream on digital capacity.

The specific objectives of the digital skills needs assessment are to:

- Develop a methodology to conduct a digital skills assessment for priority sectors in Uganda, based on existing tools, including the ITU Digital Skills Assessment Guidebook, etc.;
- Assess current and emerging digital skills supply and demand to identify gaps and opportunities;
- Develop a capacity-building action plan for the priority sectors.

About the report

This report outlines the approach, findings and recommendations for the digital skills needs assessment. It includes the following:

- Methodology: Describes research design, data collection methods, sampling strategy and data analysis tools.
- Findings: Presents results from surveys, key informant interviews (KIIs) and desk reviews. It covers foundational and advanced digital skills. The digital skills needs assessment focused on foundational and advanced digital skills to address the most critical gaps impacting Uganda's digital inclusion and innovation capacity. By prioritizing these key areas, the assessment ensures a strategic approach to enhancing both basic digital literacy and high-end technical expertise, which are essential for driving economic growth and competitiveness.
- Gap analysis: Summarizes identified skills gaps, organizing them by sectoral, occupational and demographic levels.
- Capacity-building action plan: Proposes targeted training programmes and initiatives to address identified deficiencies, as well as an implementation plan and results framework.

Methodology

Phase 1: Research design

A multistep workforce planning process was used to determine current and future digital skills needs. This included sector prioritization, analysing the current and potential workforce, identifying workforce gaps, and proposing actions to address identified shortages and mismatches. This culminated in the development of the following research questions to guide the assessment:

- Selection of organizations: Which organizations are the highest priority to include in the assessment?
- Assessment of existing digital skills competencies: What is the current level of digital skills in priority industries?
- Assessment of future workforce needs: What digital skills are necessary to ensure optimal performance of the sector?
- Gap analysis: What differences exist between existing competencies and future workforce needs?
- Actions to address gaps: What (existing or new) initiatives would help to address the identified digital skills gaps?

Phase 2: Data collection

- Desk review: Consolidated existing data, including policy and programme documents, previous skills assessments and global digital skills frameworks. This enabled the refinement of the study scope ahead of primary data collection.
- Survey: Gathered data from 101 participants across various regions, focusing on both ICT and non-ICT professionals. The employee survey data collection instrument design was guided by an adaptation of the e-Competence Framework (e-CF) and the Essential Digital Skills Framework of the Government of the United Kingdom. Google forms were used to collect the data from respondents and analysed with Excel functions such as the pivot tables. Self-assessments were employed to evaluate digital skills, where participants rated their own knowledge, abilities, confidence or usage levels. The questions utilized predefined scales, such as a Likert scale (e.g. 1 to 5). This method was guided by the ITU Digital Skills Guidebook.
- Key informant interviews: Conducted with 51 senior-level staff to validate skills gaps and priority areas. The recorded data from the KIIs were categorized by thematic areas in Excel and analysed to identify common trends in respondents' statements.
- Panel of experts: Conducted a feedback session in plenary style with 23 key stakeholders across various sectors in order to validate initial findings.

Phase 3: Analysis, synthesis and reporting

Data analysis involved using Excel for quantitative data and thematic coding for qualitative data, culminating in insights that informed the final recommendations.

Study limitations

The study acknowledges limitations, including reliance on self-reported data, a sample size that is not fully representative of Uganda's digital economy, and potential biases in survey distribution and response rates. Regarding self-reported data, respondents might have overestimated or underestimated their digital capabilities due to a desire to present themselves favourably due to inaccurate recollection of their activities and experiences. While using self-reported data is a practical and widely used method in social research, the inherent subjectivity requires that the findings be interpreted with caution. Regarding sample size, the selected participants might not capture the full spectrum of demographic and geographic variations within the public and private sectors. These limitations were overcome via triangulation of data sources to validate self-evaluation insights, including KIIs with senior staff and cross-referencing with secondary data sources, including other assessments. Furthermore, survey responses were largely from the public sector, with limited input from private sector professionals. To balance this, the study included more private sector perspectives through KIIs, expert panels and discussions at the validation workshop, providing a more comprehensive view of digital skills across both sectors. Future studies should aim to include a larger and more representative sample to ensure broader applicability of the results.

Main findings

Foundational digital skills: These are essential for both ICT and non-ICT professionals, enabling safe and productive participation in the digital world. A survey assessing digital skills in Uganda revealed that some ICT professionals, especially recent graduates, lacked basic digital skills such as usage of office packages. Non-ICT professionals show significant gaps in digital literacy, social media use and project management, scoring lower than ICT professionals across all

competencies. Key areas for improvement include skills in remote work tools, online safety and advanced Excel usage.

ICT vs non-ICT professionals: ICT professionals exhibit stronger digital skills, averaging a 4.2 score (out of 5), compared to 3.3 for non-ICT professionals. However, there are still notable deficiencies in competencies such as project management, remote work tools and cybersecurity across both groups.

Priority sectors: The assessment covers Uganda's health, education and agriculture sectors. Health and agriculture outperform education in digital proficiency, though no significant skills gaps between sectors were found. Key informants identified challenges in adopting digital tools, especially in rural areas, and highlighted the need for better integration of e-learning platforms in education and advanced technologies in health and agriculture.

Age and gender differences: Younger professionals (under 25) rank higher in digital proficiency, while older employees, particularly those aged 56–65 years, struggle with foundational competencies such as remote work tools and ethical use of technology. Gender disparities persist, with males consistently ranking themselves higher in digital competencies, though evidence suggests females may underrate their abilities. Gender disparity in ICT roles also remains an issue, with women representing only 31.3 per cent of the ICT workforce in Uganda's ministries, departments and agencies.

Advanced digital skills: ICT professionals in Uganda score less than proficient in advanced digital skills, particularly in emerging technologies such as artificial intelligence (AI), Internet of Things (IoT) and cloud computing. Despite the potential of these technologies to transform sectors such as health and agriculture, a significant skills gap exists in their adoption and integration.

Identified skills gaps

Table 1 summarizes the skills gaps identified in the study. These are organized according to different levels (sectoral, occupational and demographic) and functions (leadership, ICT professionals and non-ICT professionals). At the sectoral level, skills gaps were identified across the different sectors of focus, indicating the need for specialized skills within specific sectors. Skills gaps were also identified across occupational levels, highlighting the need for targeted training and development for leadership of public and private institutions. The table also highlights skills gaps at the demographic level, focusing on different population groups, particularly older staff. The gaps identified are taken forward to the capacity-building action plan, where specific training initiatives are identified which will address the gaps.

Table 1: Skills gaps by level and function

	Sectoral	Occupational	Demographic
Organizational leadership		Business change management with a focus on building a digital mindset (for all managers in charge of leading and facilitating organizational change initiatives who have not previously undertaken similar training)	
		Data literacy for decision-making (for all managers in charge of performance management and improvement who have not previously undertaken similar training)	
ICT professionals	Database management for record keeping in health centres, tracking patient flow, and transitioning from analogue to digital platforms (for health sector professionals)	Data skills – Information management and data analysis (for all whose job descriptions align with building competencies and who have not previously undertaken similar training)	Baseline understanding of all emerging technologies (all ICT professionals)
		Digital marketing and social media (for all whose job descriptions align with enabling competencies and who have not previously undertaken similar training)	
		Blockchain technologies (for all whose job descriptions align with this and who have not previously undertaken similar training)	
		Cloud computing (for all whose job descriptions align with this and who have not previously undertaken similar training)	

Table 1: Skills gaps by level and function (continued)

	Sectoral	Occupational	Demographic
		Machine learning (for all whose job descriptions align with this and who have not previously undertaken similar training)	
		Advanced cybersecurity and network security (for all who have not previously undertaken cybersecurity training and who have roles relevant to cybersecurity)	
		Project management (for all whose job descriptions involve managing ICT projects effectively, within time and budget, and those who have not received this training)	
Non-ICT professionals	Data management, focusing on secure handling and usage of patient data (health sector professionals)	Data skills, i.e. collection, management, analysis, storage (for all who work with data and who have not previously undertaken similar training)	Foundational digital skills to include at a minimum remote work tools, handling information and context, and ethical use of technology (workers aged 55 years or above who have not previously undertaken similar training)
	E-learning platform access and utilization (education sector professionals in rural areas)	ICT in finance training to streamline financial processes, reduce manual tasks and optimize financial operations (for all local government finance officers)	Foundational cybersecurity, i.e. being safe and legal online (for all who have not previously undertaken cybersecurity training)
	ICT in agriculture, to include IoT devices and mobile phones for monitoring crop growth, environmental conditions and market information (agriculture sector professionals)	E-procurement systems training (for all procurement officers)	
		Digital ethics (for all who have not received any training on this)	

The identification of skills gaps at sectoral, occupational and demographic levels underscores the critical need for targeted capacity building in both ICT and non-ICT professions. Addressing these gaps is essential for several reasons, including improved leadership and management, enhanced sectoral competitiveness and inclusive workforce development. It ensures that both ICT and non-ICT professionals are well equipped to meet current and future demands, thereby fostering a more competent workforce to support attainment of national development objectives.

Capacity-building action plan

Training requirements

This section outlines the recommended training programmes to address the identified skills gaps. Table 2 details the specific training needs, target groups and potential providers. The training requirements span foundational and advanced digital skills that are crucial for the selected sectors. Professionals have been categorized based on their most significant skills deficiencies. Potential providers include local universities, private and public training centres, and professional development institutions offering practical, classroom-based sessions. Additionally, online platforms such as Coursera and edX – known for their flexible, high-quality courses tailored to various skill levels – are included. Providers were selected based on their track records, expertise in specific digital domains, and ability to offer flexible training modalities.

Table 2: Training requirements mapped to providers

Training requirement	Target group(s)	In-person providers	Online providers
Foundational cybersecurity (being safe and legal online	All who have not previously undertaken cybersecurity training	Kampala University, Aptech Computer Education	Google Cybersecurity Professional Certificate (Coursera)
Data skills (collection, management, analysis, storage)	Both ICT and non-ICT professionals who work with data and who have not previously undertaken similar training	Nakawa Institute of Business Studies, Makerere Business Institute, Clarke International University	Introduction to Database Management Systems from New York University (edX), Data Analysis and Visualization with Excel from PwC (Coursera)
Foundational digital skills (to include at a minimum remote work tools, handling information and context, and ethical use of technology)	Workers aged 55 years or above who have not previously undertaken similar training	UICT, Digital Literacy Initiative	Google IT Support Professional Certificate (Coursera)
Data management, focusing on secure handling and usage of patient data	Health sector non-ICT professionals	Makerere University, Uganda Martyrs University	Health informatics specialization by Johns Hopkins University (Coursera), Healthcare Data Management and Information Systems (Coursera)

Table 2: Training requirements mapped to providers (continued)

Training requirement	Target group(s)	In-person providers	Online providers
E-learning platform access and utilization	Education sector non-ICT professionals in rural areas	N/A (platform-dependent)	N/A (platform-dependent)
ICT in agriculture (to include IoT devices and mobiles for monitoring crop growth, environmental conditions and market information)	Agriculture sector non-ICT professionals	AgriTech Talk Africa, Uganda Technology and Management University	World Bank's e-learning on digital agriculture (edX)
Business change management with a focus on building a digital mindset	For all managers in charge of leading and facilitating organizational change initiatives	Makerere University Business School	Change Management
ICT for finance officers	All finance officers who have not previously undertaken similar training	Uganda Management Institute (UMI)	UMI (distance learning)
Machine learning	All ICT professionals who work in related roles	Makerere University	Machine Learning Specialization with DeepLearning.AI (Coursera)
Blockchain technologies	All ICT professionals who work in related roles	Refactory	Blockchain specialization from University of Buffalo (Coursera)
Emerging technologies introductory course	All ICT professionals	N/A	Emerging Technologies: From Smartphones to IoT to Big Data Specialization (Coursera)
Advanced AI course	All ICT professionals	Refactory	Oxford Artificial Intelligence Programme
Advanced IoT course	All ICT professionals	N/A	Advanced Professional Certificate in IoT by London School of Planning and Management
Advanced cloud computing course	All ICT professionals	UICT	Learn Cloud Computing From the Basics to Advanced on Udemy; Advanced Certification Course in Cloud Computing on ns3edu.com
Advanced course in Big Data	All ICT professionals	Uganda Christian University	Leveraging Big Data for Business Intelligence by University of Cambridge

Table 2: Training requirements mapped to providers (continued)

Training requirement	Target group(s)	In-person providers	Online providers
Advanced cybersecurity and network security	All ICT professionals who have not previously undertaken similar training whose roles are relevant to cybersecurity	International Business, Science And Technology (ISBAT) University, Kampala University	Advanced Cybersecurity Concepts and Capstone Project (Coursera)
E-procurement systems	All procurement officers who have not previously undertaken similar training	UMI	E-Procurement Learning (World Bank), E-Procurement (glomacs.com)
Digital marketing and social media	ICT professionals (with a focus on marketing) who have not previously undertaken similar training	Billbrain Institute of Technology, Houston Executive Consulting	Digital Marketing (Coursera)
Project management	For all ICT professionals involved in managing digital projects and those who have not received this training	Houston Executive Consulting, UMI	IT Project Management Course (itonline-learning.com/), IBM IT Project Manager Professional Certificate (Coursera)
Digital ethics	For all non-ICT professionals who have not received any training on this	N/A	Essential Data Ethics (Coursera), Data and Digital Ethics (University of Oxford)
Data literacy for decision-making	For all managers in charge of performance management and improvement who have not previously undertaken similar training	N/A	Learn the language of Data Course (thedataliteracyproject.org/), Data Literacy Essentials (Cambridge)

The table identifies specific training needs across foundational and advanced digital skills, highlighting the most critical areas for development within the selected sectors. This targeted approach ensures that training efforts are focused on the skills that are most deficient. By identifying precise training needs, categorizing professionals, and selecting reputable and flexible training providers, the table will provide some guidance for drafting a roadmap for effectively enhancing digital skills across various sectors.

Required enablers

To ensure the success of these training programmes, four critical enablers are highlighted: infrastructure, staff recruitment, partnerships, and enforcing policies on skills development. Adequate and affordable infrastructure is essential, including digital hardware, reliable connectivity, suitable physical spaces (e.g. server rooms and computer labs), and stable power supply. These needs are particularly acute in rural areas, where connectivity and power supply are less reliable. Additionally, recruiting skilled ICT personnel is crucial to filling gaps and

reducing reliance on external consultants. Financial constraints, budgetary restrictions and bureaucratic delays in restructuring organizational frameworks are noted as potential challenges to recruitment efforts. The quality and effectiveness of training programmes are significantly enhanced through partnerships with globally recognized training providers, such as Cisco, Microsoft and IBM. These institutions provide access to up-to-date curricula and resources, ensuring that training programmes align with international standards. Such partnerships not only enhance skills competencies, but also offer certifications that improve the employability of professionals. These collaborations foster an environment of continuous learning and innovation within the digital sector. Finally, the lack of enforced policies for skills development weakens training initiatives, leading to inconsistent participation and skills gaps. National policies ensure consistent, mandatory training across sectors, fostering a skilled workforce essential for Uganda's productivity and alignment with DUV 2040 goals.

Implementation plan

A phased implementation plan is proposed to ensure meticulous planning and smooth execution of the capacity-building action plan. The plan outlines specific steps and resources required over a 12-month period, with continuous monitoring and evaluation to ensure quality and effectiveness. The process includes:

- Planning and development: Defining project scope, identifying target staff, and creating a detailed budget.
- Development phase: Developing curriculum, selecting training providers, and organizing logistical aspects.
- Pilot phase: Conducting initial training to test effectiveness and refine programmes based on feedback.
- Implementation phase: Delivering full-scale training and providing ongoing support to participants.
- Evaluation phase: Assessing training effectiveness and gathering feedback.
- Continuous improvement phase: Regularly updating training programmes and strategies to meet evolving needs.

Results framework and risk management

The results framework outlines the expected impact and measurable outcomes, emphasizing the goal of transforming Uganda into a digitally enabled economy. It underscores the importance of equipping professionals with relevant digital skills to enhance organizational performance and drive economic growth. Additionally, a robust risk management strategy is detailed to proactively address potential challenges, ensuring the resilience and success of the training programmes. By addressing these key enablers and following a structured implementation plan, this study aims to significantly elevate the digital capabilities within Uganda's public and private sectors, ultimately contributing to the nation's digital transformation and global competitiveness.

1 Introduction

1.1 Context

Globally, ICT plays a pivotal role in driving development by acting as a catalyst, enhancer and enabler of transformation.[4] With its immense potential, it can significantly enhance national productivity by increasing the efficiency, effectiveness and global competitiveness of government, businesses and academia. Thus, ICT emerges as a vital force behind the advancement of social and economic development.

The Government of Uganda has initiated several programmes to enhance digital skills nationwide and promote ICT as a key driver for development. One such initiative is the National ICT Initiatives Support Programme (NIISP), designed to address bottlenecks in the digital ecosystem.[5] NIISP aims to create an open digital ecosystem by promoting the development and deployment of applications, enabling the Government, companies and individuals to innovate and reach new markets.[6] The programme facilitates the creation of a digital innovation ecosystem and marketplace for Ugandan digital products.

The push for digital innovation has led to the development of various solutions to support the digitization of government services across all public sectors. Notable examples include the Integrated Facility and Health Management Information System, which is a comprehensive solution that manages all processes at public health facilities, and has been deployed in all national and regional referral hospitals in Uganda[7]; and the Education Management Information System (EMIS), a locally developed system designed to manage student and institutional data across all levels of learning in Uganda. It is currently being deployed nationwide, and "CAUCAS Anywhere", an online collaboration platform, provides a virtual environment for educational institutions to conduct classes, and for meetings and events. It is currently used at the Uganda Institute of Information Communications and Technology (UICT). Additionally, the Government has constructed the National ICT Innovation Hub to support young innovators by providing a conducive environment for creating digital solutions for local and international markets.[8]

Despite these advancements, digital development in Uganda faces several challenges. According to the Ministry of Information and Communications Technology's ICT Sector Strategic and Investment Plan, the growth of the digital sector is hindered by inadequate infrastructure, insufficient human resources capacity, limited funding, weak partnerships, low public awareness, low adoption levels of e-services, limited investment in research and development, untapped local content, and a weak institutional framework. Furthermore, the lack of digital skills is severely hindering progress across all sectors in Uganda, not just in core areas such as telecom and ICT. For example, the education sector struggles to integrate technology into teaching, limiting the ability to enhance learning and provide remote education, especially during disruptions such as COVID-19. Similarly, in agriculture, the absence of digital skills prevents farmers from adopting

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4 National Planning Authority (2020). Third National Development Plan (NDPIII) 2020/21 – 2024/25. Available at www.npa.go.ug/wp-content/uploads/2020/08/NDPIII-Finale_Compressed.pdf.

5 Ministry of ICT and National Guidance (n.d.). Support for ICT Innovation. Available at https://ict.go.ug/initiatives/support-for-innovation/.

6 Ministry of ICT and National Guidance (n.d.). National ICT Initiatives Support Programme. Available at https://ict.go.ug/programmes/national-ict-initiatives-support-program/#:~:text=The%20NIISP%20tackles%20bottlenecks%20to.

7 Ministry of ICT and National Guidance (n.d.). Support for ICT Innovation. Available at https://ict.go.ug/initiatives/support-for-innovation/.

8 Ibid.

modern techniques such as precision farming, which are essential for improving productivity and efficiency. These challenges are complex and require multilevel efforts to address them holistically. This digital skills needs assessment aims to identify and address some of the barriers related to human resource capacity.

1.2 About the assessment

The Technical Assistance and Training to Uganda on the National ICT Development Strategy project aims to contribute to a strengthened digital policy and regulatory environment to enable Uganda to continue its transformation into a digitally enabled society that is innovative and competitive. The project falls under the Digital Uganda Vision framework, and is structured in accordance with Uganda's Digital Transformation Programme outlined in NDP III. Increasing the digital human resources capital is one of the key objectives of the Digital Transformation Programme, noting initiatives such as developing a well-grounded digital professional workforce, developing an ICT professional's quality assurance framework, and providing digital literacy training, among others. In line with NDP III, the Digital Transformation Roadmap and DUV framework, the Technical Assistance and Training to Uganda on the National ICT Development Strategy project aims to deliver this through implementation of meaningful actions under the following three components, which are mutually reinforcing: (a) policy and strategy recommendations; (b) cross-cutting capacity development; and (c) design and implementation of pilot projects and use cases to support the recommendations.

This assessment is a key feature of the capacity development component of the project. The intended use of the needs assessment is to facilitate the co-design of digital skills development initiatives with stakeholders, including the Ministry of ICT and National Guidance, ITU and UICT. This requires an analysis of the most significant gaps in digital skills acquisition in key priority sectors in Uganda and the development of training initiatives to reduce these gaps.

This study will complement previous studies conducted on the digital sector of Uganda. Notable among recent work are digital needs assessments conducted by NITA-U[9] and UICT.[10] These studies sought to address some underlying challenges including (a) unharmonized and disjointed deployment of ICT staff in ministries, departments and agencies and local governments; (b) absence of professional and common digital leadership guidelines/standards in ministries, departments and agencies and local governments; (c) a need to update and/or develop public service human resource policies and regulations to cover ICT cadre; (d) misalignment between digital education programmes offered by academia, digital skills training and digital skills needs of the industry, and mindset change among public officers to transition from paper-based approaches to digital-based approaches.

Given this background, the specific objectives of this digital skills needs assessment study are to:

- Develop a methodology and plan to conduct a digital skills assessment for priority sectors in Uganda.
- Assess current and emerging digital skills supply and demand in priority sectors, with a view to identify gaps and opportunities, and detect specific needs that, if addressed, can spur the digital economy in Uganda.

[9] NITA-U (2021). ICT skills and training action plan for RCIP implementing agencies and target sectors. Available at https://empowerconsult.co.ug/wp-content/uploads/2023/06/NITA-U_ICT-Skills-and-Training-Action-Plan.pdf.

[10] UICT (2022). Final ICT skills and training assessment report.

- Develop a capacity-building action plan for the priority sectors.

1.3 About the report

This report presents the approach, findings and recommendations for the digital skills needs assessment. It details the specific methods used to investigate the topic and the steps followed to achieve the final results.

The remainder of the report is structured as follows:

- Methodology: This section outlines the research design and methods used to conduct the digital skills needs assessment. It includes details on data collection techniques, such as surveys and key informant interviews (KIIs), as well as the desk review process. The methodology section explains the sampling strategy, the tools used for data analysis (such as Excel for quantitative data and thematic coding for qualitative data), and the rationale behind the chosen approaches.
- Findings: The findings section presents the results of the digital skills needs assessment, drawing from the survey responses, KIIs and desk review. This section provides a detailed analysis of the self-reported competencies of public and private sector workers, both ICT and non-ICT professionals, and contextualizes these findings within the broader landscape of digital skills in Uganda. The section first covers foundational digital skills before moving to advanced digital skills.
- Gap analysis: This section summarizes the key gaps that have been identified in the findings, collating the gaps identified in each section, highlighting specifically who the gaps are relevant to, and organizing them according to different levels (such as sectoral, occupational and demographics) and functions (such as leadership, ICT professionals and non-ICT professionals).
- Capacity-building action plan: Based on the identified gaps and needs, this section outlines the specific digital training requirements required for priority sectors in Uganda. It provides recommendations for targeted training programmes and initiatives to address the deficiencies in digital skills. The training requirements section discusses the types of training needed, potential delivery methods (including offline and online), and the target audience for each training programme. It also discusses the prerequisite enablers to successful skills training. The plan also incorporates an implementation plan, results framework and risk management matrix.

2 Methodology

2.1 Phase 1: Research design

2.1.1 Sector prioritization

The initial step in determining the scope of the study involved selecting which sector or sectors the assessment would focus on. This process involved initial discussions with Genesis Analytics, the Ministry of ICT and National Guidance, UICT and ITU during an inception meeting that took place in February 2024. Representatives from the Ministry of ICT and National Guidance suggested focusing on programmes in the NDP, as they reflected plans to develop priority sectors in Uganda and had established interdepartmental working groups for engagement.

They emphasized that sector working groups had been established and tasked with identifying all the programme interventions to be implemented by their respective ministries, departments and agencies. These interventions would be integrated into the sector development plans and the strategic plans of the respective ministries, departments and agencies, making engagement crucial. The NDP III also noted that fully functional working groups only existed in a few sectors, including health; justice, law and order; education; and energy. This was useful for the purposes of this assessment, given the need to narrow down on specific industries upon which to focus, as well as to secure stakeholders to engage with.

A set of criteria was developed to select programmes from NDP III to focus on for this study. NDP III has 18 programmes aimed at achieving the desired outcomes outlined in the plan. These programmes align with Uganda's commitments to regional and international development frameworks, as well as address cross-cutting issues. The project team presented the criteria to prioritize these programmes during the inception meeting, and these criteria are further developed below.

Table 3: Criteria for sector selection

Criteria	Description
Sector size	Understanding the size of each sector, both in terms of contribution to gross domestic product (GDP) and to employment, is crucial because larger sectors typically have a higher impact on the economy and society. Prioritizing sectors with larger sizes ensures that the digital skills and training initiatives can reach a broader audience and have a more significant overall impact. Sectors with a larger size may also indicate greater potential for growth and development, making them strategic targets for investment in digital skills and training to support their expansion.
Importance of digital technology to the sectors	Assessing the importance of digital technology to each sector helps identify which industries rely heavily on technology for their operations, productivity and competitiveness. Sectors that heavily depend on digital technology are likely to experience a greater demand for digital skills, ICT professionals and ongoing training to keep up with technological advancements. Prioritizing sectors where digital technology plays a critical role ensures that investments in skills and training will directly contribute to enhancing the sector's performance, innovation and overall economic development.

Table 3: Criteria for sector selection (continued)

Criteria	Description
Scale of capacity-building needs	Evaluating the scale of capacity-building needs within each sector involves assessing the current digital skills gap, identifying specific areas where skills are lacking, and estimating the level of training required to address these gaps. Sectors facing significant shortages in skilled ICT professionals or experiencing rapid technological advancements may have higher capacity-building needs. Prioritizing sectors with substantial capacity-building needs ensures that resources are directed towards areas where they can make the most significant impact in bridging the skills gap and improving sectoral performance.
Ease of key stakeholder identification	Identifying key stakeholders within each sector – such as industry associations, government agencies, educational institutions and private sector organizations – is essential for effective collaboration and support in implementing digital skills and training initiatives. Sectors with easily identifiable key stakeholders who are willing to participate and support capacity-building efforts are more likely to facilitate successful implementation and sustainability of digital skills programmes. Prioritizing sectors where key stakeholders are readily accessible and engaged ensures smoother coordination, resource mobilization and stakeholder buy-in for the digital skills and training needs assessment.

By considering these criteria collectively, the project team systematically evaluated and prioritized NDP programmes in Uganda for conducting a digital skills and training needs assessment. Each criteria was ranked from 1 (the lowest possible score) to 5 (the highest possible score). The full scoring is found in section 7.5, Annex V: NDP programme prioritization.

The human capital development (HCD) and agro-industrialization programmes were the highest ranked out of the 18. Following this, the emerging sectors from these programmes were further assessed. For the HCD programme, this would involve a comprehensive assessment of the needs of education and health industries in Uganda. While the HCD programme includes several other sectors – including social protection, water, sanitation and hygiene – the study scope was limited to the education and health sectors only. This is because they constitute a majority of the HCD programme budget, with over 50 per cent allocated to education and over 35 per cent allocated to health. Furthermore, education (particularly secondary schools) is a core focus of the Ministry of ICT and National Guidance's National Digital Transformation Roadmap. The scope was partly extended to agro-industrialization after subsequent discussions with the Ministry of ICT and National Guidance, UICT and ITU, as stakeholders highlighted that agriculture was a key sector to cover. Furthermore, agro-industrialization was deemed by the prioritization exercise as the second most relevant programme. This is mainly due to the dominance of agriculture in Uganda as the largest employer, accounting for 66 per cent of employment in the country.[11]

2.1.2 Technical approach

The overarching technical approach adopted to understand the need for digital skills in Uganda was a needs assessment to build the capacity of policy-makers, industry and academia. A needs assessment is a process for determining the needs, or "gaps", between a current and

[11] ILOSTAT (2024). Employment in Agriculture. Available at https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=UG.

desired outcome. In other words, the needs assessment compares the "as-is" scenario of digital skills with the "to-be" desired scenario. An approach for undertaking a needs assessment in a workforce planning context, developed by the Chartered Institute of Professional Development, is articulated in Figure 1.

Figure 1: Steps in the workforce planning process

This workforce planning process is composed of six steps and can be applied to the development of a capacity-building needs assessment:

- Understand the organization and its environment: In this context, this involves the selection of specific organizations and industries on which to focus. This process was outlined in the previous section.
- Analyse the current and potential workforce and determine future workforce needs: In this context, this involves identification of specific ICT roles within the workforce to understand what is needed, to compare with what skills are currently available.
- Identify workforce gaps against future needs: This stage involves mapping the target digital skills in specific roles and organizations to the reality of the digital skills in the current workforce. This will form the basis of the proposals for actions to address skills mismatches.
- Actions to address shortages, surpluses and skills mismatches: In this context, this involves the recommendation for specific training initiatives based on the gaps identified in the previous step.

2.1.3 Research framework

The steps in the workforce planning process correspond to the questions in our research framework in Table 4. There are five key research questions which correspond to this. Given the scope of the study, the research framework does not include the sixth step: to monitor and evaluate actions. The research questions are articulated in Table 4, and data sources are indicated based on how they were used to answer each question. Each data source is explained in depth in the next section, entitled "Data collection".

Table 4: Research questions

Research questions	Secondary data sources			Primary data sources	
	Policy documents	Previous digital skills assessments	Digital skills frameworks	Employer survey	Key informant interviews
Selection of organizations: Which organizations are the highest priority to include in the assessment?	x				
Assessment of existing digital skills competencies: What is the current level of digital skills in priority industries?		x		x	x
Assessment of future workforce needs: What digital skills are necessary to ensure optimal performance of the sector?	x	x	x	x	x
Gap analysis: What differences exist between existing competencies and future workforce needs?			x		x
Actions to address gaps: What (existing or new) initiatives would help to address the identified digital skills gaps?		x	x		x

2.1.4 Scope of digital skills

In conducting the digital skills needs assessment for Uganda, the decision to focus on foundational and advanced digital skills was driven by strategic considerations aligned with the current and future demands of the digital economy. The framework was designed to address the most critical gaps and opportunities that would have the greatest impact on national development. Foundational digital skills are the essential building blocks for any digital engagement. Ensuring that all citizens have access to and proficiency in foundational digital skills is a prerequisite for broader digital inclusion and participation. Without a strong foundation, individuals cannot effectively engage with more complex technologies or contribute meaningfully to the digital economy.

At the other end of the spectrum, advanced digital skills are necessary for driving innovation, technological development and maintaining a competitive edge in the global market. These skills are critical for sectors that are rapidly evolving and require highly specialized expertise, such as data science, cybersecurity and software engineering.

The choice to focus on foundational and advanced skills was also informed by the pressing needs identified in the preliminary stages of the assessment. Foundational skills gaps were identified as a barrier to digital literacy and basic participation in the digital economy, while

advanced skills shortages were identified as a limiting factor in Uganda's ability to innovate and compete internationally. The strategic decision to focus on foundational and advanced skills was made to maximize the impact of the assessment within the scope of the project. By concentrating on these key leverage points, the report provides actionable insights that can drive significant improvements in Uganda's digital capabilities.

2.2 Phase 2: Data collection

2.2.1 Desk review

A desktop review was conducted to gather and analyse existing information from existing key secondary sources. This would provide a comprehensive understanding of the state of digital skills needs in the selected sectors in Uganda. This was conducted at the outset mainly to inform primary data collection tool design. After reviewing the secondary data sources, the team identified gaps in existing knowledge that the primary data could potentially address.

Scope definition was critical for this assignment, given that a similar assignment on digital skills in Uganda had been conducted in 2020 and 2021. The desktop review was used to refine and define the scope of the assessment by understanding what has already been studied and what remained to be explored. Therefore – in consultation with the Ministry of ICT and National Guidance, UICT and ITU – the project team reaffirmed what the intended focus of this assignment was. This enabled the team to outline a clear value addition rather than duplicate existing work.

The desk review also allowed for comparison with findings from other studies to validate or challenge the research outcomes of our study. This was specifically for similar assessments conducted in Uganda. For other digital skills assessments conducted by ITU in other contexts such as Kenya and Nigeria, the project team compared the various approaches and methodologies to learn what was best to apply in the Ugandan context.

The three forms of secondary data collection used in the desk review are policy documents, previous digital skills assessments and digital skills frameworks. A further description of the type of documents, the authors, year of publication and significance to the study are listed in under section 7.1, Annex I: Literature consulted.

2.2.2 Survey

The employee survey data collection instrument design was guided by an adaptation of the e-Competence Framework (e-CF)[12] and the United Kingdom Government's essential digital skills framework.[13] The eventual framework is an amalgamation of competence categories from the United Kingdom Government's essential digital skills framework – whose focus is on foundational digital skills (such as communicating, handling information and content, transacting, problem solving and being safe and legal online) – as well as the e-CF, which presents the categories Plan, Build, Run, Enable and Manage, which align with systems thinking

[12] European Commission (n.d.). European e-Competence Framework (e-CF). Available at https://esco.ec.europa.eu/en/about-esco/escopedia/escopedia/european-e-competence-framework-e-cf#:~:text=The%20European%20e%2DCompetence%20Framework.

[13] United Kingdom Department for Education (2018). Essential digital skills framework. Available at www.gov.uk/government/publications/essential-digital-skills-framework.

and the software development lifecycle competencies. The eventual framework used in this assessment has the categories Foundational Digital Skills, Plan, Build, Run, Enable and Manage indicated in section 7.6, Annex VI: Competency framework. Consequently, the survey instrument included a section on Foundational Digital Skills (which was completed by ICT and non-ICT professionals), as well as the other sections, namely Plan, Build, Run, Enable, Manage, Emerging Technologies and Shared Services (completed by only ICT professionals).

The purpose of the employer survey was to rapidly obtain information describing the characteristics, skills and competencies of ICT professionals and non-ICT professionals across Uganda. The definitions of ICT and non-ICT professional in the context of this work are as follows: An ICT professional is an expert specialized in the comprehensive design, development, implementation, testing, deployment, maintenance, support, documentation, policy analysis and procurement of ICT systems. While many hold formal degrees in computer science, software engineering or related fields, the definition also includes those with certifications or self-taught expertise from platforms such as Google and MIT open courseware. Conversely, non-ICT professionals are defined as leveraging digital systems to achieve objectives in fields such as health care, finance and education. While their expertise is not tech-centric, they routinely use digital tools in their roles, interacting with technology as an integral part of their daily functions. The survey focused on identifying and assessing competencies and skills of the current workforce in the public and private sectors, mainly in health, education and agriculture. Respondents from other agencies also contributed to the survey as a point of comparison.

The survey targeted ICT and non-ICT recipients differently. Representatives for the ICT professionals are ICT managers/supervisors/officers who are covered under the schemes of service resident in the Ministry of ICT and National Guidance. Representatives for non-ICT professionals are human resources managers who distributed the survey to their counterparts in other departments such as finance, administration and procurement. This included junior and mid-level staff across both ICT and non-ICT fields. The survey consisted of two sets of questions, one for foundational digital skills and one for advanced digital skills. ICT professionals were requested to answer both sets of questions so that their foundational and advanced digital skills were well understood. Non-ICT professionals were requested to answer the questions related to understanding foundational digital skills only.

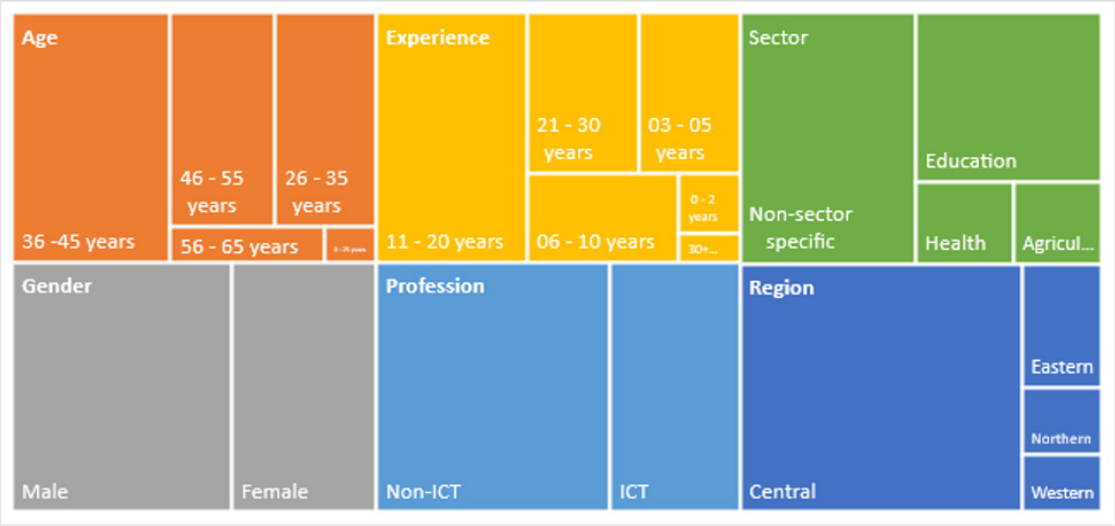
Competencies were ranked by survey respondents according to a five-point Likert scale. One is the minimum (worst-case scenario) and five is the maximum (best-case scenario). The anchors used were 1 = novice, 2 = beginner, 3 = intermediate, 4 = proficient, and 5 = expert. Reference to these figures is made throughout the assessment. Scores significantly below "proficient" are considered as gaps, particularly if other data sources also note these areas as gaps. This self-assessment approach of asking participants to rate their own level of knowledge, ability, confidence or usage to measure digital skills was informed by the ITU Digital Skills Assessment Guidebook.

For the purposes of quality assurance, all survey tools developed were validated by UICT and other stakeholders of interest. Letters were delivered to offices of ministries, departments and agencies, and private sector organizations, to inform superiors of the survey and to encourage workers to complete it. The survey included a diverse group of 101 participants, such as ICT officers, records officers, network and systems administrators, auditors, data clerks and others. These participants were drawn from various regions of Uganda – including Eastern, Western, Central and Northern –ensuring broad geographical representation. However, the majority of respondents, about 76 per cent, were from Central Uganda. The surveys were conducted from

10 June 2024 to 21 June 2024. The list of organizations that responded, the demographics and job types of respondents to the survey have been included in section 7.3, Annex III: Profile of survey respondents.

Figure 2 illustrates the breakdown of survey respondents. Each colour represents the total number of survey respondents that participated in the study (101 respondents). The size of each box within the colour represents the breakdown of respondents according to specific characteristics. As demonstrated by the graph, the largest groups to have participated in the survey are 36–45 years of age, 11–20 years of experience, non-sector-specific, male, non-ICT professionals, in the Central region.

Figure 2: Characteristics of survey respondents



2.2.3 Key informant interviews

The project team held KIIs with senior-level staff members of selected institutions across the health, education and agriculture sectors. Participants were mainly those responsible for making key decisions that affect policy or procedural changes in the digital sector. Senior staff members were asked similar questions to the junior and mid-level staff in the survey.

A KII was used for senior-level staff because it was deemed more appropriate for those in such influential positions, and this approach was more likely to yield higher response rates than responding to surveys. These interviews were focused on validating the current skill levels within the industry as outlined in our needs assessment, and the priority focus areas of government for ICT and digital skills geared towards the NDP inputs. These interviews offered an opportunity to establish any ongoing and anticipated interventions to close any existing gaps in the digital sector competencies and skills.

The KIIs involved a diverse group of 51 participants, including heads of ICT departments, ICT officers, commissioners, senior education officers, union presidents and others. The surveys were conducted from 10 June 2024 to 21 June 2024. The list of informants that responded to the request for interviews have been included in the annexes under section 7.4, Annex IV: Details of key informants.

2.2.4 Panel of experts

As part of the broader activities of the project, it was proposed by ITU and the Ministry of ICT and National Guidance to set up a panel of experts in digital skills in Uganda. This panel would act as validators of the assessment and be involved at various stages, including initial findings and at the final national validation workshop. The specific objectives of the panel of experts workshop, which was held on 19 June 2024, were:

- To share initial findings of the assessment, which identified digital skills gaps, and to validate the initial direction and/or steer the assessment accordingly;
- To brainstorm on what initiatives in the Uganda digital ecosystem could be appropriate to address the digital skills gaps that have been identified.

The panel was representative of a diverse array of stakeholders from government ministries and agencies, training institutions and the private sector within Uganda's dynamic digital skilling ecosystem. Among those represented were the Ministry of Health, Uganda Communications Commission, Uganda Institute of Information and Communication Technology, and a prominent private hospital in Kampala. The list of those in attendance is noted in section 7.2, Annex II: Panel of Experts.

2.3 Phase 3: Analysis, synthesis and reporting

The project team employed multiple data analysis techniques to comprehensively assess the digital skills needs within priority sectors in Uganda. Both primary and secondary data collected were analysed using specific methods to derive insights, which collectively informed our findings and recommendations.

The survey data collected from public sector workers were analysed using Excel, leveraging pivot tables to organize and summarize the data efficiently. This quantitative analysis enabled us to identify patterns and trends in self-reported digital competencies across different sectors. The use of pivot tables allowed for dynamic data sorting and filtering, making it easier to cross-tabulate variables and draw out significant correlations and insights. It also allowed ease of data visualization, and the graphs from the survey appear throughout the findings section of the report.

The KII data were qualitatively analysed through a process of coding and theme identification. Transcripts from the interviews were systematically coded to categorize responses into various themes and trends. This thematic analysis helped to uncover underlying patterns and insights. KIIs provided in-depth insights and supplemented the survey data. They allowed us to ask open-ended questions and receive detailed answers, offering a richer understanding of the digital skills landscape. This qualitative data helped to contextualize the survey findings, and provided narrative evidence to support our conclusions.

The desk review involved systematically reviewing existing literature, reports and documents related to digital skills in Uganda and other relevant contexts. This secondary data analysis identified what is already known about digital skills within the public and private sectors, providing a foundation upon which the primary data could build. The desk review also helped identify existing digital training initiatives and gaps, informing the overall context of our study.

2.4 Study limitations

This study aimed to assess the digital skills needs of specific sectors within priority sectors in Uganda. While the study provides valuable insights, several limitations are acknowledged:

- Self-reporting of competencies: One of the primary limitations of this study is the reliance on self-reported data for assessing digital competencies. Both ICT and non-ICT professionals were asked to rate their own skills. Self-assessment can often be subjective, leading to potential biases. Participants might overestimate or underestimate their abilities due to a lack of objective benchmarks, varying interpretations of skill levels, or social desirability bias. The study attempts to mitigate this by triangulating data sources, relying not only on self-reporting of competencies, but also on the views of senior colleagues, as well as the results of previous studies.
- Sample size: The study's findings are partly based on survey responses from 101 participants and KIIs with 51 participants. This sample size is not representative of all ICT and non-ICT professionals across the entire private and public sector in health, education and agriculture. It seeks instead to provide a snapshot of the key skills gaps within the priority sectors, and to propose training initiatives for these key gaps. While the sample is not representative, it is recognized to be large enough to draw key insights for the digital economy and thus to propose a plan of action.
- Survey distribution and response rate: The method of survey distribution and the resulting response rate may have introduced some bias. It is possible that those who chose to participate in the survey have a particular interest or higher proficiency in ICT, skewing the results towards more favourable self-assessments of digital competencies. Furthermore, the survey responses were predominantly from the public sector, with limited representation from both ICT and non-ICT professionals in private sector organizations. To address this imbalance, the study sought to mitigate the skew by incorporating more private sector perspectives through KIIs, expert panel discussions and focused conversations during the validation workshop. This approach ensured a broader range of insights and a more balanced understanding of digital skills across both the public and private sectors.

3 Findings

This section outlines the findings of the skills assessment. It is organized according to the type of digital skills being assessed. Firstly, foundational digital skills are outlined, where competencies are assessed by professional category, sector of the economy, age and gender. Foundational digital skills were assessed for both ICT and non-ICT professionals. Secondly, advanced digital skills are outlined, organized according to the competence framework categories Plan, Build, Run, Enable, Manage, Emerging Technologies, and Shared Services and Outsourcing. Only ICT professionals are assessed for advanced digital skills.

3.1 Importance of digital technology in priority sectors

While the importance of digital technology in priority sectors is discussed in the inception report, this section complements this analysis with KII inputs outlining the importance of digital technology to their specific organizations. Participants in the KII highlighted the critical role of digital technology in achieving their organizational objectives across the health, education and agriculture sectors. The responses underscored several key themes, including data management, communication efficiency, process automation and support for core functions.

Respondents emphasized the importance of digital technology in managing the extensive data accumulated by organizations, especially those working with non-governmental organizations. The digitization of paperwork through computers and systems has streamlined processes, reducing the burden of manual data handling. For instance, in the health sector, systems such as the Integrated Health Management System (IHMS) help in generating reports and managing information, thereby minimizing data leakages. Similarly, electronic medical records ensure efficient management of biographical data of patients. The automation of health services and the use of IHMS for information management demonstrate digital technology's role in enhancing health-care delivery.

Digital technology has significantly improved communication within organizations. Various platforms such as WhatsApp and e-mail facilitate the swift exchange of information between technical and administrative entities. This enhancement in communication saves time and ensures that information reaches the intended recipients quickly and accurately. This aspect is particularly crucial for organizations with widespread operations, enabling them to maintain coordination and efficiency.

The automation of administrative and operational processes is another major benefit of digital technology highlighted by participants. Many organizations have transitioned to electronic systems, reflecting the broader shift towards an e-economy. For example, educational institutions and health services have automated their administration and service delivery processes, making operations smoother and more efficient. Local governments also benefit from digital technology by simplifying implementation processes at the grassroots level.

While digital technology may not be the primary focus for some organizations, it remains a vital support function. For instance, in sectors such as education, digital technology supports the development and implementation of curricula through research, data analysis and stakeholder engagement. The automation of educational services also points to the integral role of digital technology in modernizing education and improving service delivery. The adoption of Learning Management Systems (LMS) for e-learning is an example of how digital technology is modernizing education systems. In health services, digital technology facilitates

crucial processes such as blood transfusions and electronic health records management. Even organizations where digital technology is not the core function acknowledge its importance in supporting their primary activities.

Overall, digital technology is understood to be vital for helping organizations and the economy as a whole. It enhances efficiency, improves communication, automates processes and supports core functions across various sectors. This demonstrates the potential that digital technology has to help organizations achieve their objectives and ultimately to enable Uganda to become a digitally enabled economy. Ensuring that these organizations have the skills that can enable this is the focus of the remainder of this assessment.

3.2 Foundational digital skills

Both ICT and non-ICT professionals should possess foundational digital skills. They are the skills that workers need in order to safely benefit from, participate in and contribute to the digital world. The foundational digital skills competency framework is loosely based on the essential digital skills framework from the United Kingdom Department for Education.[14] This has been adapted to suit the context, and enable participants to easily rank themselves on each of the competencies. Additional competencies have been included to make the framework suitable for professionals.

Table 5: Foundational digital skills framework

Focus area	Competency
Foundational	Ability to turn on a device, use device controls, utilize accessibility tools, interact with home screen, understand the Internet and Wi-Fi connection, keep passwords and personal information secure, update passwords
Communicating	Ability to set up e-mail and digital messaging, use word processors, share documents, use video communication tools, use social media
Handling information and content	Ability to assess online information reliably, use search engines effectively, bookmark, use cloud storage, organize files and folders, access legal entertainment
Transacting	Ability to set up online accounts for transactions, access public services online, use online payment systems, upload necessary documents, manage money online securely
Problem solving	Ability to find problem-solving information online, use online help and chat facilities, learn from tutorials and forums
Being safe and legal online	Ability to authenticate requests for accounts, use secure passwords, adjust privacy settings, identify secure websites, recognize suspicious links, backup information
Internet browsing and research	Ability to efficiently search, retrieve and evaluate information from the Internet, utilizing search engines and online databases to support decision-making and problem-solving

[14] United Kingdom Department for Education (2018). Essential digital skills framework. Available at www.gov.uk/government/publications/essential-digital-skills-framework.

Table 5: Foundational digital skills framework (continued)

Focus area	Competency
Data management and organization	Basic understanding of data handling, storage and organization principles to manage and maintain information in digital formats effectively
Adaptability and continuous learning	Willingness and ability to adapt to new technologies, software updates and digital tools, along with a commitment to continuous learning and professional development to stay updated with the latest trends and advancements in ICT
Collaboration and teamwork	Capacity to collaborate effectively with ICT professionals and cross-functional teams, communicate ICT-related needs and requirements, and work collectively towards achieving common goals and objectives
Ethical and responsible use of technology	Understanding of ethical considerations, privacy regulations and responsible use of technology, including adherence to organizational policies, legal requirements and best practices related to ICT usage and data protection
Project and time management	Basic project management skills to plan, organize and prioritize tasks, manage time effectively, and meet deadlines using project management tools and software

Previous assessments have shown that professionals in Uganda's priority sectors lack basic digital skills, but limited detail of which skills are lacking is made available. Previous assessments of digital skills in Uganda include those undertaken by NITA-U and UICT.[15], [16] They find that 16 per cent of ICT professionals, particularly new ICT graduates, lack even basic digital skills, such as usage of office packages. While this is identified as a problem, the specific skills that specific employees lack are not clearly laid out. The survey conducted as part of this assessment seeks to address this gap.

3.2.1 ICT vs non-ICT professionals

This section assesses the difference between ICT and non-ICT professionals in their foundational digital skills. Previous studies have found that non-ICT professionals lacked specific digital skills, including basic digital literacy, social media use, basic troubleshooting, use of project management software such as Microsoft Excel and Microsoft Project, report writing, and use of e-government infrastructure.[17] Previous studies have also uncovered that some ICT professionals even lacked basic digital skills, especially in office applications.[18]

The survey conducted as part of this assessment found a significant disparity between the foundational digital skills of ICT and non-ICT professionals. Across all competencies, ICT professionals averaged a score of 4.2, which is between "proficient" (4) and "expert" (5). Conversely, non-ICT professionals averaged a score of 3.3 across all competencies, or between "intermediate" (3) and "proficient" (4). This finding is perhaps not surprising, given that ICT professionals are likely to have higher digital skills.

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15 NITA-U (2021). ICT skills and training action plan for RCIP implementing agencies and target sectors. Available at https://empowerconsult.co.ug/wp-content/uploads/2023/06/NITA-U_ICT-Skills-and-Training-Action-Plan.pdf.

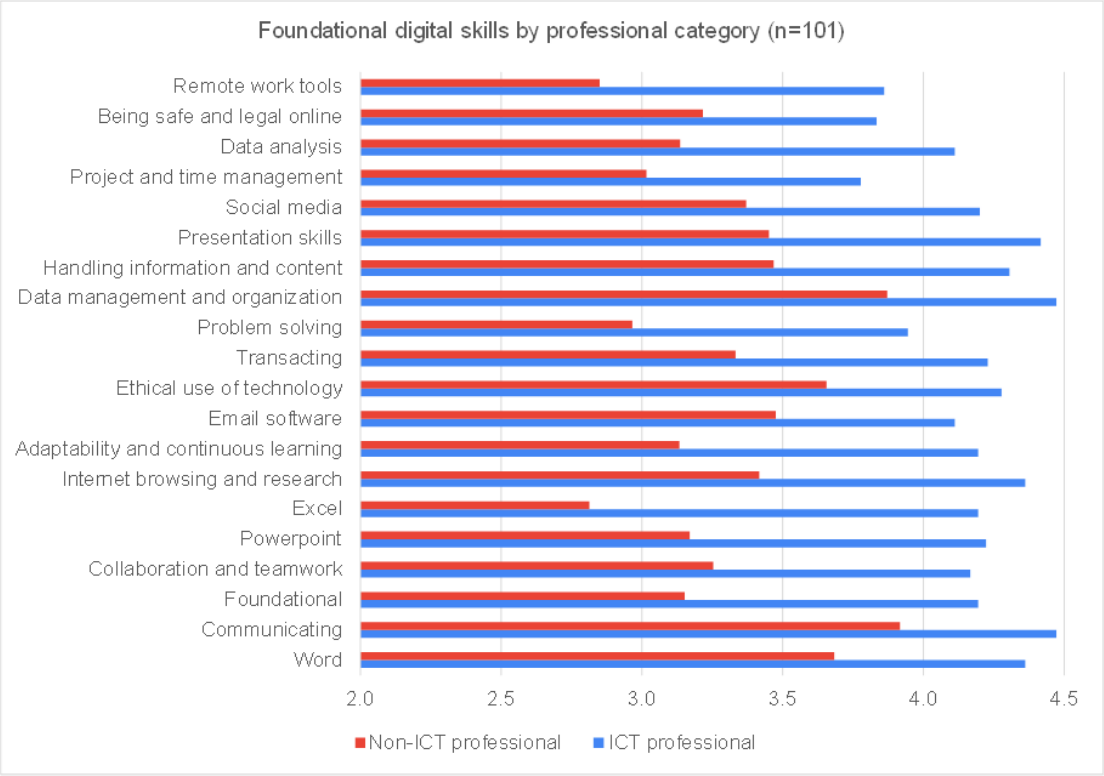
16 UICT (2022). Final ICT skills and training assessment report.

17 Ibid.

18 Ibid.

More significant findings are available when delving into the specific competencies in the foundational category. Overall, the lowest ranked competencies for ICT professionals include remote work tools, being safe and legal online, and project management. The lowest ranked for non-ICT staff specifically include remote work tools, project management and Excel.

Figure 3: Foundational digital skills by professional category



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

Comments from key informants further illustrate the nature of the proficiency in these competencies:

- Remote work tools: There is a clear recognition that, with the shift to digital platforms and the growing normalcy of remote work, skills related to remote work tools will become increasingly critical. However, issues related to this that are mentioned include poor Internet connectivity and lack of infrastructure, particularly in rural areas. Therefore, it is less likely to be a skills issue per se that is causing such a low score to appear for remote work tools, but an infrastructure issue.
- Being safe and legal online: Many organizations express concerns over cybersecurity threats and the legal implications of digital operations. Knowledge gaps in safely managing online platforms and data are evident. This can be overcome partly through ensuring good systems are in place, and there is likely to be a role for training to ensure
- Data analysis: The ability to analyse and make decisions based on data is highlighted as a crucial skill by key informants, but there is significant acknowledgment of the existing skills gap in data analysis across departments, particularly in non-ICT departments.
- Project management: Some insights point to deficiencies in project management, particularly in adapting to new ICT-related projects. Issues arise from inadequate planning and lack of skilled personnel. Skills in managing digital projects, particularly those involving new technologies such as AI and IoT, are seen as vital for future operations.

- Social media: While this is not covered in great detail in KIIs, there is a recognition that social media platforms are largely underutilized in organizational contexts.
- Excel: Excel skills are needed for complex analyses, data visualization and effective data management. Interviews suggest that, while some employees are proficient, there is a general gap in advanced Excel skills across various departments.

Key informants also highlight skills ranked more highly in the self-assessment:

- Research skills: This included skills on research collaboration, information management and data visualization. This is despite communication and research skills ranking highly on the self-assessment, indicating a gap between perceptions of employers and employees.
- Use of internal software: This included Microsoft Office more generally, task management tools such as ASANA, and online communication tools such as Google Meet, and attendance systems.

Box 1: Emerging skills gaps by professional category

ICT professionals

(1) Foundational cybersecurity (being safe and legal online)

(2) Project management for digital technology-related projects

Non-ICT professionals

(1) Foundational cybersecurity (being safe and legal online)

(2) Data analysis with Excel

(3) Use of internal software and systems

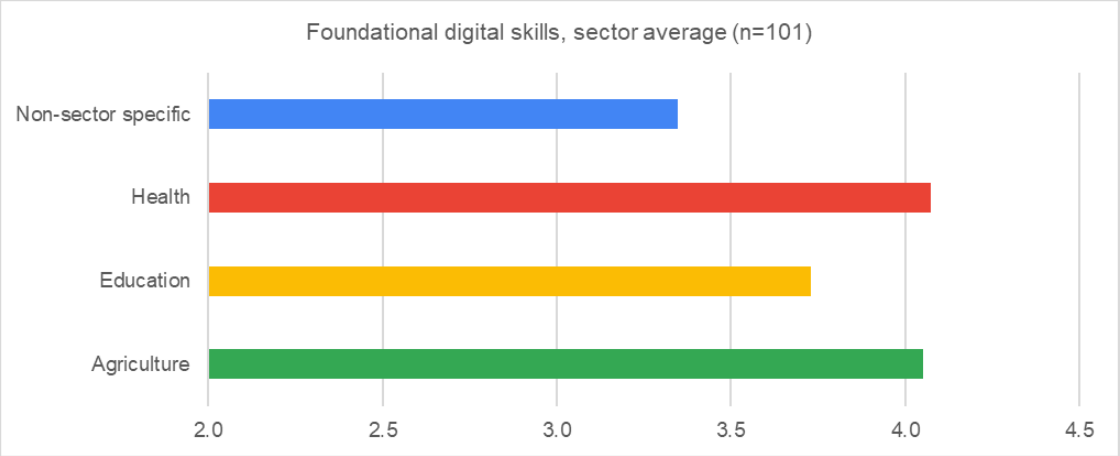
3.2.2 Priority sectors

This assessment focused on three priority sectors in Uganda: health, education and agriculture. These sectors were chosen due to their size, the importance of digital technology to the sector, the scale of capacity-building needs, and the ease of key stakeholder identification. Further information about how these sectors are chosen is available in the methodology.

Previous studies have found significant gaps between sectors in their digital proficiency. For example, the NITA-U study in 2022 found that respondents from the education, health and finance sectors indicated high levels of digital proficiency for complementary skills which involve the use of business, commercial or consumer applications, and tools such as word processing, spreadsheets, business and desktop graphics, e-mail and collaboration tools. This contrasted to other sectors, including agriculture, law and order, and media, which indicated low levels of digital proficiency in the same competencies.

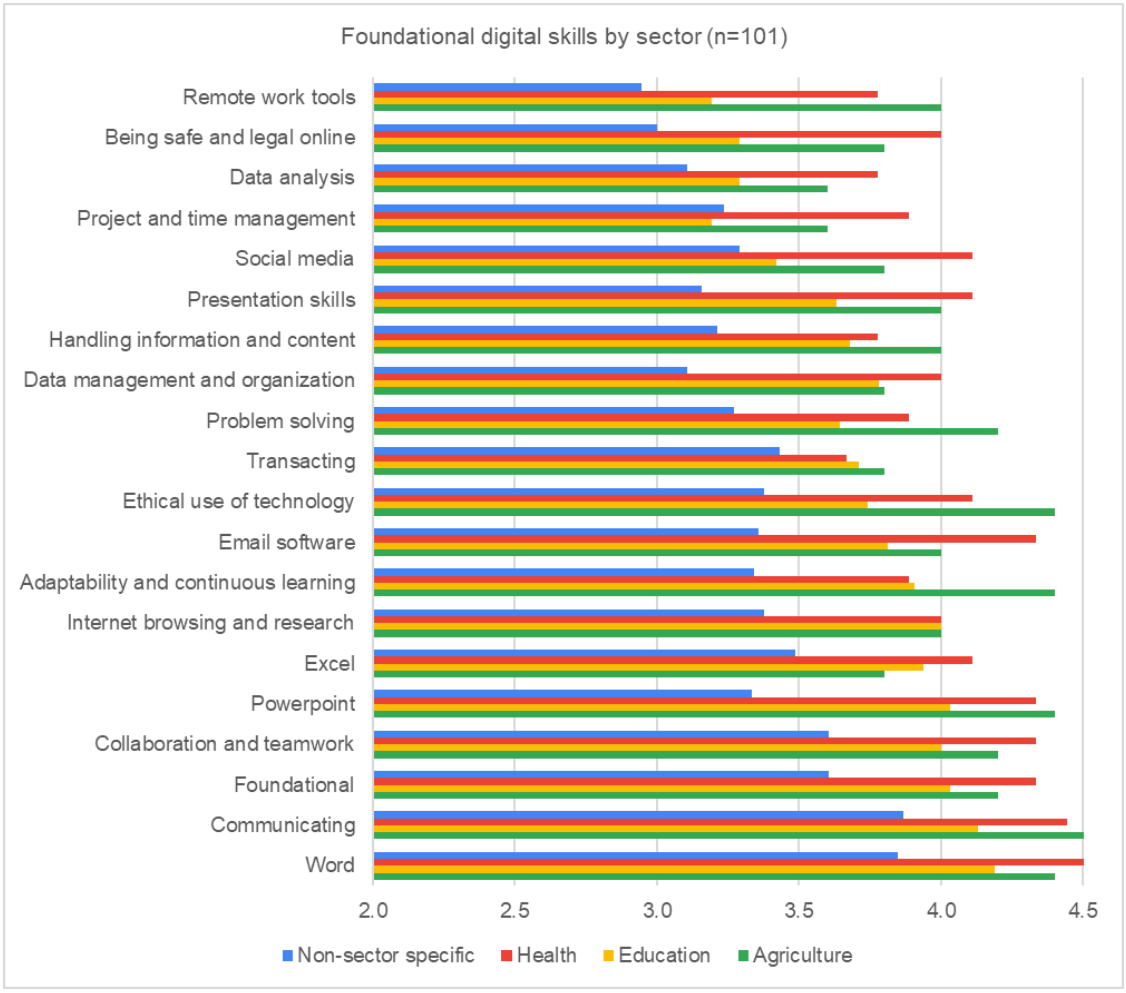
As demonstrated in the figures below, all sectors outperform the non-sector-specific group, and education lags behind agriculture and health. The average score for the non-sector-specific group was 3.3, compared with 4.1, 3.7 and 4.1 for the health, education and agriculture groups, respectively. While this initially appears promising for the priority sectors, the bulk of the non-sector-specific respondents of the survey were from local government, who are likely to have lower average skills than national government representatives, particularly those in local government from rural areas. A second finding is that education lags behind agriculture and health, although this difference is not deemed significant enough to constitute a sector-specific skills gap. Furthermore, when broken down by sector, as in Figure 4, no clear patterns emerge to differentiate the sectors beyond the average scores.

Figure 4: Foundational digital skills, sector average



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

Figure 5: Foundational digital skills by sector



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

Key informants reveal more of the sector-specific differences found in ICT competencies:

- Education: Key informants from the education sector note difficulties in adopting e-learning platforms, especially in rural schools, and propose increased digital resources and training for both students and teachers.
- Health: In the health sector, the focus is on skills in data management, particularly handling patients' data securely and efficiently. Further suggestions include the skills needed for integration of advanced digital tools such as AI for patient management and diagnostics, and adoption of telemedicine and digital health records.
- Agriculture: Agriculture stakeholder notes limited adoption of modern digital tools for data collection and analysis, citing the high costs of technology deployment in rural and remote areas. Skills are needed to ensure farmers can use IoT devices for monitoring crop growth and environmental conditions, and market and weather information through mobile technologies.

Box 2: Emerging skills gaps by priority sector

Education

E-learning platform usage for rural teachers

Health

Data handling and management

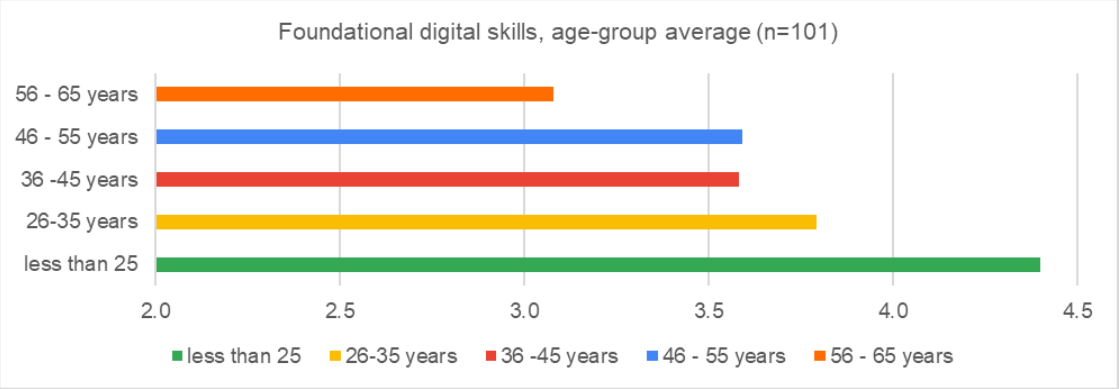
Agriculture

Use of relevant IoT devices for monitoring conditions

3.2.3 Age groups

Age is typically a key differentiator between digital skill levels. Older generations typically have lower digital competencies than younger generations, who have been more exposed to digital technology throughout their lives. The survey conducted as part of this assessment also finds that, on average, 56–65-year-olds rank as intermediate on average, whereas all other age groups rank as proficient, with under-25s ranking the highest at 4.4 (between proficient and expert).

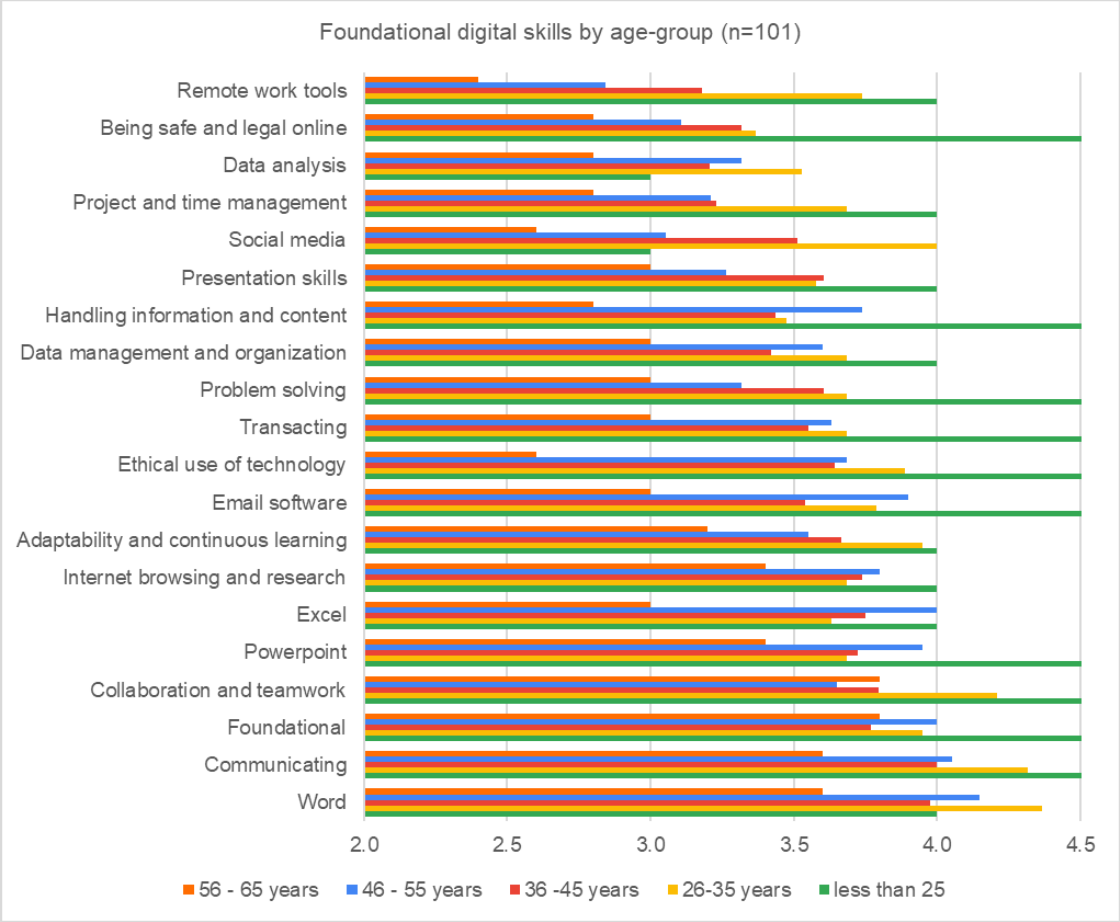
Figure 6: Foundational digital skills, age group average



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

Several competencies stood out as ranking particularly low for older age groups. This includes remote work tools, social media, ethical use of technology, and handling information and content. These four competencies all ranked below level (3), "intermediate". These competencies all reflect those which are foundational for most jobs, except for social media. This is highlighted as a key concern for older workers.

Figure 7: Foundational digital skills by age group



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

Age-related differences in digital skill levels are also subject to the concerns of key informants. Older employees are described as less familiar with newer technologies and digital tools. Other informants observe that older employees may show resistance to learning new technologies or adapting to digital transformations, which can hinder overall organizational progress. Tailored training programmes are proposed that accommodate the varying learning paces and styles of different age groups.

Box 3: Emerging skills gaps by age group

Older workers:

(1) Remote work tools

(2) Handling information and content

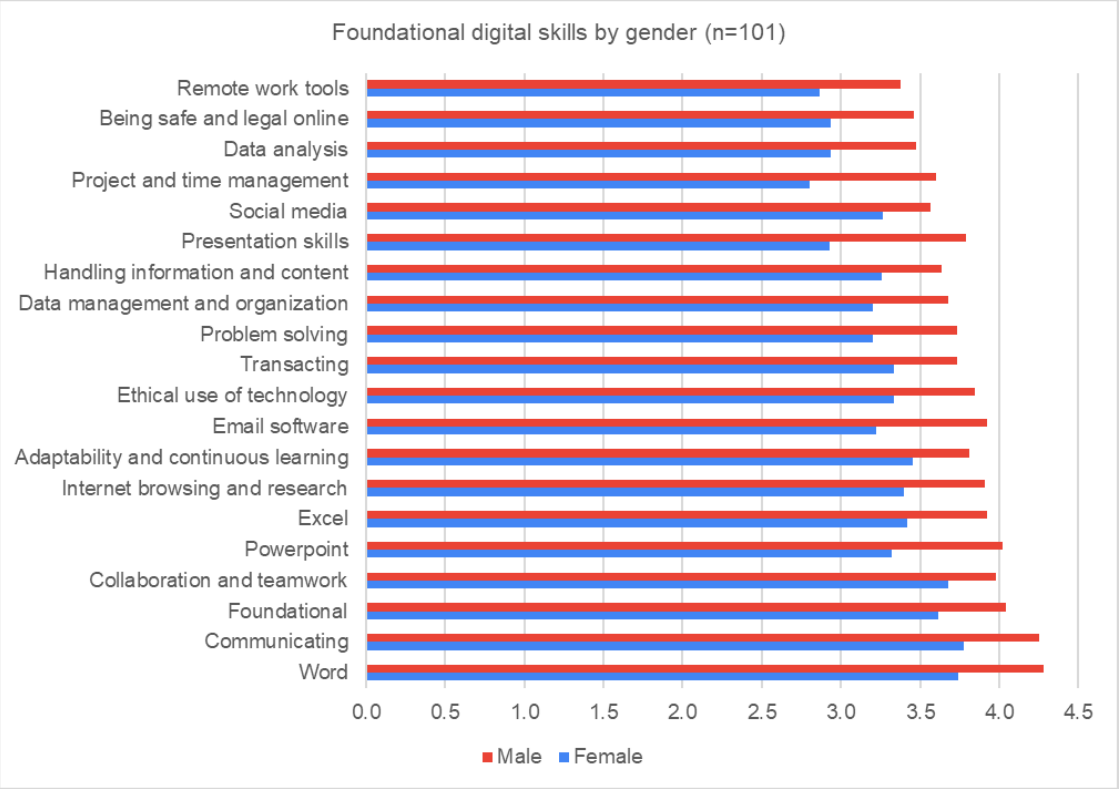
(3) Ethical use of technology

3.2.4 Gender

Gender in ICT is a significant issue given the predominance of males in ICT-related fields. The ICT staff within Uganda's ministries, departments and agencies, and also within private sector organizations, face gender disparity challenges. The ICT workforce of ministries, departments and agencies shows a significant gender disparity, where women represent only 31.3 per cent of the staff. This gender gap has remained unchanged since the 2017/18 survey, underscoring the need for targeted interventions to promote gender diversity in ICT roles.[19]

While males rank themselves more highly than females across the competencies in the survey, there is not enough information available to draw conclusions about this. When it comes to specific competencies, the survey suggests that males rank themselves higher than females in foundational digital skills. As demonstrated in Figure 8, males rank themselves as more competent across every competency. However, as has been demonstrated in a range of studies, males tend to overrate themselves, while females tend to underrate themselves across a variety of evaluation criteria.[20] Key informants also did not share significant insights about gender differences in foundational digital skills.

Figure 8: Foundational digital skills by gender



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

[19] Ibid.

[20] Scherpereel, C. and Bowers, M. (2008). Back to the future: Gender Differences in self-ratings of team performance criteria. Available at https://journals.tdl.org/absel/index.php/absel/article/view/401/367#:~:text=PERSISTENCE%20IN%20SELF%2DRATINGS&text=Previous%20studies%20have%20reported%20that.

3.3 Advanced digital skills

Advanced digital skills are those that mainly ICT professionals should possess. The advanced digital skills competency framework used in this study is based on the European e-Competence Framework for ICT Professionals in all industry sectors.[21] This framework classifies 40 competencies for the ICT professionals across various industries, including health, education and agriculture. This has been adapted to suit the context and to enable participants to easily rank themselves on each of the competencies.

3.3.1 Advanced ICT roles

The European e-Competence Framework was adapted to present seven general competence areas that were used to assess skilled ICT professionals, each of them representing a range of overlapping functions. Each of the areas has been defined in Table 6 and the number of respondents who selected each as the most relevant for their job description is also indicated. A more detailed definition of each role type is shown in Annex VI. From the sample surveyed, the majority of respondents lies in the competence areas of "Run" and "Manage", while the least occurring areas are "Build" and "Emerging Technologies".

The seven e-competence areas are as follows: Plan – Build – Run – Enable – Manage – Emerging Technologies – Shared Services and Outsourcing. They are presented from the organizational perspective and partly correspond to the ICT business processes that form the core of the traditional waterfall model, Agile project or DevOps environment lifecycles. Examples of specific competences under "Plan" include architecture design, applications design and integrated circuit design, whereas those under "Build" include application development, web development, database management, business analytics and information security. Examples of competences under the "Run" competence area include user support, change support and service delivery, while those under "Enable" include information security strategy development, education and training, sales management and contract management, among others. Under the "Manage" competence area, examples of competences include risk management, process improvement and information security management, while the "Emerging Technology" competence area includes green ICT, Internet of Things, Blockchain technologies, cloud computing and machine learning. Finally, the "Shared Services and Outsourcing" competence area includes competences such as call centre, human resources, finance and accounting, and procurement, among others.

Table 6: Advanced role types

Competence area	Definition	Number of ICT professionals
Plan	Software project planning, requirements analysis and design	18
Build	Coding, implementation, testing and deployment	14
Run	Systems maintenance	26

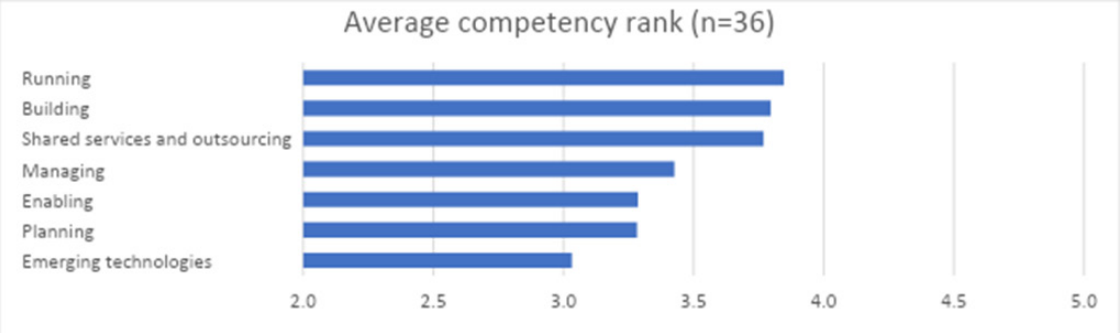
[21] European Commission (n.d.). European e-Competence Framework (e-CF). Available at https://esco.ec.europa.eu/en/about-esco/escopedia/escopedia/european-e-competence-framework-e-cf#:~:text=The%20European%20e%2DCompetence%20Framework.

Table 6: Advanced role types (continued)

Competence area	Definition	Number of ICT professionals
Enable	Strategy, training and marketing	18
Manage	Processes, information systems and governance	30
Emerging Technologies	Cloud, IoT, Data Science/AI	16
Shared Services and Outsourcing	Human resources, finance, procurement and administration	20

The survey conducted as part of this assessment found a significant disparity in the average competency for the advanced digital skills of ICT professionals. Across all seven general competence areas, all ICT professionals averaged less than a score of 4 but more than 3. This means that, on average, ICT professionals score themselves as less than "proficient" in each of the skills they need to meet their job description, but slightly more than "intermediate". ICT professionals averaged the highest score of 3.8 for "Run" roles, whereas roles involving the use of "Emerging Technologies" such as the Cloud Computing, IoT, Data Science/AI, were ranked the lowest of all seven competence areas assessed.

Figure 9: Average competency rank for advanced roles



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

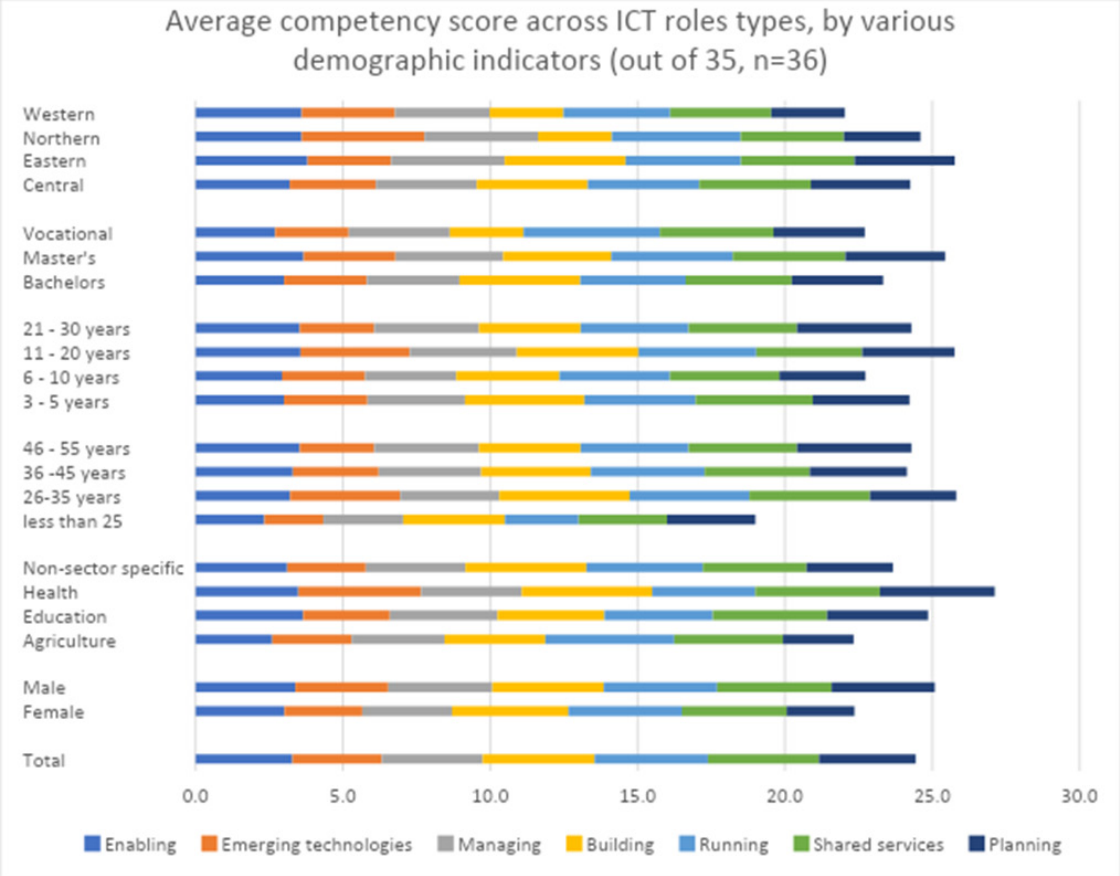
The impact of emerging technologies on the future workforce is significant, and addressing digital skills gaps is crucial to ensuring that employees can adapt to these changes. Participants in the KII highlighted that emerging technologies such as AI and IoT will significantly impact digital workforce requirements in Uganda. A recurring theme is the enhancement of efficiency and productivity through AI, which will streamline operations, improve remote training and optimize information availability. AI is expected to accelerate human capital development by equipping employees with new skills, enabling them to perform at higher levels. In sectors such as agriculture and health care, AI will provide critical information and support, such as assisting in medical procedures and disease diagnosis. Additionally, participants noted the importance of IoT in developing smart classrooms and improving communication, although budget constraints and limited infrastructure pose challenges to its widespread adoption. Overall, the impact of these technologies is viewed positively, with a focus on the need for training and infrastructure development to fully leverage their potential. Given the potential highlighted by respondents,

it is concerning, although not surprising, that "Emerging Technologies" is the lowest ranked advanced role.

3.3.2 Competencies by demographic indicators

The differences among various demographic groups – including when disaggregated by age, region, sex, education and sector – are not significantly pronounced among ICT professionals. Figure 10 outlines the overall average competency scores across ICT role types across a range of dimensions.

Figure 10: Average competency score across ICT roles types, by various demographic indicators



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

Region-specific findings do not indicate any statistically significant trends. Respondents from the Eastern region of Uganda reported the highest level of competency across the seven roles, while the Western region recorded the least. This should be interpreted with caution to avoid unfounded generalizations about regional capabilities. It is important to note that the majority of respondents, approximately 76 per cent, were from Central Uganda, resulting in an unbalanced representation across the four regions. In terms of educational attainment, the proficiency in advanced digital skills across levels of education is not widely different.

The survey results also do not show statistically significant findings between genders. While men score higher than women across the competency groups, the findings must be interpreted with caution due to the self-assessment nature of the survey and the strong evidence across a range of studies that shows females tend to underrate their performance compared to male

counterparts, hence affecting assessment accuracy.[22] Nevertheless, there is a wider issue of gender representation in ICT roles worth noting. The lower participation rate of women in the survey (40 per cent) reflects broader systemic issues, where women are often underrepresented in ICT in Uganda. The 2022 National ICT Survey noted that, within all ICT staff across ministries, departments and agencies, only 31.3 per cent were females, confirming the gender bias.[23] This underrepresentation can contribute to fewer opportunities for women to acquire and develop advanced digital skills, perpetuating the gender gap.

The survey indicates that workers aged 26–35 years exhibit the highest levels of advanced digital skills compared to their older counterparts. This trend may be attributed to several factors, including the increased exposure to digital technologies and formal ICT education that younger professionals have received. Individuals in this age group are likely to have grown up with technology as an integral part of their education and early career development, fostering a natural proficiency and adaptability to new digital tools and practices. Older employees, on the other hand, may have entered the workforce before the widespread adoption of digital technologies and therefore may not have received formal training in these areas. Their educational background likely focused less on advanced digital competencies, and they may have had fewer opportunities to engage with advanced technologies throughout their careers. Moreover, the rapid pace of technological change can be overwhelming, making it harder for older employees to stay current with the latest advancements. The KII participants noted that older employees had some resistance to new software and technologies, and often struggled to adapt, hence the need for continuous upskilling.

3.3.3 "Plan" competencies

The "Plan" competencies within advanced ICT roles recorded an average score of 3.3 and mixed proficiency levels across its five focus areas. Integrated Circuit Design received the lowest score of 2.6, indicating a notable gap in expertise related to designing integrated circuits, which are fundamental components in electronic devices and systems. This lower score suggests a potential area for targeted skills development to enhance capabilities in hardware design.

Conversely, Information Systems (IS) and Business Strategy Alignment, along with Service Level Management, both scored the highest at 3.7. These scores signify a stronger proficiency in aligning digital systems with business strategies and managing service levels effectively. This competence is crucial for ensuring that digital initiatives support organizational goals and deliver services at the expected standards. The higher scores in these areas highlight strengths that organizations can leverage to optimize planning processes and enhance overall digital strategy alignment and service delivery. Overall, while there are clear strengths in certain aspects of "Plan" competencies, addressing the lower scores in Integrated Circuit Design could further advance comprehensive digital planning capabilities.

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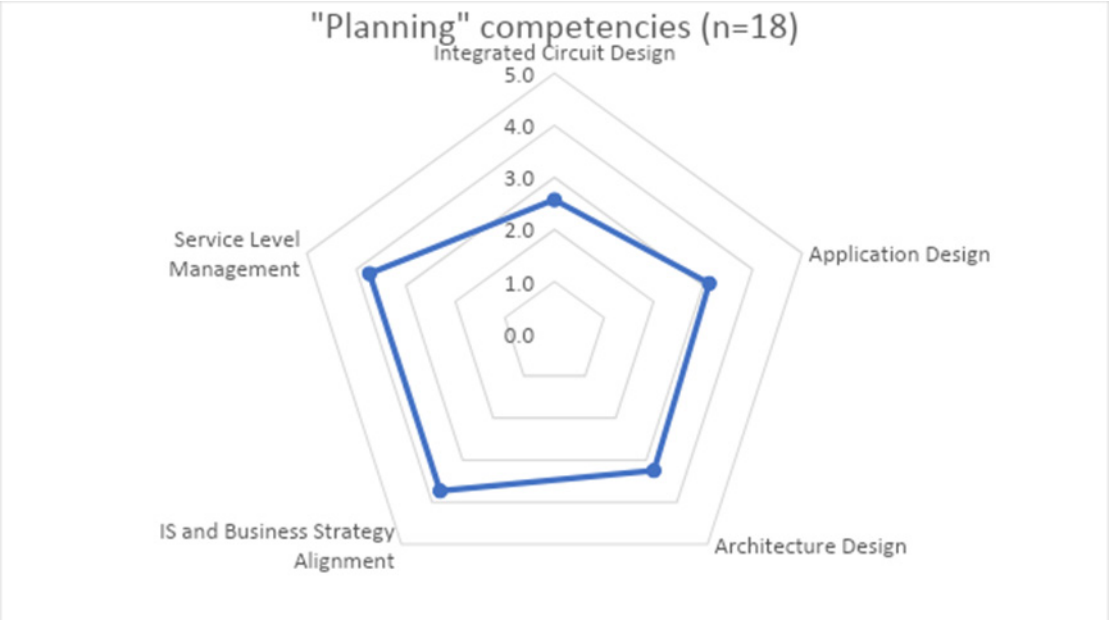
[22] Scherpereel, C.M., and Bowers, M.Y. (2008). Back to the future: Gender differences in self-ratings of team performance criteria. In Developments in Business Simulation and Experiential Learning: Proceedings of the Annual ABSEL conference (Vol. 35).

[23] NITA-U (2022). National Information Technology Survey Final Report 2022. Available at www.nita.go.ug/publications/reports/national-it-survey/national-information-technology-survey-final-report-2022.

Figure 11: "Plan" competencies (n=18)



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

3.3.4 "Build" competencies

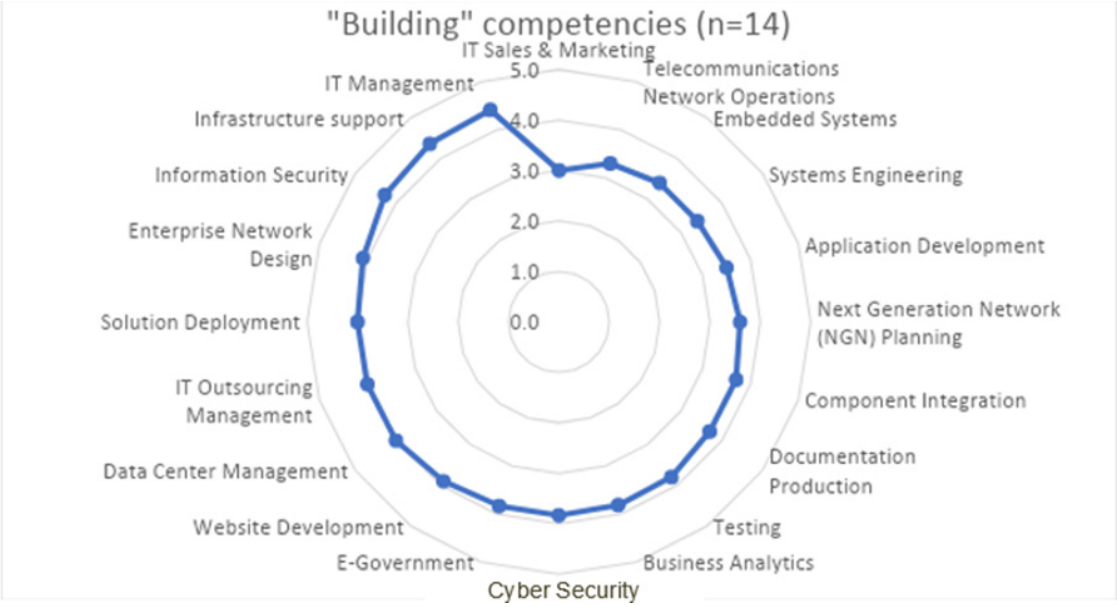
The "Build" competencies category was evaluated across 20 focus areas, with an average score of 3.8 out of 5. This average score indicates a moderate level of proficiency among the professionals in these areas. Among the "Build" competencies, IT Sales and Marketing received the lowest score of 3. This suggests that there is a significant skills gap in the ability to effectively market and sell IT products and services. Furthermore, the 2021 JCSE-UICT ICT Skills Survey Report highlighted Sales and Marketing as one of the lacking skills among ICT professionals.[24] The lower score in IT Sales and Marketing might indicate a need for more targeted training and development in these areas to better equip professionals with the skills necessary to promote and sell technology solutions effectively in sectors where these skills are relevant.

On the other hand, the highest-ranked competencies within the "Build" category were Infrastructure Support and IT Management, each receiving a score of 4.4. This high score reflects a strong capability among ICT professionals in managing and supporting IT infrastructure, which includes tasks such as maintaining hardware and software, ensuring network reliability and overseeing IT operations. The strength in IT Management also highlights the proficiency in overseeing and directing ICT operations and projects, managing teams and aligning ICT tools with business goals.

Comments from key informants further illustrate the gaps in data-related skills such as Data Analysis, Record Management and Information Management, and security skills such as Cybersecurity and Network Security.

[24] The 2021 JCSE-UICT ICT Skills Survey Report.

Figure 12: "Build" competencies



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

Box 4: Emerging skills gaps from KIIs related to "Build" competencies

Data skills: Record Management, Data Analysis, Information Management

Security skills: Cybersecurity, Network Security

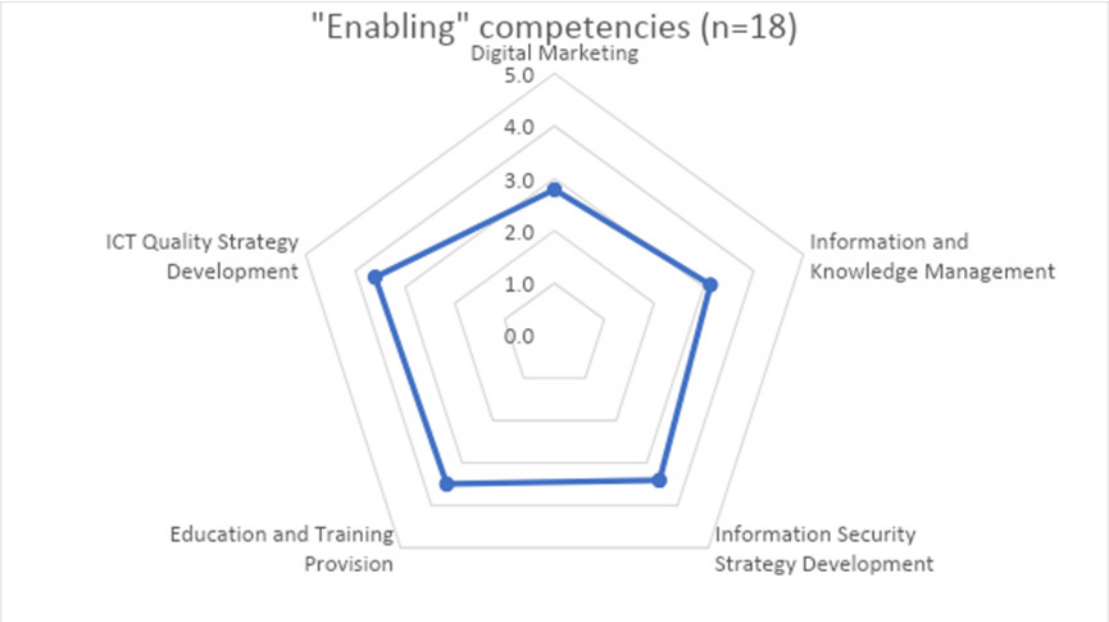
3.3.5 "Enable" competencies

The advanced ICT role of "Enable" competencies averaged 3.3 out of 5 across its five focus areas, reflecting a mixed perception among professionals regarding their proficiency in these skills. Digital Marketing received the lowest score at 2.8, indicating a perceived need for improvement in leveraging digital platforms for marketing purposes within the sectors of focus. This is further confirmed by the 2021 JCSE-UICT ICT Skills Survey Report, which highlighted digital marketing as one of the skills lacking across four sectors, including the services sector, where health and education would be categorized.[25] One of the participants in the KIIs also noted the need for social media marketing to enhance digital skills development. On the other hand, ICT Quality Strategy Development scored the highest at 3.6, highlighting a stronger capability in formulating strategies to ensure the quality and reliability of digital systems and services. Information and Knowledge Management (one of the five focus areas), scoring 3.1, reflects a moderate competency level in effectively organizing and utilizing information resources. The Final ICT Skills and Training Needs Report further notes that the inadequacy of knowledge management practices is a significant challenge for most institutions, evidenced by the lack of knowledge work systems, intelligent techniques and enterprise-wide knowledge management systems.[26]

[25] The 2021 JCSE-UICT ICT Skills Survey Report.
[26] UICT (2022). Final ICT Skills and Training Needs Report.

The disparity in scores across the "Enable" competencies suggests a varied level of expertise, emphasizing the importance of targeted training and development initiatives to enhance skills in digital marketing and potentially other areas such as Information and Knowledge Management. Strengthening these competencies can enable ICT professionals to better support organizational objectives, improve information management practices, and enhance overall ICT service delivery and quality assurance frameworks.

Figure 13: "Enable" competencies



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

Box 5: Emerging skills gaps from KIIs related to "Enable" competencies

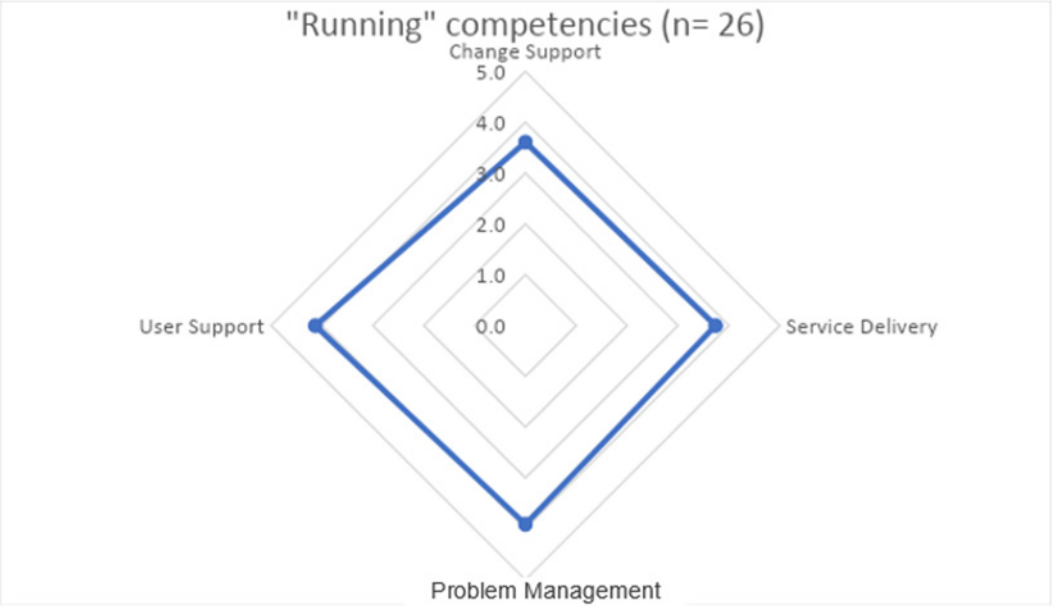
Information Security

Digital Marketing

3.3.6 "Run" competencies

The "Run" competencies across their four focus areas have an average score of 3.8 out of 5, one of the highest averages across all seven advanced ICT roles. This indicates a relatively strong foundation in critical operational skills within advanced ICT roles. The scores for these focus areas were closely aligned, indicating a balanced proficiency among professionals in these areas. Specifically, Change Support received the lowest score of 3.6, while User Support achieved the highest at 4.1, with Service Delivery and Problem Management falling in between. This uniformity suggests that ICT professionals possess a well-rounded capability in running ongoing ICT operations, ensuring smooth service delivery, effective problem resolution and comprehensive user support.

Figure 14: "Run" competencies



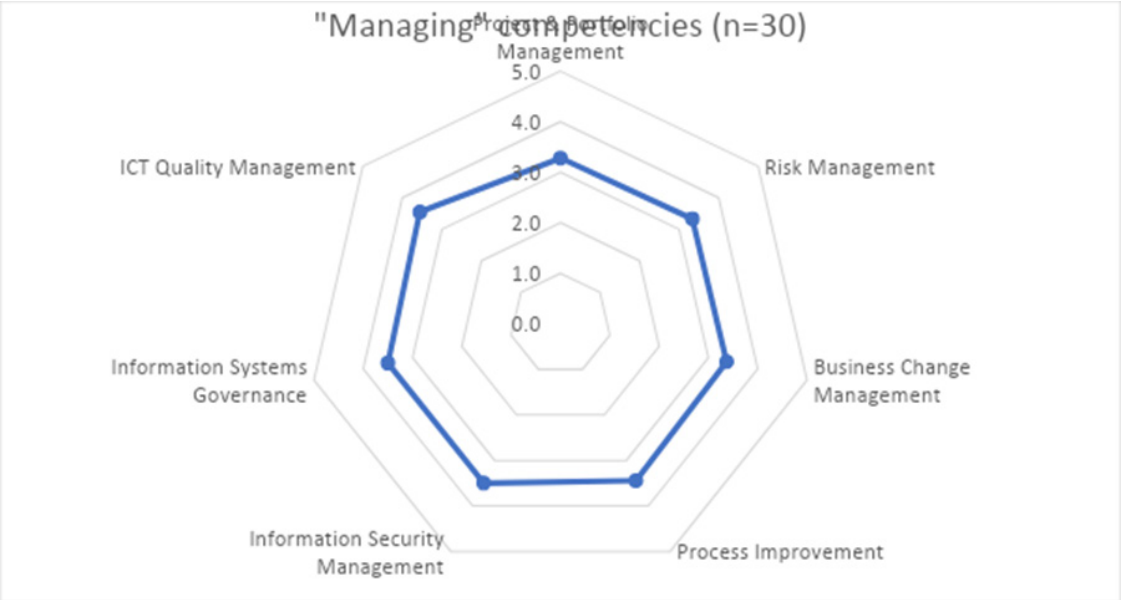
Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

3.3.7 "Manage" competencies

The "Manage" competencies across their seven focus areas recorded an average score of 3.4 out of 5. This suggests that, while professionals perceive themselves as performing at "intermediate" level in all the seven focus areas, there remains room for improvement and specialization in specific areas. The Final ICT Skills and Training Assessment Report noted that change management was one of the lacking skills among ICT graduates, and one of the most desired skills at strategic leadership and senior management levels.[27] Furthermore, the 2021 JCSE-UICT ICT Skills Survey Report also highlighted that change management was one of the most lacking skills in organizations across most sectors.[28] Strengthening these skills is essential for ensuring effective oversight, governance and adaptation within digital frameworks, thereby enhancing organizational resilience and operational efficiency in response to evolving technological landscapes and business needs.

[27] Ibid.
[28] The 2021 JCSE-UICT ICT Skills Survey Report.

Figure 15: "Manage" competencies



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

3.3.8 "Emerging Technologies" competencies

The advanced ICT role of Emerging Technologies competencies received an average score of 3 out of 5, the lowest score across all seven advanced ICT roles. Blockchain Technologies received the lowest score of 2.1, indicating a significant gap in expertise in this area. Blockchain, being a relatively new and rapidly evolving technology, may not yet be widely adopted or understood among professionals, highlighting an urgent need for targeted training and development initiatives to bridge this gap. The 2021 JCSE-UICT ICT Skills Survey Report also notes Blockchain as one of the lacking skills. In contrast, the other competencies, except for IoT (3.1), received relatively higher scores, with an average of 3.2. This suggests a moderate level of proficiency in Machine Learning, Data Science, Green ICT and Cloud Computing among the respondents. These scores indicate that, while there is some familiarity and skill in these areas, there is still room for improvement, and all of these competencies are among the lowest in all ranked competency areas.

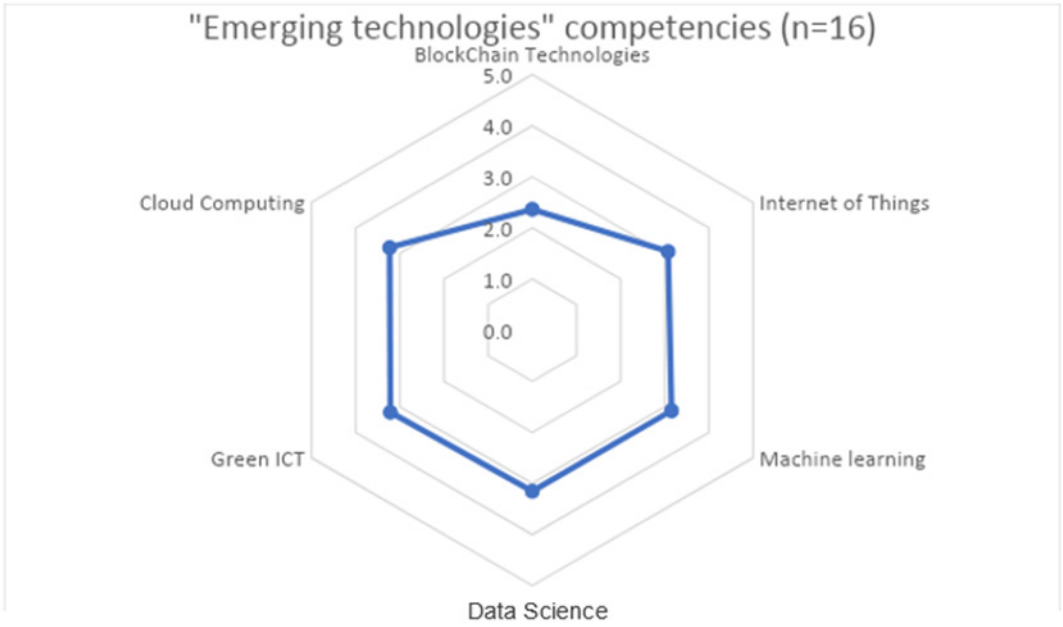
Key informants provided further insights on the state of emerging technologies. When asked about the new roles or skill sets that needed to be incorporated into their workforce planning, AI was mentioned by close to 30 per cent of the respondents. IoT was also mentioned a number of times. However, previous studies have noted that, although many organizations have expressed a need for more IoT specialists, no such occupation currently exists in a strict sense. Instead, IoT specialists are likely to emerge as specializations within existing fields, such as software development and design.[29] Machine Learning was highlighted as one of the most critical skills needed in the next three to five years, and some participants indicated the need for it to be incorporated into workforce planning. Previous assessments also have noted Machine Learning as a key skills gap, and it is mentioned in NDP III under the category of "required skills with inadequate supply".[30] One study even noted that there were no existing staff in UICT with the

[29] UICT (2022). Final ICT Skills and Training Needs Report.
[30] Republic of Uganda (2020). Third National Development Plan (NDP III) 2020/21 – 2024/25. Available at www.health.go.ug/cause/third-national-development-plan-ndpiii-2020-21-2024-25/.

knowledge that could help to develop machine learning algorithms and improve the data collection process.[31]

Overall, the findings highlight a relatively low level of proficiency in emerging technologies. This assessment underscores the importance of focusing on advanced training and development programmes to enhance competencies in these critical areas, ensuring that ICT professionals are well equipped to leverage emerging technologies effectively for innovation and growth.

Figure 16: "Emerging Technologies" competencies



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

Box 6: Emerging skills gaps from KIIs related to "Emerging Technologies" competencies

Blockchain technologies

Machine learning

All other emerging technologies to some extent

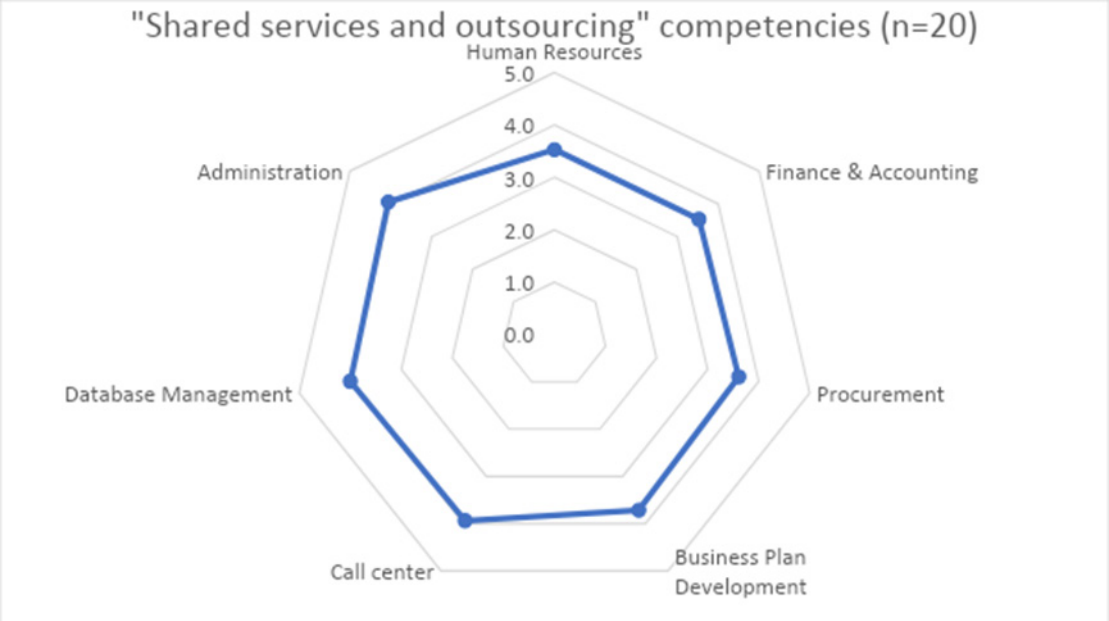
3.3.9 "Shared Services and Outsourcing" competencies

The "Shared Services and Outsourcing" competencies across their seven focus areas averaged 3.8 out of 5, reflecting a strong foundation in diverse operational functions within advanced ICT roles. Human Resources and Finance and Accounting received the lowest scores at 3.5, indicating areas where professionals perceive a need for further enhancement or specialization. Conversely, Administration scored the highest at 4.1, suggesting a high level of proficiency in managing administrative functions within Shared Services and Outsourcing contexts. Comments from key informants further illustrate significant gaps, particularly in digital skills

[31] UICT (2022). Final ICT Skills and Training Needs Report.

for procurement and operational departments, and finance procedures in local government. Database Management also came up as one of the lacking skills across sectors.

Figure 17: "Shared Services and Outsourcing" competencies



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

Box 7: Emerging skills gaps from KIIs related to "Shared Services and Outsourcing" competencies

Procurement and Operations

Finance Procedures

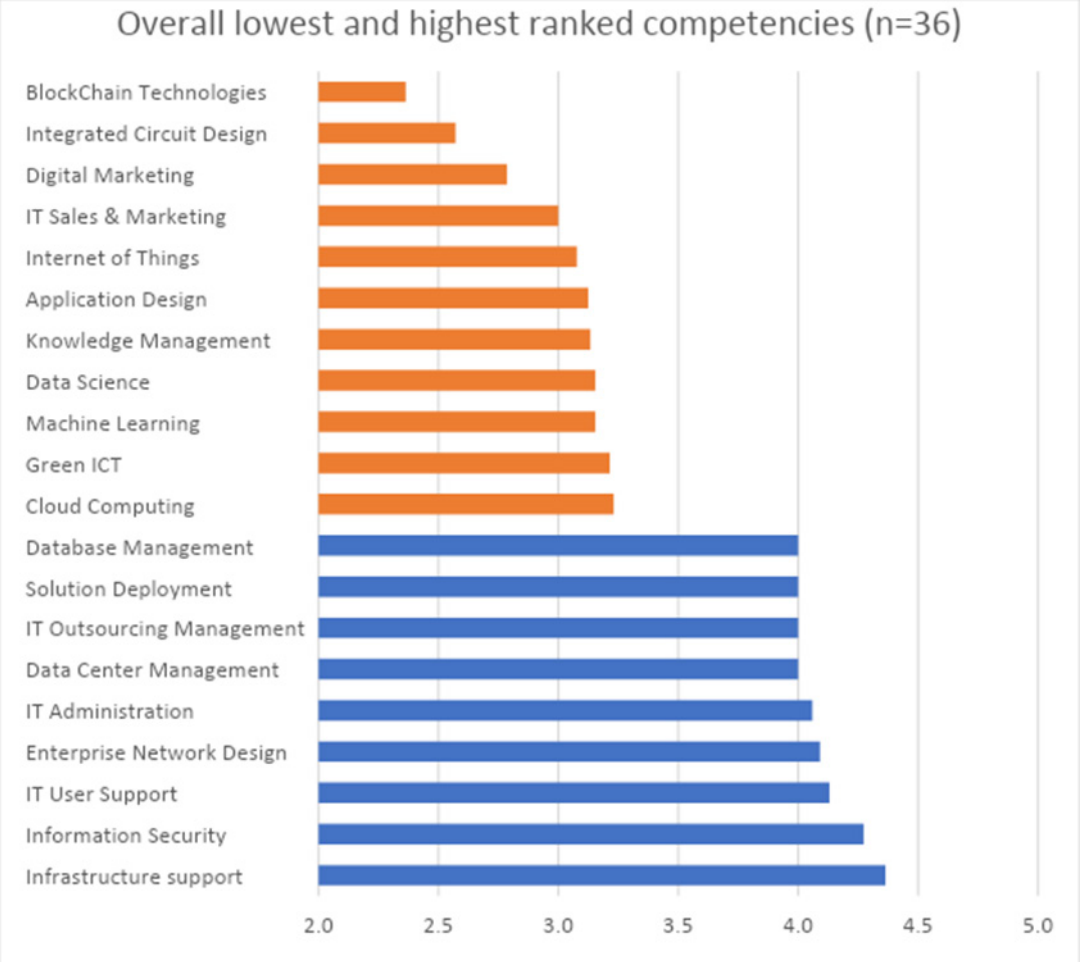
Database Management

3.3.10 Outlier competencies across role types

The survey findings revealed that the lowest ranked competencies across advanced digital skills were in Blockchain technologies, integrated circuit design and digital marketing, while the highest ranked competencies were in infrastructure support, information security and ICT user support. The low ranking in Blockchain technologies and integrated circuit design suggests significant gaps in knowledge and proficiency in emerging and highly specialized technologies. Blockchain – with its potential applications in finance, supply chain and governance – represents a growing field with substantial opportunities for innovation and efficiency. Similarly, integrated circuit design is crucial for hardware development, which underpins the functionality of all digital systems. Digital marketing is also essential for businesses to thrive in the modern economy, enabling organizations to reach and engage customers through digital channels. Improving skills in this area can significantly impact competitiveness of the public and private sectors.

The high ranking in infrastructure support, information security and ICT user support reflects strengths in maintaining and securing digital systems. These competencies are foundational for any digital infrastructure, ensuring that systems run smoothly, data are protected, and users receive the necessary support. This strength is critical for maintaining the operational integrity of organizations, and highlights the importance of continuing to develop and refine these skills to keep up with evolving threats and technological changes.

Figure 18: Overall lowest and highest ranked competencies



Source: Graph constructed with data collected from survey of ICT and non-ICT professionals.

4 Gap analysis

This section provides a summary of the key gaps that have been identified in the findings above. It collates the gaps identified in each section, highlighting specifically to whom the gap is relevant. The gaps are then organized according to different levels and functions. The different levels where gaps are present are threefold: at the sectoral level (e.g. in the education, health or agriculture sector); at the occupational level (e.g. planning roles and building roles); and at the demographic level (e.g. all workers of a specific age, gender or region). The different functions in which gaps are present refer to the roles within organizations that make up the digital skills ecosystem. These include organizational leadership (e.g. heads of units in government or executives in private sector companies), ICT professionals and non-ICT professionals. The gaps identified are taken forward to the capacity-building action plan, where specific training initiatives are identified which will address the gaps.

Table 7: Digital skills gaps by level and function

Sectoral	Occupational	Demographic
Organi-zational leadership	Business change management with a focus on building a digital mindset (for all managers in charge of leading and facilitating organizational change initiatives who have not previously undertaken similar training) Data literacy for deci-sion-making (for all managers in charge of performance manage-ment and improvement who have not previously undertaken similar train-ing)	

Table 7: Digital skills gaps by level and function (continued)

	Sectoral	Occupational	Demographic
ICT professionals	Database management for record keeping in health centres, tracking patient flow, and transitioning from analogue to digital platforms (for health sector professionals)	Data skills: Information management and data analysis (for all whose job descriptions align with "Build" competencies and who have not previously undertaken similar training)	Baseline understanding of all emerging technologies (all ICT professionals)
		Digital marketing and social media (for all whose job descriptions align with "Enable" competencies and who have not previously undertaken similar training)	
		Blockchain technologies (for all whose job descriptions align with this and who have not previously undertaken similar training)	
		Cloud computing (for all whose job descriptions align with this and who have not previously undertaken similar training)	
		Machine learning (for all whose job descriptions align with this and who have not previously undertaken similar training)	
		Advanced cybersecurity and network security (for all who have not previously undertaken cybersecurity training and who have roles relevant to cybersecurity)	
		Project management (for all whose job descriptions involve managing ICT projects effectively, within time and budget, and those who have not received this training)	

Table 7: Digital skills gaps by level and function (continued)

	Sectoral	Occupational	Demographic
Non-ICT professionals	Data management, focusing on secure handling and usage of patient data (health sector professionals)	Data skills, i.e. collection, management, analysis and storage (for all who work with data and who have not previously undertaken similar training)	Foundational digital skills to include at a minimum remote work tools, handling information and context, and ethical use of technology (workers aged 55 years or above who have not previously undertaken similar training)
	E-learning platform access and utilization (education sector professionals in rural areas)	ICT in finance training to streamline financial processes, reduce manual tasks and optimize financial operations (for all local government finance officers)	Foundational cybersecurity i.e. being safe and legal online (for all who have not previously undertaken cybersecurity training)
	ICT in agriculture, to include IoT devices and mobiles for monitoring crop growth, environmental conditions and market information (agriculture sector professionals)	E-procurement systems training (for all procurement officers)	
		Digital ethics (for all who have not received any training on this)	

The identification of skills gaps at sectoral, occupational and demographic levels underscores the critical need for targeted capacity building in both ICT and non-ICT professions. Addressing these gaps is essential for several reasons, including:

- Improved leadership and management: Leadership skills are crucial for the effective governance of public and private institutions. The identified gaps highlight the need for targeted development programmes for leaders to enhance their strategic thinking, decision-making and management capabilities. This, in turn, can lead to more efficient and effective organizations.
- Enhanced sectoral competitiveness: Specialized skills within specific sectors are vital for driving innovation and improving productivity. By providing targeted training, sectors can become more competitive and better equipped to handle industry-specific challenges.
- Inclusive workforce development: Addressing demographic-specific gaps, particularly among older staff, ensures that all population groups can keep pace with technological advancements and evolving job requirements. This inclusivity fosters a more dynamic and adaptive workforce, capable of leveraging diverse experiences and perspectives.

5 Capacity-building action plan

The capacity-building action plan will outline specific initiatives for addressing skills gaps identified in the assessment. Following a comprehensive digital skills capacity assessment focusing on priority sectors in Uganda, significant gaps have been identified in both foundational and advanced digital skills. This action plan outlines targeted initiatives to bridge these gaps, utilizing the insights from the needs assessment.

Previous studies have made recommendations about training requirements, and this action plan attempts to go further and provide a more detailed plan for actioning recommendations. In the needs assessment undertaken in 2021 by UICT, three recommendations related to training were presented:

- Provide an annual training plan with a dedicated budget line for digital skills development.
- Set up online training programmes for government agencies in areas where capacity gaps have been identified.
- Organize regular annual training programmes for leaders in ministries, departments and agencies covering critical areas.

This action plan seeks to outline the specific capacity gaps and propose training programmes to address these directly.

This section of the report will proceed as follows. Firstly, the status of existing training initiatives will be outlined, including the inputs of the survey respondents and the in-person training initiatives that have been identified in both the private and public sectors. The section will then detail training requirements, proposing options for both in-person and online initiatives for each of the gaps identified in the gap analysis. A section on required enablers will follow, focusing on prerequisites to training being impactful, including infrastructural requirements and staff recruitment.

5.1 Mapping of training initiatives

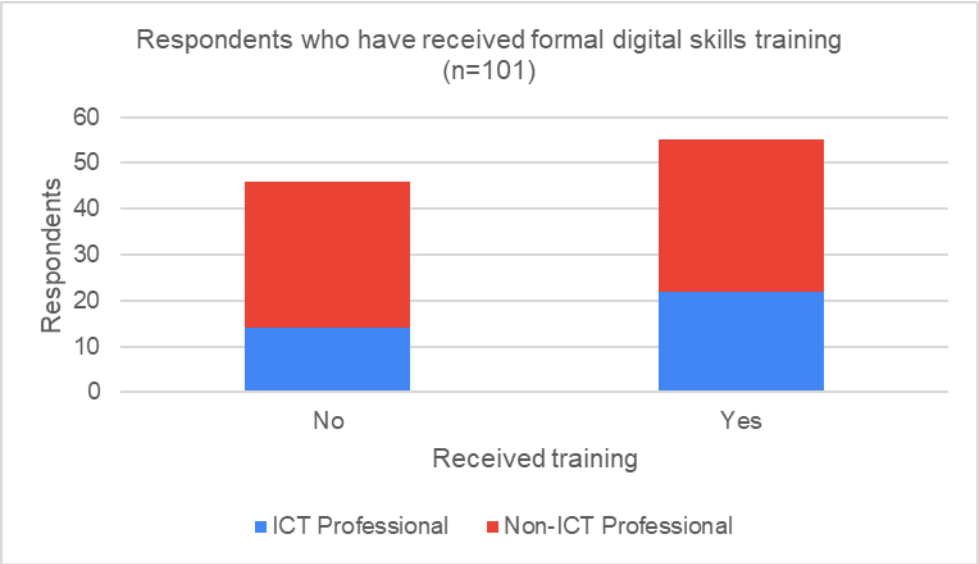
There are a significant number of initiatives ongoing in Uganda to upskill ICT and non-ICT professionals in Uganda's priority sectors. These include a wide range of formal activities being undertaken within organizations, informal activities being undertaken by individuals, and degrees and training courses being provided by research institutes and universities.

Over half of the respondents of the survey mentioned that they had received formal training. This is demonstrated in Figure 19. This is higher than the figure in previous studies, where only 43 per cent of ICT and non-ICT professionals had received any training.[32] The study also found that the majority (81 per cent) of institutions had not provided any digital training to their staff in the past 12 months, resulting in 77.3 per cent of individuals not attending any digital training during the same period.[33] In the survey, the vast majority of respondents described the type of training they received as effective.

[32] NITA-U (2021). ICT skills and training action plan for RCIP implementing agencies and target sectors. Available at https://empowerconsult.co.ug/wp-content/uploads/2023/06/NITA-U_ICT-Skills-and-Training-Action-Plan.pdf.

[33] Ibid.

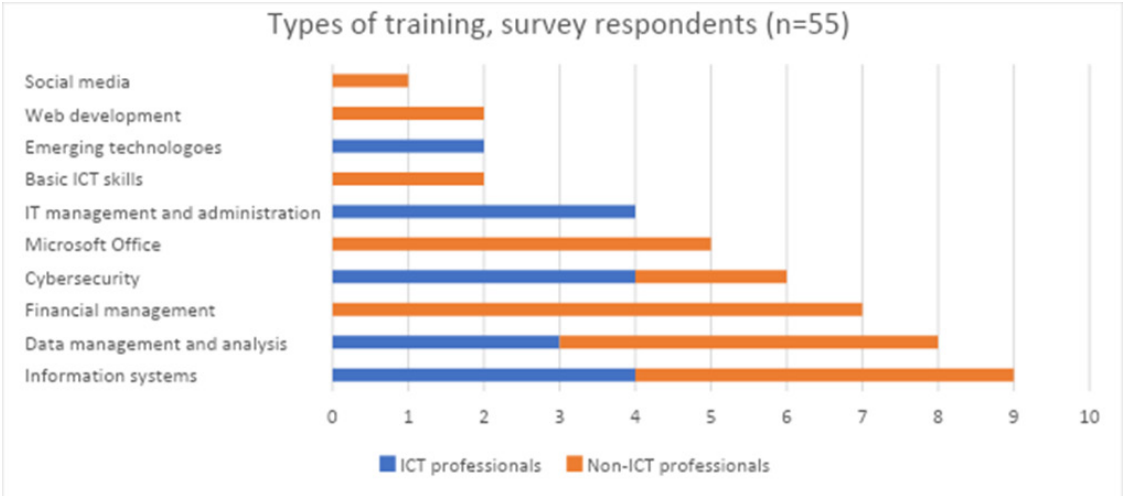
Figure 19: Respondents who have received formal digital skills training



Source: Graph constructed with data from survey of ICT and non-ICT professionals.

The types of training survey respondents have received is outlined in Figure 20. This shows that the most popular type of training is in information systems, for both ICT and non-ICT professionals. Data management and analysis, and cybersecurity, are also popular forms of training across these groups. For non-ICT professionals specifically, financial management and Microsoft Office are common forms of training, whereas ICT management and administration is popular for ICT professionals. Previous studies confirm that the most popular forms of training were short courses in areas such as cybersecurity, web design and information management.[34]

Figure 20: Types of training undertaken, survey respondents



Source: Graph constructed with data from survey of ICT and non-ICT professionals.

[34] Ibid.

To some extent, the training that is ongoing matches what key informants noted as training requirements that were needed. Several informants mentioned the need for data analysis and management. Due to the widespread need for proficiency in handling and interpreting data, training in advanced Excel features, statistical software and data visualization tools was crucial. Cybersecurity was also frequently mentioned, with emphasis on secure practices and understanding of the latest security technologies and regulations.

However, there were several key areas of focus highlighted by key informants that did not feature in the existing training initiatives of respondents. These included:

- Technical training in areas such as software development and programming – including coding, software development frameworks and application development – and understanding technologies and how to apply them such areas as AI and machine learning.
- Soft skills training in areas such as problem solving, critical thinking and project management: Employees must navigate and troubleshoot complex systems and technology-related issues, where those in management roles must understand methodologies such as Agile, Scrum or Lean Six Sigma, which can help in managing digital projects more effectively.
- Operational training on remote work tools, including collaboration platforms, virtual meeting software and cloud-based tools, as well as basic digital literacy such as use of common office software, Internet navigation and digital communication tools.
- Sector-specific training in health care (e.g. electronic health records, telemedicine platforms and regulatory compliance specific to health data); education (digital tools for effective teaching and learning, e-learning platforms and student data management systems); and agriculture (use of digital technology in farming management systems, climate and weather forecasting tools, and agricultural drones for large-scale monitoring).
- Leadership training to facilitate change management processes and adaptation to technological change.

The major universities and training centres in Uganda offer a variety of courses in ICT skills, including short courses, diplomas and bachelor's degrees. Table 8 maps the training courses that are available in Uganda.

Table 8: Digital skills training courses available in Uganda

Institution	Short courses/ certificates	Diploma courses	Bachelor's degree courses
Makerere University	Certificate in Computer Application, ICDL, IT Essential 1&2, Cisco Certified Network Associate (CCNA) 1-4, CCNP, Oracle Certified Associate Programme, 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

Table 8: Digital skills training courses available in Uganda (continued)

Institution	Short courses/ certificates	Diploma courses	Bachelor's degree courses
APTECH Computer Training Centre	National Certificate in Information and Communication Technology, ACSE (Advanced Certificate in Software Engineering), CISSP (Certified Information Systems Security Professional), PCSE (Professional Certificate in Software Engineering), CPISM (Certificate of Proficiency in Information Systems Management), HDIM (Higher Diploma in Multimedia), PCIM (Professional Certificate in Multimedia), CIMA (Certificate In Multimedia and Animation), CIM (Certificate in Multimedia)	ADSE (Advanced Diploma in Software Engineering), HDSE (Higher Diploma in Software Engineering), HDIM (Higher Diploma in Multimedia)	
Nakawa Institute of Business Studies	Certificates in Information Technology, Computer Applications, Computer Repair and Maintenance, Statistical and Data Analysis, Computerized Accounting, Networking, Database Management, Video Editing and Shooting, Programming, Information Systems Management	Diplomas in Information Technology, Computer Science, Networking and PC Engineering, Graphics Design, E-commerce and Web design, Business Computing	
Makerere Business Institute	Database Designing and Management, Dynamic Website Designing and Hosting, Desktop Application Development, Computer Repair and Software Maintenance, Computer Networks and Data Communications, Computer Applications and Computer Graphics	Diploma in ICT, Diploma in Business Computing	
Kampala International University	Certificate in Computer Science, Certificate in Library and Information Science	Diploma in Computer Science, Diploma in Library and Information Science, Diploma in Information Technology	

Table 8: Digital skills training courses available in Uganda (continued)

Institution	Short courses/ certificates	Diploma courses	Bachelor's degree courses
Clarke International University	Data Management and Analysis in Research (SPSS/ STATS, Epi-Data and Info) 4 weeks, Records Management and Information Systems in Health, Introduction to Computer Skills		Bachelor of Information Systems
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
Uganda Institute of Information and Communications Technology	Certificate in Information and Communications 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	
Cavendish University	Certificate in Information Technology	Diploma in Computer Science and Information Technology	
Uganda Communications Commission	Digital Technology for Agriculture, Digital Technology for persons with disabilities, Digital Technology in Education Programme, Digital Skilling Programme		

5.2 Training requirements

This section outlines the training programmes that are recommended to be taken forward. Table 9 lists the specific training requirement that has been identified as a gap, the target group who requires the training, and potential providers of this training. The training requirements cover a spectrum of foundational and advanced digital skills that are notably deficient in the selected sectors. To deliver tailored training, specific categories of professionals have been identified based on the skills they lack most. The table lists local universities, private and public training centres, and professional development institutions capable of offering practical, classroom-based sessions. Additionally, online platforms such as Coursera and edX, which provide flexible courses tailored to various skill levels and expertise areas, are included as potential providers. The training providers were selected based on their proven track records in delivering quality training programmes, their expertise in specific digital technology domains, and their ability to

offer flexible training modalities. Finally, despite the lack of mention of skilling challenges for persons with disabilities during the KIIs and surveys, it is important to acknowledge that skills training for persons with disabilities will be different from that of others. Table 9 includes training requirements to help create an inclusive environment that empowers employees with disabilities with the tools and knowledge to succeed. Besides having these training requirements included, all training providers selected should be able to demonstrate their ability to provide satisfactory training sessions for persons with disabilities.

Table 9: Digital skills training courses for each training requirement

Training requirements	Target group(s)	In-person providers	Online providers
Foundational cybersecurity (being safe and legal online)	All who have not previously undertaken cybersecurity training	Kampala University, Aptech Computer Education	Google Cybersecurity Professional Certificate (Coursera)
Data skills (collection, management, analysis, storage)	Both ICT and non-ICT professionals who work with data and who have not previously undertaken similar training	Nakawa Institute of Business Studies, Makerere Business Institute, Clarke International University	Introduction to Database Management Systems from New York University (edX), Data Analysis and Visualisation with Excel from PwC (Coursera)
Foundational digital skills (to include at a minimum remote work tools, handling information and context, and ethical use of technology)	Workers aged 55 or above who have not previously undertaken similar training	UICT, Digital Literacy Initiative	Google IT Support Professional Certificate (Coursera)
Digital literacy for employees with disabilities	All workers with disabilities	Uganda Communications Commission (UCC)	Ability Net UK, Eloomi
Accessible technology training	All workers with disabilities	UCC	Ability Net UK, Hassell Inclusion
Data management, focusing on secure handling and usage of patient data	Health sector non-ICT professionals	Makerere University, Uganda Martyrs University	Health informatics specialization by Johns Hopkins University (Coursera), Healthcare Data Management and Information Systems (Coursera)
E-learning platform access and utilization	Education sector non-ICT professionals in rural areas	N/A (platform-dependent)	N/A (platform-dependent)

Table 9: Digital skills training courses for each training requirement (continued)

Training requirements	Target group(s)	In-person providers	Online providers
Digital technology in agriculture (to include IoT devices and mobiles for monitoring crop growth, environmental conditions and market information	Agriculture sector non-ICT professionals	AgriTech Talk Africa, Uganda Technology and Management University	World Bank's e-learning on digital agriculture (edX)
Business change management with a focus on building a digital mindset	For all managers in charge of leading and facilitating organizational change initiatives	Makerere University Business School	KPMG Digital Mindset and Assessment, Change Management
ICT for finance officers	All finance officers who have not previously undertaken similar training	Uganda Management Institute (UMI)	UMI (distance learning)
Machine learning	All ICT professionals who work in related roles	Makerere University	Machine Learning Specialization with DeepLearning.AI (Coursera)
Blockchain technologies	All ICT professionals who work in related roles	Refactory	Blockchain specialization from University of Buffalo (Coursera)
Emerging technologies introductory course	All ICT professionals	N/A	Emerging Technologies: From Smartphones to IoT to Big Data Specialization (Coursera)
Advanced AI course	All ICT professionals	Refactory	Oxford Artificial Intelligence Programme
Advanced IoT course	All ICT professionals	N/A	Advanced Professional Certificate in Internet Of Things (IoT) by London School of Planning and Management
Advanced cloud computing course	All ICT professionals	UICT	Learn Cloud Computing From the Basics to Advanced on Udemy; Advanced Certification Course in Cloud Computing on ns3edu.com

Table 9: Digital skills training courses for each training requirement (continued)

Training requirements	Target group(s)	In-person providers	Online providers
Advanced course in big data	All ICT professionals	Uganda Christian University	Leveraging Big Data for Business Intelligence by University of Cambridge
Advanced cybersecurity and network security	All ICT professionals who have not previously undertaken similar training whose roles are relevant to cybersecurity	ISBAT University, Kampala University	Advanced Cybersecurity Concepts and Capstone Project (Coursera)
E-procurement systems	All procurement officers who have not previously undertaken similar training	UMI	E-Procurement Learning (World Bank), E-Procurement (glomacs.com)
Digital marketing and social media	ICT professionals (with a focus on marketing) who have not previously undertaken similar training	Billbrain Institute of Technology, Houston Executive Consulting	Digital Marketing (Coursera)
Project management	For all ICT professionals involved in managing digital projects and those who have not received this training)	Houston Executive Consulting, UMI	IT Project Management course (itonlinelearning.com/), IBM IT Project Manager Professional Certificate (Coursera)
Data literacy for decision-making	For all managers in charge of performance management and improvement who have not previously undertaken similar training	N/A	Learn the Language of Data Course (thedataliteracyproject.org), Data Literacy Essentials (Cambridge)
Digital ethics	For all non-ICT professionals who have not received any training on this	N/A	Essential Data Ethics (Coursera), Data and Digital Ethics (University of Oxford)

Table 9 identifies specific training needs across foundational and advanced digital skills, highlighting the most critical areas for development within the selected sectors. This targeted approach ensures that training efforts are focused on the skills that are most deficient. By identifying precise training needs, categorizing professionals and selecting reputable and flexible training providers, the table provides guidance for the implementation plan that follows.

This list is not comprehensive, but details the non-organization-specific training requirements for ICT and non-ICT professionals. All professionals should continue to partake in initiatives at an organization-wide level that may be related to internal policies and processes that are specific to those organizations, or pieces of software that are used within organizations.

5.3 Required enablers

This section details required enablers that are prerequisites to having a highly skilled and efficient digital workforce in selected sectors. Two key enablers are highlighted by survey participants, namely infrastructure and further staff recruitment in areas where skills are lacking. Key informants and the panel of experts consistently highlighted the importance of these enablers to ensure training has its intended benefit. Another important enabler, considering that the training of professionals is a continuous process, is the need to establish partnerships with reputable training providers. While these are not the direct focus of this report, and instead are the subject of a separate report, this section summarizes stakeholder concerns.

5.3.1 Infrastructure

Adequate infrastructure is a key enabler of ensuring digital skills can be developed and utilized. Equipment, connectivity and power supply are key factors that ensure that skills development has its intended impact. Key informants observed a shortage of essential digital hardware, such as computers and networking devices, that are crucial for conducting ICT-related roles. In rural areas in particular, poor connectivity and low bandwidth were also cited as concerns. Also noted was the absence of suitable physical spaces, which should be equipped with necessary technological set-ups, such as server rooms or computer labs. Finally, power supply issues were noted as a recurrent theme, where unstable supply disrupts and disincentivizes the use of digital tools.

5.3.2 Recruitment

The potential of staff recruitment to address identified skills gaps in digital technology should be considered in tandem with skilling programmes. Several key informants highlighted the importance of recruiting skilled ICT personnel to bridge skills gaps, with one estimating the potential impact of 80 per cent of skills gaps being filled. Moreover, it could also be a cost-effective solution, given that recruitment of skilled staff would reduce reliance on external consultants.

The recruitment strategy for organizations, particularly in the public sector in Uganda, needs to be thoroughly reassessed. During the validation workshop, participants expressed concern that some employees whose roles required basic digital skills such as typing or using digital signatures, were not adequately equipped to perform their duties effectively. This issue is not confined to lower-level staff; it extends to top management as well. There is a perception that some senior staff lack a comprehensive understanding of the critical role digital skills play in enhancing work productivity, which in turn negatively impacts the departments they lead. Given these challenges, it is essential that recruitment processes are robust and designed to ensure that candidates are the best fit for their roles. This includes verifying that they possess the necessary digital competencies before they are on-boarded. A more rigorous approach to recruitment would help ensure that employees at all levels are capable and prepared to leverage digital tools effectively, ultimately contributing to better organizational performance and efficiency.

However, recruitment drives should not undermine the importance of upskilling existing staff. Skilling existing employees remains viewed as a sustainable approach, ensuring that staff can

adapt to various roles and responsibilities. Furthermore, upskilling existing staff reduces the need to ensure that new recruits fit into the organization's skills requirements.

Key informants identified several challenges and barriers in attracting candidates with the desired digital skills. A recurring theme was the financial challenge of attracting skilled ICT candidates due to budgetary constraints. Limited funds to offer competitive salaries, budgetary restrictions hindering recruitment efforts, and high salary expectations from candidates were common issues highlighted by respondents. Additionally, financial problems related to paying salaries on time were noted as impacting both recruitment and retention. The policy and regulatory framework governing recruitment and budget allocation posed another significant barrier to recruitment. Government restrictions on recruitment, policies dictating the number of ICT officers allowed per local government area, and bureaucratic delays in changing organizational structures to accommodate new roles all contribute to a slow process. This results in challenges in hiring the necessary skilled personnel swiftly, thereby hindering the ability to respond effectively to evolving technological needs and demands within the organization.

Overall, a holistic approach is necessary. While the potential benefits of recruiting skilled ICT personnel are recognized, a holistic approach that integrates recruitment with continuous training and development is deemed necessary.

5.3.3 Building partnerships

The quality and effectiveness of training programmes heavily depend on the trainers' expertise and qualifications. Therefore, partnerships with established training providers – such as Cisco, Microsoft, IBM, Huawei and other globally recognized institutions, including ITU Academy Training Centres – are essential for achieving a highly skilled and efficient digital workforce. These partnerships offer access to cutting-edge curriculum and resources that are continuously updated to reflect the latest advancements in technology. Such providers bring a wealth of experience and expertise, ensuring that training programmes are of the highest quality and aligned with international standards. This not only enhances the competencies of professionals, but also ensures they are well prepared to tackle contemporary technological challenges.

Moreover, these established training providers often offer certification programmes that are globally recognized and valued by employers. Earning certifications from renowned institutions boosts the credibility and employability of professionals, providing them with a competitive edge in the job market. Additionally, these providers typically offer a range of flexible learning options, including online courses, which can accommodate diverse learning needs and schedules. Collaborating with such esteemed partners also fosters an environment of continuous learning and professional development, which is crucial for maintaining a dynamic and responsive digital sector capable of driving digital transformation and innovation.

5.3.4 Enforcing national policies on skills development

The absence or lack of enforcement of policies guiding skills development for professionals diminishes the effectiveness of training initiatives, often resulting in inconsistent or voluntary participation rather than mandatory and systematic engagement. National policies ensure that training requirements are consistent and standardized across all sectors and organizations. This means that every employee, regardless of their role or location, receives the necessary training to stay current with technological advancements and industry standards. Without such policies, training may vary widely between organizations, leading to gaps in skills and knowledge that

can hinder overall productivity and competitiveness. National policies provide a framework for accountability, ensuring that organizations comply with training requirements. Without a policy mandate, there is little incentive for organizations to invest in continuous training, especially if it is seen as an optional or non-essential activity. Enforcement mechanisms, such as regular audits or penalties for non-compliance, can motivate organizations to prioritize training and development, leading to a more skilled and capable workforce. By enforcing training through national policies, Uganda can ensure that its workforce remains agile, adaptable and capable of driving the DUV 2040.

5.4 Implementation plan

An implementation plan provides a detailed outline that describes the steps, resources and timeline required to execute the capacity-building action plan for skilling ICT and non-ICT professionals in the public and private sectors of Uganda. It serves as a roadmap to ensure that the identified training programmes are carried out efficiently and effectively, achieving the desired outcomes. Table 10 presents a breakdown of the proposed implementation plan over a 12-month period.

Table 10: Implementation plan

Phase	Activity	Responsible	Parties	Expected
Planning and development	Define project scope and objectives of the training requirement	Project manager	Detailed project plan	Month 1
	Identify target staff, determine the specific groups needing training based on the assessment	Project manager and project steering committee	List of target groups	Month 1
	Create a detailed budget and allocate resources necessary for the project	Project manager and project steering committee	Approved budget and resource allocation plan	Month 1
Development	Develop curriculum tailored to identified skills gaps	Training providers, project steering committee	Training programme curriculum	Months 2–3
	Choose qualified organizations (in-person or online providers) to deliver the training programmes	Project manager, steering committee	List of selected training providers	Months 2–3
	Co-create comprehensive materials and resources for the training programmes with the training provider	Training providers, steering committee	Training materials	Months 2–3
	Organize venues, schedules, and other logistical aspects for the training sessions	Project manager	Logistics plan	Months 2–3

Table 10: Implementation plan (continued)

Phase	Activity	Responsible	Parties	Expected
Pilot	Conduct pilot training sessions, implement initial training sessions to a small group to test the effectiveness	Training providers	Feedback from pilot sessions	Months 4–5
	Gather input from participants in the pilot to refine the training programmes	Monitoring and evaluation team	Pilot phase evaluation report	Months 4–5
	Adjust and improve the training programmes based on feedback and results from the pilot phase	Training providers, steering committee	Revised training programmes	Months 4–5
Implementation	Deliver the full-scale training programmes to all identified target groups	Training providers	Trained professionals	Months 6–9
	Continuously observe training sessions to ensure quality and adherence to plan	Monitoring and evaluation team	Monitoring reports	Months 6–9
	Offer ongoing assistance and materials to help participants throughout the training process	Training providers	Ongoing support records	Months 6–9
Evaluation	Evaluate the effectiveness and impact of the training programmes after completion	Monitoring and evaluation team	Post-training evaluation report	Month 10
	Obtain comprehensive feedback from all involved parties – participants and training providers	Monitoring and evaluation team	Feedback reports	Month 10
	Review and interpret data to understand the training's effectiveness and areas for improvement	Monitoring and evaluation team	Impact assessment report	Month 10
Continuous improvement	Pinpoint aspects of the training programmes that need enhancement	Monitoring and evaluation team, stakeholders	Improvement plan	Months 11–12
	Regularly revise and improve the training curriculum and resources	Training providers, steering committee	Updated training programmes	Months 11–12
	Develop a schedule for future training sessions and continuous support initiatives	Project manager, training providers	Schedule for future training sessions	Months 11–12

Table 10: Implementation plan (continued)

Phase	Activity	Responsible	Parties	Expected
	Regularly review and refine the capacity-building strategy to meet evolving needs	Project steering committee, monitoring and evaluation team	Continuous improvement plan	Ongoing

The implementation plan has a phased approach that allows for meticulous planning and development, ensuring that training programmes are well designed and logistics are thoroughly organized. This reduces the risk of disruptions and ensures smooth execution. The plan also highlights the need for a defined project scope to ensure that the training programmes are tailored to the specific needs of different sectors, occupations and demographics, leading to more effective and relevant skills development. Conducting pilot sessions allows for real-time testing and feedback, ensuring that any issues are identified and addressed before full-scale implementation. This iterative process enhances the quality and effectiveness of the training.

Continuous monitoring during implementation ensures that the training programmes are delivered as intended, and providing support to participants maximizes their chances of successfully acquiring new skills. Post-training assessments and feedback collection provide valuable insights into the effectiveness of the programmes, allowing for data-driven adjustments and improvements. Finally, the continuous improvement phase ensures that the training programmes and the overall capacity-building strategy are regularly updated to meet evolving needs, ensuring long-term sustainability and relevance.

5.5 Results framework

The results framework outlines the expected impact, outcomes, assumptions and indicators to monitor the progress towards achieving the study's intended results. It will provide some guidance to intervention implementers to identify where progress is achieved or derailed. The overarching goal of this study is to support the vision of transforming Uganda into a digitally enabled economy. From the perspective of this study, this will be achieved by equipping professionals in both the public and private sectors with the necessary job-relevant digital skills. This transformation is predicated on a systematic approach that starts with identifying specific skills gaps, developing and delivering targeted training programmes, and ensuring that these newly acquired skills are effectively applied within the workplace.

Outputs in Table 11 represent the immediate deliverables which, if successfully achieved, are expected to lead to the measurable outcome of professionals in the public and private sectors being equipped with job-relevant digital skills. This in turn enhances the performance of organizations across various sectors. The cumulative effect of this outcome contributes directly to the impact – the broader goal of transforming Uganda into a digitally enabled economy. As professionals apply their enhanced digital skills, the productivity, innovation and efficiency within both the public and private sectors will improve, driving economic growth and increasing Uganda's competitiveness in the global digital economy.

Baseline data for certain indicators are not readily available. To address this, it will be necessary to collect and verify baseline data prior to the implementation. The proposed targets were determined by a combination of sources, including government projections in the National Budget Framework Paper, historical performance data for particular indicators such as the ICT

Development Index score, and informed estimates for indicators where data were not readily available. This framework is also underpinned by key assumptions – such as the availability of resources and the commitment of stakeholders, among others – that ensure the outputs lead to the desired outcome and ultimately contribute to the overarching impact.

Table 11: Results framework

Level	Expected result	Indicators	Data source and collection method	Baseline	Target	Assumptions
Impact	Transforming Uganda into a digitally enabled economy	Increase in ICT sector contribution to GDP	Annual economic surveys and reports	3% (2021/22)	3.6%	The economy continues to grow, and other sectors do not significantly overshadow the digital sector's growth
		Improvement in Global ICT Index rankings	ITU ICT Development Index score	40.4 (2024)	55	Consistent and comparable data collection across countries
Outcome	Professionals in the public and private sectors equipped with job-relevant digital skills	Number of professionals trained	Training programme records	TBC	Increase by 10% in both private and public sectors	Training programmes are accessible and appealing to professionals

Table 11: Results framework (continued)

Level	Expected result	Indicators	Data source and collection method	Baseline	Target	Assumptions
Outputs	Tailored foundational and advanced digital skills training programmes developed	Number of training programmes developed	Training programme records	TBC	Increase by 10% in both private and public sectors	Availability of qualified trainers and resources
		Quality of training programmes developed	Feedback from participants	TBC	TBC	All stakeholders work together to develop the training programmes
	Delivery of tailored advanced digital skills training programmes	Number of training programmes delivered	Training programme records, participant attendance sheets	TBC	Increase by 10% in both private and public sectors	Availability of qualified trainers and resources
	Certification and accreditation of participants	Number of participants who successfully complete training and receive certification	Certifications documented	TBC	Increase by 10% in both private and public sectors	Participants are trained by accredited institutions
	Collaboration and partnerships with training providers	Number of partnerships formed with training entities	Partnership agreements	TBC	Increase by 10% in both private and public sectors	Training providers are willing to partner with private and public organizations over the long term

5.6 Risk management

Effective risk management is crucial to the success of the capacity-building action plan aimed at equipping professionals in Uganda's public and private sectors with job-relevant digital skills. This section identifies potential risks that could impact the achievement of the desired outcomes and outputs, assesses the likelihood of these risks occurring, evaluates their potential impact, and outlines mitigation strategies to manage or minimize these risks. By proactively addressing these challenges, the programme ensures a more resilient implementation process,

thereby increasing the chances of achieving the overarching goal of transforming Uganda into a digitally enabled economy.

Table 12: Risk management

Level	Expected result	Indicators	Data source and collection method	Baseline	Target	Assumptions
Impact	Transforming Uganda into a digitally enabled economy	Increase in digital sector contribution to GDP	Annual economic surveys and reports	3% (2021/22)	3.6%	The economy continues to grow, and other sectors do not significantly overshadow the digital sector's growth
		Improvement in Global ICT Index rankings	ITU ICT Development Index score	40.4 (2024)	55	Consistent and comparable data collection across countries
Outcome	Professionals in the public and private sectors equipped with job-relevant digital skills	Number of professionals trained	Training programme records	TBC	Increase by 10% in both private and public sectors	Training

Table 12: Risk management (continued)

Level	Expected result	Indicators	Data source and collection method	Baseline	Target	Assumptions
Outputs	Tailored foundational and advanced digital skills training	Number of training	Training programme records	TBC	Increase by 10% in both private and public sectors	Availability of qualified trainers and resources
	Delivery of tailored advanced digital skills training	Number of training	Training programme records, participant attendance sheets	TBC	Increase by 10% in both private and public sectors	Availability of qualified trainers and resources
	Certification and accreditation of participants	Number of participants who successfully complete training and receive certification	Certifications documented	TBC	Increase by 10% in both private and public sectors	Participants are trained by accredited institutions
	Collaboration and partnerships with training providers	Number of partnerships formed with training entities	Partnership agreements	TBC	Increase by 10% in both private and public sectors	Training providers are willing to partner with private and public organizations over the long term

6 Conclusion

The digital skills capacity-building needs assessment for priority sectors in Uganda provides a comprehensive analysis of the current state of digital skills across the private and public sectors in the priority sectors of education, health and agriculture. The assessment highlights significant gaps in both foundational and advanced digital skills, underscoring the urgent need for targeted capacity-building initiatives to support Uganda's digital transformation roadmap

The assessment identified differences in digital skills deficiencies and requirements across sectors. For the education sector, difficulties in adopting e-learning platforms, especially in rural schools, were noted. It was proposed that increased digital resources and training for both students and teachers could be beneficial. In the health sector, the focus is on skills in data management, particularly handling patients' data securely and efficiently. Further suggestions include the skills needed for integration of advanced digital tools such as AI for patient management and diagnostics, and adoption of telemedicine and digital health records. Agriculture stakeholders note limited adoption of modern digital tools for data collection and analysis, citing the high costs of technology deployment in rural and remote areas. Skills are needed to ensure farmers can use IoT devices for monitoring crop growth and environmental conditions, and market and weather information through mobile technologies.

There is a pronounced need for digital skills development at all occupational levels, from leadership to technical professionals. Leaders in public and private institutions often lack the strategic digital knowledge or data literacy necessary to drive digital initiatives and data-driven decision-making, ICT professionals require advanced training in emerging technologies and project management skills, and non-ICT professionals lack data management skills and knowledge of data ethics.

The assessment revealed that older employees and workers in rural areas faced significant barriers to digital skills acquisition, limiting their ability to contribute effectively to digital transformation efforts. Younger workers, although more digitally literate, still required upskilling in areas such as advanced software usage and cybersecurity.

The study presented recommendations in the form of training requirements which covered a range of foundational and advanced digital skills that were notably deficient in the selected sectors. To deliver tailored training, specific categories of professionals were identified based on the skills they lacked most. A non-exhaustive list of training providers – including local universities, private and public training centres, and professional development institutions capable of offering practical, classroom-based sessions – was provided as a starting point for identifying the right partners for collaboration. Additionally, online platforms such as Coursera and edX, which provide flexible courses tailored to various skill levels and expertise areas, were included as potential providers. The training providers were selected based on their proven track records in delivering quality training programmes, their expertise in specific digital domains, and their ability to offer flexible training modalities.

Besides the training programmes, several key enablers were identified. These included adequate infrastructure (equipment, connectivity and power supply), recruiting skilled ICT personnel to bridge skills gaps, and building partnerships with globally recognized institutions – prerequisites to having a highly skilled and efficient digital workforce in selected sectors.

The final section of the report provided a comprehensive implementation plan. This detailed the steps, resources and timeline necessary to carry out the capacity-building action plan for skilling ICT and non-ICT professionals in Uganda's public and private sectors. Additionally, it included a results framework that outlined the expected impact, outcomes, assumptions and indicators to track progress towards the study's intended goals, along with a risk management plan to flag and address potential challenges to implementation.

7 Annexures

7.1 Annex I: Literature consulted

Table 13: Documents consulted

Document type	Name (with link)	Author
Policy and programme documents	Third National Development Plan (NDPIII) 2020/21 – 2024/25	National Planning Authority
	ICT Sector Strategic and Investment Plan (2015/16 - 2019/20)	MOICT
	Digital Transformation Roadmap	MOICT
	The National Broadband Policy	MOICT
	Sixth EAC Development Strategy 2021/22 – 2025/26	East African Community
	National 4IR Strategy	MOICT
	National ICT Initiatives Support Programme	MOICT
Digital skills assessments	Inclusive Digital Economy Scorecard	UNCDF
	Data Collection Survey on ICT Industry Development and Enhancement of Startup Ecosystem in Uganda	JICA
	National Information Technology Survey 2017/18	NITA
	ICT Needs Assessment And Priority Requirements For Key Teacher Training Institutions	UNESCO
	Pilot Digital Skills Acceleration program 2023/2024 - 2025/2026	MOICT
	JSCE-UICT ICT Skills Survey Report (First Ugandan Edition)	NITA-U
	NITA-U ICT Skills and Training Needs Assessment (STNA) and Training Action Plan (STAP) Development	GoU
	Assessment of skills supply and demand in the digital economy in Nigeria, including digital skills	ITU
	Final ICT Skills and Training Assessment (STA) Report	UICT

Table 13: Documents consulted (continued)

Document type	Name (with link)	Author
Skills frameworks	Essential Digital Skills Framework	UK Department for Education
	European E-Competence Framework	European Commission
	Digital Skills Assessment Guidebook	ITU
	Global framework on core skills for life and work in the 21st Century	ILO
	Educators' Digital Competency Framework	UNICEF

7.2 Annex II: Panel of experts

Table 14: Panel of experts

Participant name	Organization
Agnes Lumala	UICT
Andrew Kinene	Ministry of Health
Elizabeth Anne Okota	Genesis Analytics
Badru Mayanja	Metropole Credit Reference Bureau
Francis Bwire	UICT
Brian Semambo	Credit Info Uganda
Daniel Wambi	Intern
Edward Kasule Musisi	National Project Officer/ITU consultant
Arnold Mujuni	Uganda Communications Commission
Musitafa Kalyowa	National Chemotherapeutic Research Institute
Patrick Kadama	ICT Association of Uganda
Moses Tuhame	National Curriculum Development Center
Paul Muyinda	Makerere University, Institute of Open Distance and E-learning
William Bieranga*	Ministry of Health
Emmanuel Nyikora	ITU
Peter Ogule	MoICT&NG
Mbabazi Propsper	Civil Service College
Savia Mugwanya	Ministry of Public Service

7.3 Annex III: Profile of survey respondents

Table 15: Survey respondents

Profiles	Categories	Percentage
Sex	Male	60.4
	Female	39.6
Age group	Less than 25	< 2
	26-35	24.8
	36-45	43.6
	46-55	23.8
	56-65	5.9
Working Experience	Less than 2 years	4
	3-5 years	18
	6–10 years	15
	11-20 years	42
	21-30 years	19
	30+ years	2
Highest Education Level	High School	0
	Professional or vocational qualification	8.1
	Bachelor's Degree	40.4
	Master's Degree	47.5
	PhD	4

7.4 Annex IV: Details of key informants

Table 16: Key informants

Name	Organisation	Position
Savia Mugwanya	Civil Service College	Commissioner
Patrick Muinda	Ministry of Education and Sports	Assistant Commissioner ICT
Abubaker Buye	Ministry of Education and Sports	
Andrew Rutebuka	National Drug Authority	Ag Head ICT

Table 16: Key informants (continued)

Name	Organisation	Position
Joseph Mutasaaga	National Drug Authority	Head of Business Planning and Development
Joseph Bagambe	Uganda Business and Technical Examination	
Waman Godfrey Bagamba	Uganda Business and Technical Examination	
Prosper Mbabazi	Nakasero Hospital	IT Manager
Lwanga Ronald	Mulago School of Nursing and Midwifery	Head ICT
Nabuuma Flavia	Mulago School of Nursing and Midwifery	
Tonny Okwera	Parliament of Uganda	Principal Hr Officer
Musitafa Kalyowa	Natural Chemotherapeutics Research Institute	ICT Officer
Kayongo Herbert	Victoria University	
Ssonko Peter	Natural Chemotherapeutics Research Institute	Nutritionist Researcher
Kinene Andrew	Ministry of Health	M & E Officer
Dr.Byaruhanga William	Ministry of Health	Senior Logistics Officer
Nanyanzi Annet	National Organic Agriculture Movement of Uganda	Finance and Administration Officer
Justus Cherop	Uganda Nurses and Midwives' Union	President Uganda Nurses and Midwives Union
Sesinde Nicholas	Uganda Coffee Development Authority	IT Manager
Brian Ssemambo	Crb Association of Uganda	Head IT and Data Analyst
Badru Mayanja	Crb Association of Uganda	Operations Manager
Ivan Sanya	Uganda Manufacturers Association	IT Lead
Geoffrey Ekol	Education Service Commission	Senior Information Scientist
Smith Andrew Mugimba	National Drug Authority	ICT Officer
Irene Namwase	Ngo Bureau	
Dorothy Namagga	Education Service Commission	Ass Commissioner Hr
Innocent Kainamura	Uganda Blood Transfusion Services	Principal IT Officer

Table 16: Key informants (continued)

Name	Organisation	Position
Badru Musinguzi	Ngo Bureau	Head ICT
Muhereza Louis	Sheema Dlg	IT Officer
Anzo Walter	Obongi Dlg	IT Officer
Baisani Thomas	Kaliro Dlg	Information Technology Officer
Saade Ahamed	Kaliro Dlg	Communication Officer
Oyuku Ocen Emmanuel	Amudat Dlg	Chief Administrative Officer
Okurut George Inyoin	Mulago National Referral Hospital	Head ICT
Dr. Mark Kasumba	Mulago National Referral Hospital	Non ICT Representative
Gerald Balitwawula	Private Sector Foundation Uganda	Senior IT Manager
Susan Kasadhakawo	Department of The Private Schools and Institutions	Senior Education Officer
Tuhame Moses	National Curriculum Development Centre	Manager ICT & Multimedia
Tibakanya Joseph	National Curriculum Development Centre	Curriculum Specialist
Elizabeth Asiimwe	Uganda Forum for Agricultural Advisory Services (Ufaas)	Communications and Infomanagement
Samuel Muyinda	Uganda Forum for Agricultural Advisory Services (Ufaas)	ICT Adviser/ Website Manager
Ruth Mugisha	Uganda Forum for Agricultural Advisory Services (Ufaas)	Project Coordinator
Salim Kasamba	Uganda Forum for Agricultural Advisory Services (Ufaas)	Extension Digital Connector
Andrew Munyole	Uganda Forum for Agricultural Advisory Services (Ufaas)	Extension Digital Connector
Pascal Ndarahutse	Private Sector Foundation Uganda	
Mugabi Samuel	Makerere University, Kampala	Director ICT
Dr. Joseph Balikudembe	Makerere University, Kampala	Dean School of Computing and Information Technology
Dr. Ruth Nalumaga	Makerere University, Kampala	University Librarian
Dr. Paul Muyinda Birevu	Makerere University, Kampala	Director Institute Open Distance E-Learning

Table 16: Key informants (continued)

Name	Organisation	Position
Ssekabira Peters	Lwengo Dlg	IT Officer
Barigye Nicholas	Lwengo Dlg	District Planner

7.5 Annex V: NDP programme prioritization

Table 17: Programme prioritisation scores

NDP III Programme	Industry size	Importance of ICT to the sector	Scale of capacity building needs	Ease of key stakeholder identification	Total score
Human capital development	5	5	5	4	19
Agro-industrialization	5	5	5	3	18
Innovation, technology development and transfer	3	5	5	4	17
Tourism development	4	5	4	3	16
Private sector development	2	5	5	4	16
Digital transformation	2	5	5	4	16
Manufacturing	2	5	5	3	15
Energy development	2	5	5	3	15
Public sector transformation	2	5	5	3	15
Mineral development	3	4	4	3	14
Community mobilisation and mindset	1	5	5	3	14
Governance and security	3	5	4	2	14
Regional development	1	5	5	3	14
Sustainability development of petroleum resources	1	4	5	3	13
Climate change, natural resources, environment and water management	1	5	5	2	13
Sustainable urbanisation	1	5	5	2	13
Integrated transport infrastructure and services	1	4	4	3	12

7.6 Annex VI: Competency framework

Category	Focus area	Competency
Foundational ICT Skills	Foundational	Ability to turn on a device, Use device controls, Utilize accessibility tools, Interact with home screen, Understand the internet and Wi-Fi connection, Keep passwords and personal information secure, Update passwords
	Communicating	Ability to set up email, Digital messaging, Use word processors, Share documents, Video communication tools, Social media usage
	Handling information and content	Ability to Assess online information reliability, Use search engines effectively, Bookmarking, Cloud storage use, Organize files and folders, Access legal entertainment
	Transacting	Ability to set up online accounts for transactions, Access public services online, Use online payment systems, Upload necessary documents, Manage money online securely
	Problem Solving	Ability to find problem-solving information online, Use online help and chat facilities, Learn from tutorials and forums
	Being safe and legal online	Ability to authenticate requests for accounts, Use secure passwords, Adjust privacy settings, Identify secure websites, Recognize suspicious links, Backup information
	Internet Browsing and Research:	Ability to efficiently search, retrieve, and evaluate information from the internet, utilising search engines and online databases to support decision-making and problem-solving.
	Data Management and Organization	Basic understanding of data handling, storage, and organisation principles to manage and maintain information in digital formats effectively.
	Adaptability and Continuous Learning	Willingness and ability to adapt to new technologies, software updates, and digital tools, along with a commitment to continuous learning and professional development to stay updated with the latest trends and advancements in the IT
	Collaboration and Teamwork	Capacity to collaborate effectively with IT professionals and cross-functional teams, communicate IT-related needs and requirements, and work collectively towards achieving common goals and objectives.
	Ethical and Responsible Use of Technology	Understanding of ethical considerations, privacy regulations, and responsible use of technology, including adherence to organisational policies, legal requirements, and best practices related to IT usage and data protection.
	Project and Time Management	Basic project management skills to plan, organise, and prioritise tasks, manage time effectively, and meet deadlines using project management tools and software.

(continued)

Category	Focus area	Competency
"Plan"	A.1. IS and Business Strategy Alignment	Leads strategic IS policy decisions, shapes organisational efficiency, establishes enterprise architecture aligned with policies, and determines sourcing strategies to ensure a secure ICT environment.
	A.2. Service Level Management	Defines, validates and makes applicable service level agreements (SLAs) and underpinning contracts for services offered. Negotiates service performance levels taking into account the needs and capacity of stakeholders and business.
	A.3. Business Plan Development	Focuses on designing business or product plans, evaluating alternative approaches and ROI, selecting sourcing models, and ensuring alignment with business and tech strategies. Communicates and promotes the plan to stakeholders while addressing political, financial, and organisational interests.
	A.5. Architecture Design	Specifies, refines, updates and makes available a formal approach to implement solutions, necessary to develop and operate the IS architecture. Identifies change requirements and the components involved: hardware, software, applications, processes, information and technology platform. Takes into account interoperability, scalability, usability and security. Maintains alignment between business evolution and technology developments.
	A.6. Application Design	Analyses, specifies, updates and makes available a model to implement applications in accordance with IS policy and user/ customer needs. Selects appropriate technical options for application design, optimising the balance between cost and quality. Designs data structures and builds system structure models according to analysis results through modelling languages. Ensures that all aspects take account of interoperability, usability and security. Identifies a common reference framework to validate the models with representative users, based upon development models (e.g. iterative approach).
	Integrated Circuit Design	Integrated Circuit Design skills involve conceptualising, designing, and testing semiconductor devices and circuits for electronic applications. These competencies encompass expertise in electronics, CAD tools, and simulation techniques to optimise performance, functionality, and reliability of IC designs.

(continued)

Category	Focus area	Competency
"Build"	Application Development	Interprets the application design to develop a suitable application in accordance with customer needs. Adapts existing solutions by e.g. porting an application to another operating system. Codes, debugs, tests and documents and communicates product development stages. Selects appropriate technical options for development such as reusing, improving or reconfiguration of existing components. Optimises efficiency, cost and quality. Validates results with user representatives, integrates and commissions the overall solution.
	Website Development	Website Development skills involve designing, coding, and maintaining websites to ensure optimal user experience and functionality. These competencies encompass proficiency in web technologies, responsive design principles, and content management systems (CMS). Attention to detail, problem-solving, and staying updated with web trends are essential for creating effective and engaging websites.
	Database Management	Database Management skills encompass designing, implementing, and optimising databases to store, retrieve, and manage data efficiently. These competencies involve expertise in database systems, data modelling, and ensuring data integrity and security.
	Data Center Management	Data Center Management skills encompass overseeing and maintaining data centre operations, ensuring uptime, and optimising infrastructure performance. These competencies involve expertise in infrastructure design, capacity planning, and implementing security and disaster recovery measures.
	Infrastructure support	Infrastructure support skills involve maintaining, troubleshooting, and optimising IT infrastructure components like servers, networks, and storage systems. These competencies encompass technical expertise, problem-solving abilities, and effective communication to ensure reliable and secure infrastructure operations.
	IT Outsourcing Management	IT Outsourcing Management skills involve overseeing and coordinating outsourced IT services and projects to ensure alignment with organisational goals and standards. These competencies encompass vendor management, contract negotiation, and performance monitoring to optimise service delivery, cost-efficiency, and stakeholder satisfaction.
	Business Analytics	Business Analytics skills involve analysing data to derive insights, make data-driven decisions, and drive business growth and efficiency. These competencies encompass data analysis, statistical modelling, and data visualisation to identify trends, patterns, and opportunities for optimization and innovation.

(continued)

Category	Focus area	Competency
	Information Security	Information Security skills involve protecting organisational data and systems from unauthorised access, breaches, and cyber threats. These competencies encompass expertise in cybersecurity practices, risk management, and compliance to safeguard information assets and ensure data integrity, confidentiality, and availability.
	IT Sales & Marketing	IT Sales & Marketing skills involve promoting and selling IT products, services, and solutions to prospective clients and customers. These competencies encompass market analysis, strategic planning, and customer relationship management to drive revenue growth, market expansion, and brand awareness in the IT sector.
	IT Management	IT Management skills involve overseeing and directing IT operations, projects, and teams to align with organisational objectives and technological advancements. These competencies encompass leadership, strategic planning, and resource allocation to optimise IT performance, innovation, and stakeholder satisfaction.
	Cyber Security	Cyber Security skills involve protecting computer systems, networks, and data from cyber threats, attacks, and vulnerabilities. These competencies encompass expertise in threat analysis, risk mitigation, and security measures to safeguard information assets, maintain data integrity, and ensure regulatory compliance.
	E-Government	E-Government skills involve leveraging digital technologies to enhance government services, transparency, and citizen engagement. These competencies encompass digital strategy development, data management, and public service innovation to improve efficiency, accessibility, and effectiveness of governmental operations and communication.
	Embedded Systems	Embedded Systems skills involve designing, developing, and testing hardware-software integrated systems for specific functions or applications. These competencies encompass expertise in programming, hardware design, and real-time operating systems to create efficient, reliable, and optimised embedded solutions for various industries and applications.
	Telecommunications Network Operations, Planning & Management	Telecommunications Network Operations, Planning & Management Skills encompass designing network architectures, optimising performance, and ensuring security and compliance. These competencies also involve capacity planning, fault troubleshooting, vendor management, and effective stakeholder communication. Continuous improvement and staying updated with industry trends are integral for operational excellence in telecommunications

(continued)

Category	Focus area	Competency
	Enterprise Network Design & Management	Enterprise Network Design & Management skills involve planning and implementing scalable network architectures, optimising performance, and ensuring robust security measures. These competencies encompass capacity planning, fault detection, troubleshooting, and effective vendor management. Continuous adaptation to industry trends and stakeholder communication are key for maintaining network reliability and efficiency.
	Next Generation Network (NGN) Planning, Operations & Deployment	Next Generation Network (NGN) Planning, Operations & Deployment skills involve designing and implementing advanced network architectures, ensuring seamless integration of voice, data, and multimedia services. These competencies encompass proactive monitoring, fault resolution, and optimising NGN performance for reliability and efficiency. Staying updated with emerging technologies and collaborating with stakeholders are crucial for successful NGN deployment and operations.
	Component Integration	Integrates hardware, software or sub system components into an existing or a new system. Complies with established processes and procedures such as, configuration management and package maintenance. Takes into account the compatibility of existing and new modules to ensure system integrity, system interoperability and information security. Verifies and tests system capacity and performance and documentation of successful integration.
	Testing	Constructs and executes systematic test procedures for ICT systems or customer usability requirements to establish compliance with design specifications. Ensures that new or revised components or systems perform to expectation. Ensures meeting of internal, external, national and international standards; including health and safety, usability, performance, reliability or compatibility. Produces documents and reports to evidence certification requirements.
	Solution Deployment	Following predefined general standards of practice carries out planned necessary interventions to implement solutions, including installing, upgrading or decommissioning. Configures hardware, software or network to ensure interoperability of system components and debugs any resultant faults or incompatibilities. Engages additional specialist resources if required, such as third party network providers. Formally hands over fully operational solution to user and completes documentation recording all relevant information, including equipment addressees, configuration and performance data.
	Documentation Production	Produces documents describing products, services, components or applications to establish compliance with relevant documentation requirements. Selects appropriate style and media for presentation materials. Creates templates for document-management systems. Ensures that functions and features are documented in an appropriate way. Ensures that existing documents are valid and up to date.

(continued)

Category	Focus area	Competency
	Systems Engineering	Engineers software and/or hardware components to meet solution requirements such as specifications, costs, quality, time, energy efficiency, information security and data protection. Follows a systematic methodology to analyse and build the required components and interfaces. Builds system structure models and conducts system behaviour simulation. Performs unit and system tests to ensure requirements are met.
"Run"	User Support	Responds to user requests and issues, recording relevant information. Assures resolution or escalates incidents and optimise system performance in accordance with predefined service level agreements (SLAs). Understands how to monitor solution outcomes and resultant customer satisfaction.
	Change Support	Implements and guides the evolution of an ICT solution. Ensures efficient control and scheduling of software or hardware modifications to prevent multiple upgrades creating unpredictable outcomes. Minimises service disruption as a consequence of changes and adheres to defined service level agreement (SLA). Ensures consideration and compliance with information security procedures.
	Service Delivery	Ensures service delivery in accordance with established service level agreements (SLAs). Takes proactive action to ensure stable and secure applications and ICT infrastructure to avoid potential service disruptions, attending to capacity planning and to information security. Updates operational document library and logs all service incidents. Maintains monitoring and management tools (i.e. scripts, procedures). Maintains IS services. Take proactive measures.
	Problem Management	Identifies and resolves the root cause of incidents. Takes a proactive approach to avoidance or identification of the root cause of ICT problems. Deploys a knowledge system based on recurrence of common errors. Resolves or escalates incidents. Optimises system or component performance.
"Enable"	Information Security Strategy Development	Defines and makes applicable a formal organisational strategy, scope and culture to maintain safety and security of information from external and internal threats, i.e. digital forensic for corporate investigations or intrusion investigation.
	ICT Quality Strategy Development	Defines, improves and refines a formal strategy to satisfy customer expectations and improve business performance (balance between cost and risks). Identifies critical processes influencing service delivery and product performance for definition in the ICT quality management system.
	Education and Training Provision	Defines and implements ICT training policy to address organisational skill needs and gaps. Structures, organises and schedules training programmes and evaluates training quality through a feedback process and implements continuous improvement. Adapts training plans to address changing demand.

(continued)

Category	Focus area	Competency
	Purchasing	Applies a consistent procurement procedure, including deployment of the following sub processes: specification requirements, supplier identification, proposal analysis, evaluation of the energy efficiency and environmental compliance of products, suppliers and their processes, contract negotiation, supplier selection and contract placement.
	Sales Proposal Development	Develops technical proposals to meet customer solution requirements and provide sales personnel with a competitive bid. Underlines the energy efficiency and environmental impact related to a proposal.
	Sales Management	Drives the achievement of sales results through the establishment of a sales strategy. Demonstrates the added value of the organisation's products and services to new or existing customers and prospects. Establishes a sales support procedure providing efficient response to sales enquiries, consistent with company strategy and policy
	Contract Management	Provides and negotiates contracts in accordance with organisational processes. Ensures that contract and deliverables are provided on time, meet quality standards, and conform to compliance requirements. Addresses non-compliance, escalates significant issues, drives recovery plans and if necessary amends contracts.
	Personnel Development	Diagnoses individual and group competence, identifying skill needs and skill gaps. Reviews training and development options and selects appropriate methodology taking into account the individual, project and business requirements.
	Information and Knowledge Management	Identifies and manages structured and unstructured information and considers information distribution policies. Creates information structure to enable exploitation and optimisation of information.
	Digital Marketing	Understands the fundamental principles of digital marketing. Distinguishes between the traditional and digital approaches. Appreciates the range of channels available. Assesses the effectiveness of the various approaches and applies rigorous measurement techniques. Plans a coherent strategy using the most effective means available.

(continued)

Category	Focus area	Competency
"Manage"	Project & Portfolio Management	Project & Portfolio Management skills involve planning, executing, and overseeing projects and portfolios, complemented by IT skills for project management software, data analytics, and collaboration tools. These competencies encompass strategic planning, risk assessment, and technology utilisation to optimise project workflows, resource allocation, and decision-making for successful project delivery and portfolio optimization.
	Risk Management	Risk Management skills involve identifying, assessing, and mitigating risks within an organisation, enhanced by IT skills for cybersecurity, data analytics, and compliance monitoring tools. These competencies encompass risk assessment, data analysis, and technology utilisation to proactively identify vulnerabilities, implement controls, and ensure regulatory compliance, safeguarding organisational assets and reputation.
	Process Improvement	Process Improvement skills involve analysing and optimising organisational workflows and operations, complemented by IT skills for automation, data analytics, and workflow management tools.
	Information Security Management	Information Security Management skills involve protecting organizational data and systems, complemented by IT skills in cybersecurity, risk assessment, and compliance monitoring tools.
	ICT Quality Management	ICT Quality Management skills involve ensuring the reliability and performance of IT systems and services, complemented by IT skills in software testing, quality assurance, and performance monitoring tools.
	Information Systems Governance	Information Systems Governance skills involve overseeing and managing the strategic alignment, risk management, and compliance of IT systems and processes, complemented by IT skills in governance frameworks, regulatory compliance, and IT auditing tools.
	Business Change Management	Business Change Management skills involve leading and facilitating organisational change initiatives, complemented by IT skills in project management, communication tools, and digital transformation strategies.

(continued)

Category	Focus area	Competency
Emerging Technologies	Green ICT	Green ICT skills involve promoting and implementing environmentally sustainable practices and technologies within the IT sector. These competencies encompass expertise in energy-efficient computing, waste reduction, and eco-friendly IT solutions to minimise carbon footprint, enhance sustainability, and support green initiatives in organisational operations.
	Cloud Computing	Cloud Computing skills involve designing, implementing, and managing cloud-based solutions and services to optimise IT infrastructure and scalability. These competencies encompass expertise in cloud architecture, virtualization, and security to enable flexible, cost-effective, and reliable computing environments for organisations.
	Internet of Things	Internet of Things (IoT) skills involve designing, implementing, and managing interconnected devices and systems to collect, exchange, and analyse data for automation and insights. These competencies encompass expertise in IoT architecture, sensor integration, and data analytics to drive innovation, efficiency, and connectivity across various industries and applications.
	Blockchain Technologies	Blockchain Technologies skills involve designing, developing, and implementing decentralised and secure digital ledger systems for transactions and data management. These competencies encompass expertise in cryptography, smart contracts, and distributed ledger technology to ensure transparency, immutability, and integrity in various applications such as finance, supply chain, and healthcare.
	Artificial Intelligence/Machine learning	Artificial Intelligence/Machine Learning skills involve developing, training, and deploying algorithms and models to analyse data, make predictions, and automate tasks. These competencies encompass expertise in data analytics, neural networks, and algorithm optimization to drive innovation, improve decision-making, and enhance efficiency across diverse industries and applications.
	Data Science	Data Science skills involve collecting, analysing, and interpreting large datasets to extract valuable insights and inform decision-making processes. These competencies encompass expertise in statistical analysis, machine learning, and data visualisation to uncover patterns, trends, and opportunities that drive business growth and innovation.

(continued)

Category	Focus area	Competency
Shared Services & Outsourcing	Call centre	Call centre skills involve effectively communicating with customers, resolving issues, and providing exceptional service through various channels like phone, email, and chat. These competencies encompass strong interpersonal skills, problem-solving abilities, and product knowledge to ensure customer satisfaction, retention, and positive brand perception.
	Human Resources	Human Resources (HR) skills involve talent management, employee relations, and organisational development, enhanced by IT skills for HR analytics, HRIS management, and digital recruitment platforms. These competencies encompass strategic planning, data analysis, and technology adoption to streamline HR processes, enhance employee engagement, and support organisational growth and transformation.
	Finance & Accounting	Finance & Accounting skills involve financial management, budgeting, and reporting, complemented by IT skills for financial modelling, data analysis, and enterprise resource planning (ERP) systems. These competencies encompass proficiency in financial analysis, software applications, and automation tools to optimise financial operations, ensure compliance, and facilitate strategic decision-making for organisational success.
	Procurement	Procurement skills involve sourcing, negotiating, and managing supplier relationships, enhanced by IT skills for e-procurement platforms, data analytics, and supply chain management systems. These competencies encompass strategic sourcing, contract management, and technology utilisation to streamline procurement processes, optimise costs, and enhance supplier collaboration for organisational efficiency and value creation.
	Administration	Administration skills involve office management, coordination, and organisational support, complemented by IT skills for database management, office productivity software, and digital communication tools. These competencies encompass multitasking, technical proficiency, and adaptability to leverage technology effectively, streamline administrative tasks, and enhance operational efficiency within an organisation.

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