UNIVERSITY OF DAR ES SALAAM

Information and Communication Technologies Policy
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Policy Approval

UDSM Information and Communication technologies Policy

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List of Acronyms and Abbreviations

ARIS	Academic Registration Information System
BICO	Bureau for Industrial Cooperation
CCTV	Closed-Circuit Television
CoAF	College of Agricultural Sciences and Food Technology
CoICT	College of Information and Communication Technologies
CoHU	College of Humanities
CoMPAR	Computer Public Access Room
CSP	Corporate Strategic Plan
CVL	Centre for Virtual Learning
DICT	Directorate of ICT
DUCE	Dar es Salaam University College of Education
eGA	e-Government Authority
EMR	Electronic Medical Records
ERP	Enterprise Resource Planning
ESMIS	Estate Services Management Information System
FAQs	Frequently Asked Questions
FIS	Financial Information System
FYRSP	Five Years Rolling Strategic Plan
HESLB	High Education Students Loan Board
ISICTI	Information Systems and ICT Infrastructure
HURIS	Human Resource Information System
ICL	International Computer Limited
ICT	Information and Communication Technology
ICTD	ICT Director
ICTSC	ICT Steering Committee
ICTSM	ICT Services Management
ICTSOP	ICT Standard Operating Procedures
IFMIS	Integrated Financial Management Information System
IMS	Institute of Marine Sciences
IP	Internet Protocol
IPP	Information Policy Plan
IPR	Intellectual Property Rights
KVA	Kilovolts Ampere
LAN	Local Area Network
LIBIS	Library Information System
LMS	Learning Managing System

MDB	Main Distribution Point
MCHAS	Mbeya College of Health and Allied Sciences
MIS	Management Information System
MIICT	Ministry for Information and ICT
MRI	Mineral Resources Institute
MUCE	Mkwawa University College of Education
NECTA	National Examinations Council of Tanzania
NHIF	National Health Insurance Fund
OJS	Open Journal System
OPRAS	Open Performance Review and Appraisal System
PAR	Public Address Room
PAS	Public Access Service
PC	Personal Computer
PCR	Public Computer Room
PIMS	Postgraduate Information Management System
PMU	Procurement Management Unit
PPRA	Public Procurement Regulatory Authority
PTMS	Practical Training Information Management System
RIMS	Research and Consultancy Information Management System
SJMC	School of Journalism and Mass Communication
SLA	Service Level Agreement
SOP	Standard Operating Procedures
STM	Synchronous Transport Module
TERNET	Tanzania Education and Research Network
THA	Tanzania Harbours Authority
UCC	University Computing Centre
UDBS	University of Dar es Salaam Business School
UDeLP	UDSM e-Learning Policy
UDeLIS	UDSM e-Learning Implementation Strategy
UDICTBC&DRP	UDSM ICT Business Continuity and Disaster Recovery Plan
UDICTI	UDSM ICT Incubator
UDICTP	UDSM ICT Policy
UDICTMaP	UDSM ICT Maintenance Plan
UDICTMP	UDSM ICT Master Plan
UDICTSP	UDSM ICT Security Policy
UDSM	University of Dar es Salaam
UDSMIPP	UDSM Intellectual Property Policy

UDSMNet	UDSM Network
UDSoL	University of Dar es Salaam School of Law
UFIS	University Financial Information system
UPS	Uninterruptible Power Supply
UPMIS	University Projects Management Information System
UTPMIS	University Travel Permit Management Information System
WLAN	Wireless Local Area Network

Preamble

Since early 1990s, the University of Dar es Salaam (UDSM) has been heavily investing in Information and Communication Technologies (ICT) resources through different strategic initiatives and development projects. Importantly, the University is committed to investing in ICT infrastructure, facilities, and innovative solutions to accelerate the achievement of its Five Years Rolling Strategic Plans (FYRSP) and Corporate Strategic Plans (CSP), which are feeders to the realisation of UDSM Vision 2061. Through Vision 2061, UDSM aims *"To become a leading Centre of Intellectual Wealth spearheading the Quest for Sustainable and Inclusive Development"* by the year 2061. The university envisions a transformation into a world class, international university, which performance is distinctively outstanding from that of competitors.

The ambitious Vision 61 recognises ICT as an enabler of UDSM core business of teaching, research, consultancy, and public services as well as administrative functions. Accordingly, the University has strategically decided to improve its services by strengthening the use of ICT across its campuses by instituting facilitating institutional ICT policy frameworks.

Having an effective ICT policy is key to enable the University define what ICT facilities should be put in place, as well as how and for what purpose ICT services and solutions should be used. The policy also should be supported by the laws of the land and related ICT policies, strategies, and initiatives implemented at the national level. For the past 15 years, the investment, use and support of ICT at UDSM has been guided by the UDSM ICT Policy of 2006. Since 2006, when the previous ICT Policy was operationalised, significant technological and organisational changes have taken place in the ICT field, the University has considerably expanded its operations, and students' enrolment has increased considerably. Therefore, the UDSM ICT Policy (2006) can no longer meet the current and future ICT needs of the University community. It is on this basis that this review has been conducted.

This UDSM ICT Policy (2022) was developed by involving key UDSM internal and external stakeholders when conducting ICT needs assessment and establishing strategic priority areas. The review identified the following fourteen ICT strategic issues of concern, for which strategic policy objectives and policy statements were developed.

1. Investing in robust and resilient ICT infrastructure to improve and accommodate the increasing needs of ICT facilities and services and access to reliable Internet connectivity.

2. Enhancing and technologically advancing the use of ICT-mediated solutions for teaching and learning, considering staff and students with special needs.

3. Developing and operationalising a UDSM e-Learning Policy and its implementation strategy.

4. Expanding the use of ICT solutions for research and consultancy activities, and acquiring supporting application software.

5. Enforcing the UDSM Intellectual Property Policy (UDSMIPP) to protect ICT-related intellectual property rights (IPR) of the University, staff, and students and to limit the violation ICT-related IPR of the third party within the UDSM ICT environment.

6. Digitalising all administrative functions and integrating all related information systems.

7. Strengthening UDSM ICT governance in developing and coordinating ICT resources.

8. Building the capacity of the ICT management team to provide good quality ICT services, support users, and maintain and secure ICT resources.

9. Providing relevant ICT training to staff and students to optimise the benefits from the use of provided ICT facilities and services.

10. Enhancing the security of ICT resources by developing and operationalising a UDSM ICT Security Policy.

11. Enhancing and expanding stakeholders' collaboration in ICT research, innovation and training.

12. Establishing and seizing avenues for participating in national ICT initiatives and contributing to efforts on building a digital economy.

13. Developing and operationalising an ICT Maintenance Plan, Sustainability Plan for ICT Resources, and ICT Business Continuity and Disaster Recovery Plan.

14. Establishing and operationalising strategies to help staff and students to safely and securely use social media networks and online platforms.

This UDSM ICT Policy (2022) provides fundamental principles and directions to guide the use and harness the full potential of ICT facilities and services across UDSM campuses, in order to ensure that the use of ICT benefits the University community. Furthermore, it provides the plan on how the policy will be governed and implemented, and proposes the means for continuous monitoring and evaluation of its operationalisation. The policy should be implemented alongside the UDSM ICT Master Plan (2022). Any other UDSM ICT-related policy, plan, strategy, or initiative to be revised or developed should make reference and align to this policy. Appendix 1 in this document, provide recommendations on important issued to be considered for effective implementation of this policy.

This policy has been developed using a gender responsive approach as it addresses ICT needs and priorities of both male and female members of the University community and ensures equitable access to ICT resources and ICT related-opportunities to both genders. Likewise, it has considered the ICT needs of staff and students with special needs and sets specific strategies to ensure they have access to and benefit from provided ICT resources.

1. Introduction

1.1. Background Information

The University of Dar es Salaam (UDSM) was established in 1961 as a University College, Dar es Salaam, which was an affiliate college of the University of London. In 1963, it became a constituent college of the University of East Africa, together with Makerere College (Uganda) and University College Nairobi (Kenya). In 1970, the University of East Africa was dissolved, and thus the University of Dar es Salaam, University of Nairobi, and Makerere University were formed as independent universities in their respective countries.

At its establishment in 1961, UDSM started with only one unit, the Faculty of Law. It was located in a rented building along Lumumba Street in Dar es Salaam city centre, but since then it has been progressively growing to its current status as a full-fledged University with several campuses that are managed from its main location at the Mwalimu JK Nyerere Mlimani Campus. At the time of writing this document, in April 2022, the University had twenty-one academic units (seven campus colleges, seven schools, seven institutes), two constituent colleges, and thirteen centres. Appendix 1 provides the list with categories of UDSM academic units and their physical locations.

At present, UDSM has approximately 1,250 academic staff with diverse academic and research backgrounds, and 1,050 non-academic staff in charge of administrative and technical functions. Together, the dual enables the University to effectively offer good quality training, undertake basic and applied research, provide consultancy services, deliver public services, increase admission for undergraduate and postgraduate programmes, and strengthen a handful of non-degree programmes. In 2021/22 academic year, the University had nearly 40,000 students across its campuses, who were enrolled in 308 different undergraduate and postgraduate degree programmes and 24 non-degree programmes.

UDSM has gone through several periods of development and reformation to align its vision with the national educational and development goals, academic rigour, research priorities, and global issues. Thus, UDSM has, at different periods, redefined its vision and objectives. The current UDSM direction is guided by the UDSM Vision 2061, which was launched in 2012. The vision seeks to make the University *"A leading Centre of Intellectual Wealth spearheading Tanzania's and Africa's Quest for Sustainable and Equitable Development"*. To achieve this goal, the University has set the following mission: *"To advance the economic, social and technological development of Tanzania and beyond through excellent teaching and learning, research and knowledge exchange"*.

The UDSM Vision 2061 is realised through different strategic approaches stipulated in the UDSM Corporate Strategic Plan (CSP), UDSM Five Years Rolling Strategic Plan (FYRSP) and

corresponding plans implemented at unit levels, as well as policies and plans focusing on strategic development, functional, and operational agenda of the University. Among key development agenda that are stipulated in UDSM strategic documents is the use of Information and Communication Technologies (ICT) as an enabler of the University core business functions and processes.

1.2. ICT as a Strategic Investment in Implementation of UDSM Vision 2061

The UDSM Vision 2061 outlines Teaching and Learning, Research and Innovation, and Knowledge Exchange as the core business of the University. The vision recognises ICT as an enabler of the University business. This creates the need to take firm actions to get ICT in mediating all academic and administrative functions of the University. Critical measures envisioned include the following:

(a) Transforming UDSM into an e-University by upgrading ICT infrastructure and services as a means of supporting national development efforts.

(b) Creating and developing ICT applications and multimedia contents to support teaching and learning, and improving e-Learning environment for on campus and distance learners.

(c) Enhancing e-Library services.

(d) Establishing an ICT Park with basic infrastructure for IT businesses to house, among other things, modern data centres, state-of-the-art software development labs, and call centres.

(e) Creating and maintaining strong partnership with both local and international ICT firms.

(f) Establishing state-of-the-art research and development infrastructure, and creating ICT incubation centres to support national efforts to transform Tanzania into a knowledge society through ICT innovations and deployment in various sectors of the economy.

(g) Proactively going for public, private and joint venture investments in ICT infrastructure and on-campus software development to enhance access to good quality ICT services that support both academic and business endeavours.

The UDSM Corporate Strategic Plan (CSP) for the period of 2014 -2023 specifies several strategic goals for achieving the UDSM Vision 2061. It puts greater emphasis on capacity development, quality assurance, and outreach activities that focus on the University's core functions of teaching, research, consultancy, and public service. The use of ICT is regarded as necessary in teaching and learning, and therefore the University intends to strengthen the

application of ICT in the discharge of all academic and administrative functions *(strategic goal 1 &5).*

Similarly, the UDSM Five Year Rolling Strategic Plan (FYRSP) aims to address issues specified in the UDSM Vision 2061 and CSP by developing specific strategic objectives and specific targets to monitor the implementation. Regarding ICT, the current FYRSP (2020- 2025) aims to modernize ICT and information management as a means of strengthening institutional capacity and operational efficiency of the University. The following targets are set:

a) Strengthen ICT governance and services across the University by transforming the ICT Unit into a Directorate.

b) Modernise the UDSM e-Learning platform to enable effective use of multimedia and interactive content in teaching and learning.

c) Establish new ICT methods of teaching (e.g., using 'Smart Classrooms') by equipping all lecture rooms with multimedia facilities.

d) Adopt a web-based UDSM Enterprise Resource Planning (ERP) and Management System

e) Develop a harmonized set of UDSM and unit level ICT master plans.

f) Upgrade the UDSM Internet bandwidth from Synchronous Transport Module 1 (STM1) to Synchronous Transport Module 4 (STM4).

g) Improve UDSM website and its management.

h) Integrate UDSM information systems

i) Provide all UDSM campuses with adequate and functional wireless access points.

j) Upgrade all finance and administrative systems.

k) Modernise the existing ICT network and inter-office telephone network.

l) Improve Library services.

m) Improve and link all unit level libraries to the main library.

n) Establish a local content repository.

o) Install linked systems of CCTV cameras at the Mwalimu Nyerere Mlimani campus.

Similarly, the current FYRSP stipulates the need for transforming the governance of ICTs at the University.

1.3. Governance and Growth of ICT at UDSM

The growth of ICT at the University of Dar es Salaam can be traced back to 1965, in the former Dar es Salaam University College, when the college established the Department of Mathematics with a mandate to teach computer programming languages. A notable advancement in ICT at UDSM occurred in 1972, when UDSM rented a computer from

International Computer Limited (ICL) and set up a separate unit, the Computer Unit, to manage computing services for UDSM and outside clients. As ICT activities increased with time, the Computer Unit was elevated to an independent Centre (the University of Dar es Salaam Computing Centre (UCC)) in 1980. UCC had no computer in 1984-1986 as a result of the 1974 government ban on importation of computers; consequently, UCC used computers owned by the National Treasury and Tanzania Harbours Authority (THA). In early 2000, UCC became a Private Limited Company of the University, offering computing vocational training and different ICT services.

Some notable improvements in ICT services and training were observed in early 1990s. The first working LAN was in place at the UDSM in 1991 and, by mid 1990s, there were several computers at the University, owned by individuals or faculties/ institutes/ departments/ sections. Later on, several services were introduced, including e-mail services in 1993/94 and vocational training offered by the Bureau for Industrial Cooperation (BICO) and UCC. The growth in ICT facilities and services at UDSM led to the formulation and approval of the UDSM Information Policy Plan (IPP) and the UDSM IT Master Plan in 1995. In 2006, a major review of IPP was conducted, producing the UDSM ICT Policy; and, in 2007, a major review of the 1995 IT Master Plan was conducted, producing the UDSM ICT Master Plan. The two documents were supposed to be reviewed after 5 years, but they were not reviewed. This is the reason for the current review of the UDSM ICT Policy and the associated strategic documents.

Since the commercialisation of services offered by UCC, the governance of ICT at UDSM has been under the UDSM ICT Unit, which was led by the ICT Manager. However, most of the ICT technical activities and operational functions were handled by UCC as the main ICT services provider to the university. Several gaps of using this structure were identified, which weakened the ICT governance at UDSM, causing poor and unsatisfactory ICT services. As a result, the University formed the Directorate of ICT (DICT), which became functional in June 2021, following the appointment of the UDSM ICT Director (ICTD).

Moreover, as part of the UDSM strategic goals to harness the potential of ICT, the College of Information and Communication Technologies (CoICT) was established in 2011, to address the increasing demand of ICT experts in the country and strengthen teaching, research and public service in the ICT disciplines through efficient utilisation of the available human and physical resources. CoICT houses the Centre for Virtual Learning (CVL), which is a unit responsible for providing technical support to UDSM academic units in designing and providing ICT-mediated courses and distance learning programmes. Additionally, CoICT houses an incubation unit known as UDSM ICT Incubator (UDICTI), which is responsible for nurturing ICT innovative ideas from UDSM students to grow into ICT related businesses.

1.4. The UDSM ICT Policy of 2006 and the Rationale for its Review

The first UDSM ICT Policy was developed in 1995 and was revised in 2006, to strengthen ICT infrastructure and human resources across the University and to increase access to ICT facilities by staff and students. The policy also requires UDSM to sustain and enhance capacity for ICT at national and international levels by developing essential ICT skills and expertise. In addition, it requires all units to take concrete measures to ensure that ICT is effectively used in supporting UDSM core business functions. However, the UDSM ICT Policy of 2006 has been implemented for a period of more than fifteen (15) years, which has been characterised by the following four major shifts regarding ICT resources at the University.

Firstly, the ICT industry has witnessed major technical and technological changes. ICT services have been greatly transformed and advanced, the Internet has become a basic need that is widely accessible, professional and personal life is increasingly depending on virtual platforms, the industry provides numerous options for digital devices and solutions, and smart devices and solutions are widely used in academic institutions and beyond. Moreover, there have been major developments in innovation, research, and application of advanced digital technologies such as Machine Learning, Artificial Intelligence, Internet of Things, and Data Science. All these aspects make the 2006 ICT policy outdated and irrelevant to lead initiatives focusing on strengthening the use of ICT by the University.

Secondly, Tanzania has made significant strides in adopting and implementing ICTs in all socioeconomic sectors; ICT solutions are widely used to facilitate and improve governance and delivery of social services. Since when the 2006 policy was operationalised, there have been major developments in ICT at the national level, including the following: development of the National ICT Policy of 2016; establishment of the e-Government Agency in 2012 (which was transformed into eGovernment Authority in 2019), which is responsible for improving and coordinating ICT services in the public sector, as well as ensuring that ICT initiatives in the public sector simplify the delivery of public services to citizens; formation of the Ministry responsible for the ICT sector; and enactment of specific legal frameworks for cybercrimes and regulations of online content.

Thirdly, since 2006, there has been a considerable increase in the number of UDSM academic and non-academic staff, students, service providers, and national and international collaborations. Proportionately, the University has had to implement different reforms and development projects to accommodate the needs of its community and external stakeholders. In line with those reforms, the University has had to change the module operand on how it executes its core businesses, deliver services, interact with its stakeholders, and handle administration functions. All these changes have seen a remarkable

shift in the needs for ICT facilities and services by the University community. This creates the need for new strategic objectives and guidelines on how ICT resources should be developed, managed, maintained, supported, and sustained across UDSM campuses.

Fourthly, the socioeconomic development of Tanzania and the global community has transformed the needs of education and training offered by higher learning institutions and the means of teaching and learning. Different from traditional education systems that require face-to-face interaction between students and instructors, necessitating physical presence at training institutions, modern education systems promote dynamic and flexible approaches for teaching and learning, and flexible ways for institutions interact with both students and instructors. All these are made possible through ICT-medicated approaches and the use of digital and online platforms. As UDSM is committed to becoming a world-class university in the pursuit of its Vision 2061, it has to remain relevant to the needs of its stakeholders, academic community, and the public it serves. In so doing, it has to adopt state-of-the-art ICT resources and strengthen the use of ICT as an enabler in the execution of its statutory functions.

Therefore, the University Management has seen the necessity of a major review of the 2006 ICT Policy, to accommodate appropriate changes that address current and future ICT needs of the University. This review is meant to provide strategic guidelines that take care of strategic issues stipulated in UDSM Vision 2061. The present review is guided by national ICT strategic development agenda, as stipulated by the Tanzania Development Vision 2025, the National ICT Policy, and new developments in the ICT sector. It also recognises new developments in ICT research, technologies, services and digital solutions. The revised UDSM ICT Policy is also in line with ICT Policy Guidelines specified by the Tanzania e-Government Authority (eGA) which direct public institutions to develop and operationalize institutional ICT policies, and provides guidelines for compliance, acceptable and secure use of ICT by public institutions, employees, and external stakeholders. In general, apart from improving the execution of core and administrative functions of the UDSM, the revised policy aims to enable UDSM to retain its strategic national and regional position as the hub of ICT training, innovation, research and application.

1.5. UDSM ICT Vision and Mission

It is expected that the UDSM community will observe the provisions contained in this revised ICT Policy to ensure a conducive environment for application of ICT and harnessing its full potential to advance the institutional agenda. To make that happen, the University has set the following revised ICT Vision and Mission:

1.5.1. UDSM ICT Vision

Harnessing the full potential of ICT as an enabler to transform UDSM into an e-University and support the national development agenda in building a digital economy.

1.5.2. UDSM ICT Mission

Upgrading and developing UDSM ICT resources and strengthening their use in discharging core business and administrative functions, and enhancing ICT research, innovation, training and industry collaboration to actively contribute to the national strategic ICT priorities.

1.6. Process Followed to Update the UDSM ICT Policy

The review of UDSM ICT Policy has been done through a participatory approach, by involving the UDSM community (staff and students), covering all UDSM campuses namely CoICT, IMS, MRI, SJMC, MCHAS, Mwalimu Nyerere Mlimani Campus and the two Constituent Colleges (DUCE & MUCE). External stakeholders were also consulted. These include the Ministry for Information and ICT (MIICT), which is responsible for ICT policy formulation, monitoring and evaluation, as well as regulating the use of ICT across Tanzania; and the e-Government Authority. Evidence to inform the review process were gathered through the following four main approaches:

- Intensive desk review of several institutional, national, regional, and international ICT strategic documents and reports. Relevant sources were consulted to identify potential ICT strategic objectives and issues that can potentially be addressed by enhancing ICT facilities and services at UDSM. Previous institutional ICT strategic documents (master plan and policies) were reviewed to establish gaps and strategic issues which had not been addressed. Also, national ICT-related plans, strategies, standards, and guidelines were reviewed to align the institutional ICT needs with national priorities.

- Surveys were conducted through electronic questionnaires, involving UDSM academic and non-academic staff, undergraduate and postgraduate students. The questions on the questionnaires covered various issues related to the situation of ICT services across UDSM campuses; the questions also sought views on strategic ICT investments.

- Focus group discussions were conducted with UDSM staff in different campuses. Specifically, discussions were held at the Mwalimu Nyerere Mlimani Campus, UDSM-MCHAS, IMS, MRI, CoICT and SJMC, and the two UDSM constituent colleges (MUCE and DUCE). Also, the consultative meetings were held in Dodoma with officials in the Ministry of Information and ICT and the e-Government Authority.

- Physical observation of ICT infrastructures across UDSM campuses was done. The

review team also observed information systems that were used or under development for different purposes.

The consultative approach was gender sensitive as it involved both male and female staff and students to make sure potential gaps accessing and use ICT resources are addressed. The collected data were critically analysed to identify individual and institutional ICT needs, as well as specific strategic issues necessary for consideration when reviewing the policy. The needs and aspirations established were used to establish the focus of this review.

1.7. Implementation of this Policy

The UDSM ICT Policy (UDSMICTP) has been reviewed alongside the review or development of other ICT strategic documents, namely UDSM ICT Master Plan (UDICTMP), UDSM ICT Security Policy (UDICTSP), UDSM ICT Business Continuity and Disaster Recovery Plan (UDBC&DRP), UDSM ICT Maintenance Plan (UDICTMaP), UDSM e-Learning Policy (UDeLP), UDSM ICT Sustainability Strategy (UDICTSS), UDSM e-Learning Implementation Strategy (UDeLIS), and ICT Standard Operating Procedures (ICTSOPs). The implementation of all these other ICT strategic documents and associated guidelines and procedures should align with the provisions of this policy, because it provides overall strategic directions, objectives, targets, and guidelines for acquisition, use and development of ICT resources and services at UDSM.

2. Situation Analysis of UDSM ICT Resources

To date, UDSM has made remarkable progress in deploying ICT resources, thanks to the UDSM ICT Policy (2006) and UDSM ICT Master Plan (2008), which emphasised the use of ICT in supporting UDSM core business and administrative functions. ICT services at UDSM focus on three important components: ICT governance, ICT infrastructure, and Information systems and applications. The next sections describe the current status of various ICT resources at UDSM.

2.1. Network Infrastructure (UDSMNet)

The UDSM Network (UDSMNet) mainly consists of Local Area Networks (LANs) within buildings and a backbone network that interconnects the LANs at the Mwalimu Nyerere Mlimani Campus and other off-campus premises, at CoICT and SJMC. The University backbone network is laid using high-speed optic-fibre cables connecting main distribution points (MDP) at the Mwalimu Nyerere Mlimani campus to all buildings and CoICT Kijitonyama Campus. The link to SJMC site is via a point-to-point wireless link. The UDSMNet backbone is made of Cisco Catalyst35350 series switches. However, the UDSM network is not delivering services at its expected capacity because part of the network has low data transmission capacity (consisting of multi-mode fibre optic cable links and active devices with low capacity), despite the core network being laid using single-mode fibre optic cables with up to 100Gbps data transmission capacity and corresponding active devices (switches). Moreover, the extended LANs in buildings are delivering less than 1 Gigabit Ethernet capacity because they are served using 10/100Mbps switches and Category 5 UTP cables.

Most of the buildings at the UDSM Mwalimu Nyerere Mlimani campus and off-campus units have wired LANs. However, the cabling in many rooms is damaged, and hence the need for major repair; and the LAN cabling is aged, because in some areas, it was done more than 10 years ago. The twisted UTP cables used in the LANs are of category five (UTP CAT5) class variant, which has low data transmission capacity, hence cannot support the current needs. Similarly, active distribution devices in buildings (switches and routers) are aged with low data transmission capacities. With this setting in place, even when the Internet bandwidth is upgraded, users will hardly feel the difference. The Wireless Fidelity (Wi-Fi) LAN is installed only in some areas and buildings to enable access to the UDSMNet resources through mobile devices such as laptops, tablets, and smartphones, most of which are personal. As part wide UDSMNet, Wi-Fi access point devices need to be upgraded and expanded to all buildings and publicly accessible areas, such as outdoor study areas.

2.2. Internet Access

The University is connected to the Wide Area Network (WAN) through Internet link supplied by SeaCom through fibre optic cable at 155Mbps and TERNET Consortium at 150Mbps, making a total bandwidth of 305Mbps. The existing links provide Internet services at the Mlimani and CoICT Kijitonyama Campuses only. Other off-campus units such as SJMC, SoAF (Kunduchi and Lindi), UDSoL BIMA (Mikocheni Dar es Salaam), MRI (Dodoma), IMS (Zanzibar), and UDSM-MCHAS (Mbeya), which could ideal be connected to the UDSMNet, are connected to the Internet through separate links by different service providers, mostly TTCL. The constituent colleges of MUCE (Iringa) and DUCE (Chang'ombe Dar es Salaam) use TTCL as their main service providers but they have their own arrangements because they are semi-autonomous, hence different ICT governance and management structure and budget allocation direct from the government.

The available internet bandwidth across campuses is insufficient, the service is unreliable, the quality of internet is poor, and access is limited. Also, there is no a centralised active directory service to manage access to the Internet and control access to UDSMNet, hence posing security threats that cannot be monitored or objectively dealt with.

2.3. Access to Computers by Staff and Students

Staff expect to get office computers for work from their employer. Currently, most of the administrative and technical staff across the University have office computers. Academic staff make use of computers made available in some of the teaching rooms or borrow laptops from their units for teaching activities in rooms without computers. Some academic staff have access to office/work computers, which are either desktop or laptops computers. However, there is a significant number of academic staff who still use personal computers for work, and some have no access to computers altogether, hence borrowing from colleagues becomes the only option they have when they need computers for teaching or office work. In some units the situation is different because all staff have been provided computers for work. Generally, there is unequitable access to computers among academic staff across teaching units.

Students depend on computer laboratories only to access computers for academic activities or private studies, because Computer Public Access Rooms (ComPARs), which were previously established in some halls of residence, no longer exist. The University maintains computer labs for teaching and learning purposes at some departments and college/school/institute levels. The survey done during the preparation of the revised ICT Policy and this Master Plan indicates that some students are confident that they can access a

computer in the lab when they need to, while others rarely get access or do not have access to any computer. At times, some students fail to perform learning activities that require the use of computers. However, students have digital devices such as laptops, desktop computers, tablets and smartphones which they use to facilitate their studies. A big number of students depend on smartphones which are not suitably useful for study related works.

Moreover, only a handful of academic/teaching units have computer laboratories with sufficient numbers of functional computers. Laboratories have many broken computers and majority of functional ones are aged, miss important application software, or installed with unlicenced software packages. The situation is the same for most of staff computers.

Though there has been progressive improvement in the access to computers, cost effectiveness and appropriate space to deploy computer facilities has been a problem. Having central learning facilities such as labs and large ComPARs could increase access to computers to both students and staff.

2.4. Information Systems (IS)

The current UDSM portfolio of information systems can be grouped into the following four clusters, depending on the functions they support: teaching and learning IS, research IS, consultancy IS, and administrative IS. While majority of these information systems are internally developed, some are used under proprietary licences. More description about these IS clusters is provided next.

2.4.1. Information Systems for Teaching and Learning functions

(a) *Academic Registration Information System (ARIS):* is used to manage students' information from admission to graduation. The system has evolved from ARIS1, ARIS2, and, currently, ARIS3, which was launched in the 2021/2022 academic year. ARIS3 has several modules, namely, Admission, Registration, Academic, Accommodation Allocation, Graduation, Staff, Students, Billing and Finance, Communication, Sponsorship Management, Facts and Figures, Attendance, Timetables Dashboard, Supervision, and Reporting. It provides interfaces for data exchange with other related IS maintained by other institutions such as the High Education Students Loan Board (HESLB) and National Examination Council of Tanzania (NECTA). ARIS3 helps students to access their records and interact with the University Management. However, not all modules are effectively implemented, so their use has not started.

(b) Student Admission System: is used to handle online admission for undergraduate and postgraduate students.

(c) *Moodle*: is a Learning Management System (LMS) used to facilitate online teaching and

learning, sharing of materials, and continuous assessment.

(d) *Turnitin*: is an online system used for plagiarism detection in academic works.

2.4.2. Information Systems for Research and Consultancy Functions

(a) *Open Journal System (OJS):* is used for research publications.

(b) *dSPACE*: is used as a research repository.

(c) *Research Information Management System (RIMS)*: is used for registering and maintaining records of research and consultancy projects.

2.4.3. Information Systems for Administrative and other Support Functions

(a) *VoteBook:* this is a Financial Management System with Accounting, Payroll, Human Resource, Stock Control and equipment/asset management modules. It is an in-house system, which has been in use since 2009 when the UDSM abandoned the use of SCALA, a proprietary financial information system. Votebook is used at the Mwalimu Nyerere Mlimani Campus and in all off-campus UDSM units. However, given some challenges observed in using Votebook, especially by the off-campus units, an alternative web-based financial management system called University Financial Management Information System (UFMIS) was proposed. The billing module of UFMIS is already in use at the Mlimani campus.

(b) *Celcat:* this is a timetable management information system used to prepare teaching and examination timetables across UDSM campuses.

(c) *Final Year Projects Information System (FYPIS):* is used for managing and evaluating projects done by students in their final year of study at CoICT.

(d) *Practical Training Management Information Systems (PTMIS):* is used for managing practical training records and evaluating practical training reports at CoICT.

(e) *Postgraduate Management Information Systems (PMIS):* is used at CoICT for managing postgraduate records, monitoring the postgraduate student supervision process, and submission of research proposals, thesis, and dissertations for presentation at the department or college level.

(f) *Adlib:* this is a Library Information System (LIBIS) that has computerised library processes, making it possible for the library catalogue to be available online.

(g) *Online Open Performance Review and Appraisal System (OPRAS):* is used for assessing the performances of UDSM staff.

(h) *AfyaCare:* this is an electronic medical records (EMR) system used to capture and manage medical records at the UDSM Health Centre. The system is linked to the NHIF system.

(i) *Estate Management Information Systems (ESMIS):* is used by the UDSM Directorate of

Estate Services to manage the services they provide to the UDSM community.

(j) *Graduway:* this is a web-based system used for managing UDSM alumni records, to facilitate outreach and marketing of UDSM activities.

(k) *UDSM Travel Permit Management Information System (UTPMIS):* is a system for managing in-country travel requests and permissions for UDSM staff, but it has not yet been deployed.

(l) *UDSM Projects Management Information System (UPMIS):* is a system to facilitate the management of development projects and investment activities through the Directorate of Planning, Development and Investment. It is still under development.

(m) *Undergraduate Management Information System:* is a system to facilitate the management of all undergraduate students. It is still under development.

(n) *Smart Card System:* Is a system that was implemented to produce smart identity cards that are capable of replacing convectional staff and student identity cards. Smart cards were meant to serve different purposes, including accessing several automated services at the University such as library, banks, hospital, and car parking. However, the system has not been implemented in full as planned, and thus it is used only to issue chipless IDs to staff and students.

Despite the implementation of several information systems described above, there are still several core and supportive processes that are handled manually. These include examinations, student supervision processes, file management, monitoring of teaching and learning, and students' evaluation of instructors, learning process and environment. Hence, there is a need for UDSM to acquire additional information systems to address the gaps. Also, most of the existing systems are not integrated, hence hindering exchange and sharing of information. This arrangement causes unnecessary duplication of resources, and increasing workload in managing and supporting ICT resources and requires staff and students to have different usernames and passwords for different systems they use. Thus, different systems at UDSM need to be integrated.

2.5. ICT Security Controls and Monitoring Tools

The University ICT infrastructure and systems are protected against various cyber security threats at the entry/exit points (gateways) by using firewalls, antivirus, and network monitoring tools. Within the internal network, security is ensured by using, mostly, antivirus software. However, the security control and monitoring tools at the gateways and in the internal network are inadequate to achieve a reasonable security posture for the UDSM ICT resources. The existing firewalls are incapable of carrying out low level filtering processes, e.g., at protocol or packet payload levels. In the internal network, not all the connected hosts

are installed with genuine antivirus.

2.6. System Software and Other Application Software

Besides system software (such as computer operating systems), various computer application software and some specialised software tools are needed by staff and students for research and other academic activities, but they are not always provided. When they are provided, they are often acquired for individual computers instead of central acquisition for the entire University or units needing them. This approach is expensive in the long run. Also, since the software are expensive when purchased for individual computers, the failure to acquire them centrally encourages the use of counterfeit software in the UDSM ICT environment, because individuals use their own means to acquire them illegally or use unlicenced versions of software. The enforcement of UDSM Intellectual Property Policy (UDSMIPP) of 2008 in protecting ICT-related products and services owned or produced by UDSM staff and students or the third party is very low.

2.7. Telephony system

system at the Mwalimu Nyerere Mlimani Campus is being replaced with the Internet Protocol (IP) Phones system. So far, the new telephony system has been deployed in the main administration block (Cranford Pratt Building), UDBS, CoHU, UCC and Science complex. Efforts to scale the system to the rest of the buildings at the Mwalimu Nyerere Mlimani Campus are ongoing. The deployment has not started in any of the UDSM off-campus units.

2.8. Data Centre Management

The UDSM main server room has several servers, active devices (routers and switches) and rackcabinets. It hosts all UDSM critical information systems, email system, and data storage servers. The server room is equipped with heavy duty integrated uninterruptible power supply (UPS), protected with an access control system, and entry is monitored by a CCTV camera system. Also, the University maintains several server rooms (main distribution facilities) at different locations within its campuses, most of which serve information needs of specific units. There are other servers in off-campus units used for different purposes, but a reliable data recovery site as per standards and best practices for ICT business continuity and disaster recovery plan is yet to be established. This jeopardises critical UDSM systems and information resources in the event of a disaster.

2.8.1. University Main Website, Units and Project/Initiative Specific Websites

The University main website provides comprehensive information about the university, its

management, structure, staffing, operations, services, and activities. It provides links to unit websites. The University website and most of the unit websites are hosted and managed by the University Computing Centre (UCC). There is inadequate coordination of design, contents, and management of the University main and unit websites. There are no clear guidelines on how websites should be designed and managed nor for contents preparation, posting and updating.

2.8.2. Email System

The current email system setup at the UDSM is centralised and managed by UCC. Not all staff have UDSM institutional email addresses, very few students have addresses, the process of getting an account is not clear to all staff and students, and account counts are not consistently registered. Also, the service is unreliable because it frequently becomes inaccessible and when available users face huge delays in sending and receiving emails. Currently, there is no a university-wide policy requiring all communications to take place through the use of institutional email accounts, and the plan to provide email service exclusively for students has not been implemented. As a result, users maintain email accounts from international email services such as Yahoo, Hotmail, and Gmail.

2.9. ICT Governance

Since the early 2000s, UCC has been playing a key role as a service provider in managing and servicing UDSM ICT infrastructure and services. At the University level, there was an office of ICT manager, which was operating under the office of DVC Administration with the key role of coordinating UDSM ICT service providers and managing ICT resources and system administrators who are allocated in different UDSM units. However, it was observed that this organisation structure was ineffective and hindered effective ICT services delivery to the University community. The observed challenges include insufficient ICT governance framework; absence of feasible ICT maintenance plan and support framework; absence of service level agreement (SLA) between the University and service providers; uncoordinated and poor end-user support; and ineffective management of ICT services. These challenges led to the formation of the new governance structure that became operational from June 2021. The new ICT governance structure comprises of the ICT Steering Committee (ICTSC) and the Directorate of ICT (DICT), which together make a strategic, operational, and technical decision-making organ necessary to ensure an innovative, reliable, and robust ICT ecosystem at the University.

2.9.1. UDSM ICT Steering Committee

At the top of the structure of the UDSM ICT governance organ is the UDSM Vice Chancellor

who chairs the ICTSC. Other ICTSC members are all Deputy Vice Chancellors, Chief Corporate Counsel and Secretary to the Council, Principals, Deans and Directors, Director of ICT as the secretary and technical advisor of the ICTSC, and the Managing Director of UCC. The ICTSC is responsible for ICT oversight, by providing ICT governance and the overall ICT strategic direction of the University. It has to ensure effective and efficient use of ICT in enabling the university to achieve its goals within acceptable levels of risk. Moreover, it is tasked with ensuring that ICT services add value and that benefits expected from new investments are fully realised. Specific functions of the ICTSC are stipulated in the *UDSM ICT Governance and Management Framework.*

2.9.2. ICT Management

Management of ICT resources and services is under the DICT which is led by the ICT Director (ICTD). The DICT is responsible for enabling effective use of information technology in supporting the University functions. The DICT fulfils its responsibility by performing the following functions:

(a) Deliver ICT products and services that meet the needs of the University community and achieve the highest level of customer satisfaction;

(b) Support the use and development of ICT to enable innovation in teaching, learning, research, and public service;

(c) Provide leadership in planning for effective use of ICT;

(d) Provide a robust, reliable, and secure ICT infrastructure;

(e) Attract, develop, and retain good quality ICT professionals;

(f) Enable communication and collaboration among ICT professionals and users at UDSM.

(g) Provide academic, research, and administrative ICT resources for the University in a gender response manner; and

(h) Provide and support an infrastructure that meets the needs of teaching, research, and administrative functions of the University.

The directorate is divided into two sections, namely, Information Systems and ICT Infrastructure (ISICTI) and ICT Services Management (ICTSM). The ISICTI is responsible for the University-wide information systems strategy, including business process improvement, requirements specification, and developing information architecture. It also leads the strategic design, development, and evolution of the University-wide ICT infrastructure. The ICTSM is responsible for monitoring and control of ICT services as delivered by service providers, to ensure that performance targets are met, users are satisfied, expected service

levels are achieved, and the services are delivered in an expected manner. The Heads of sections report to the ICTD and their specific responsibilities are stipulated in the *UDSM ICT Governance and Management Framework.*

2.10. ICT Services Management

ICT services and support at the University are currently managed by UCC in coordination and consultation with the UDSM Directorate of ICT. Some of the services are contracted between UDSM and UCC and others are not because they are handled as project assignments.

(a) Current ICT Services provided by UCC:
- UDSMNet management (beyond the network active and passive devices, this category also includes core services like email, DNS and DHCP);
- Gateway management (Internet connectivity);
- Website hosting and maintenance (extended service scope);
- UDSM staff email system (installation, configuration and management);
- UDSM directory service (installation, configuration and management);
- Wireless hotspots management at the Mwalimu Nyerere Mlimani Campus; and
- Second level of end-user support.

(b) Non-contracted ICT Services (managed by individual departments/units):
- Library Information Systems (LIBIS) – Library;
- Human Resource Information Systems (HURIS) – Administration; and
- Financial Information System (FIS) – Administration.

(c) Project-based ICT services provided by UCC:
- Development, management and support of ARIS; and
- Development of Integrated Financial Management Information System (IFMIS).

Following the establishment of DICT, which became operational from June 2021, it should be made clear what arrangement will be used to manage ICT services, particularly the role to be played by UCC as the service provider, and the DICT as the manager of UDSM ICT services. The existing structure of DICT should be reviewed to accommodate important functions such as help desk, software and hardware maintenance services, training unit to cater for training needs of staff and students, innovation of ICT solutions, and resource mobilisation for ICT resources. All functions related to management of ICT resources and e-Learning should be housed under one roof to facilitate coordination of services and user support and benefit from technical, equipment, and human resources that can be shared between the DICT and CVL.

2.11. Summary of changes introduced in the revised ICT Policy

A. *Updated contents of the previous ICT Policy*

The updated version of ICT Policy (2022) has accommodated all ICT policy areas defined in the ICT Policy 2006 version, but in a more streamlined manner, based on the current UDSM vision, mission, needs, and plans. Additionally, the updated ICT policy has introduced new ICT policy areas focusing on ICT training; websites, online visibility, and information sharing; intellectual property, social media and other online platforms, and leadership in ICT innovation and research.

Table 1: Prioritised policy areas in the UDSM ICT Policy 2006 and the revised 2022 version

Policy areas in the ICT Policy (2006)	Policy areas in ICT Policy (2022)
1. Access 2. Teaching, learning and research; 3. information systems 4. ICT organization and management; 5. ICT assets management, accountability and disposal 6. Human resources; 7. Partnership with the government, private sector and public institutions; 8. Acquisition of ICT products and services; and 9. Establishment and support of administrative	1. ICT infrastructure; 2. Information systems and application software; 3. Websites, online visibility, and information sharing; 4. Teaching and learning; 5. Research, consultancy, and delivery of public services; 6. ICT governance; 7. ICT services and technical support; 8. ICT security; 9. ICT training; 10. Safe and secure use of social media and other online platforms; 11. Collaboration with stakeholders and national ICT agenda, and 12. Leadership in ICT innovation and research

B. *ICT Policy changes that focus on the newly established Directorate of ICT*

The ICT Policy (2006) mandated UCC to oversee the implementation of both the ICT Policy (2006) and the ICT Master Plan (2008-2012). It also mandated UCC to serve as an ICT resource management (IRM) centre for the entire University. However, UDSM introduced a new governance structure of ICT services in 2021 which comprises of the ICTSC and DICT.

The revised ICT Policy (2022) reflect such changes. For example, the mandate to oversee the implementation of the revised ICT Policy and associated strategies and plans falls under the newly established ICT Directorate and UCC remains with the role of service provider only.

C. Removed some ICT Policy (2006) contents

The ICT Policy 2006 version had contents which are irrelevant to the UDSM community at the moment. For example, policy contents which were referring to the then University College of Lands and Architectural Studies (UCLAS) and Muhimbili University College of Health Sciences (MUCHS) are no longer relevant because the two colleges are no longer part of UDSM.

3. Policy Issues, Objectives, and Statements

The UDSM ICT Policy has been reviewed to provide a more focused framework for enhancing the application of ICT to enable the execution of core functions of the University; provide a University-wide framework to accommodate the use of ICT; promote the use of digital solutions for teaching and learning through an e-Learning strategy; enhance research and consultancy activities; improve administrative functions; improve and promote UDSM online visibility; ensure safe, secure, and reasonable use of online platforms by UDSM staff and students; and strengthen the contribution of UDSM to national ICT initiatives that aim to transform Tanzania into a knowledge-based society and to build a strong and resilient digital economy. Thus, this policy will focus on eleven strategic priority areas that are presented next.

3.1. ICT infrastructure

3.1.1. Issues

ICT infrastructure enable hosting and provision of ICT facilities and services to users. The existing UDSM ICT infrastructure has the following issues which need to be addressed:

(a) The available Internet bandwidth of 305Mbps is insufficient for the data needs of the entire University community, hence users experience a slow, unstable and unreliable Internet service, and there is poor access to networked ICT services through UDSMNet.

(b) Network connection points are inadequate and of poor quality; and access to the available Internet connectivity is limited because UDSMNet has not been extended to all places. Precisely, Wi-Fi is unavailable in several UDSM locations and buildings.

(c) A larger portion of UDSMNet is aged (over 15 years), with low-capacity active network equipment and links.

(d) There are frequent and/or longer power outages by the power supply company (TANESCO), causing frequent unavailability of the entire UDSM ICT infrastructure and making it unusable. University does not have sufficient power backup systems to support all critical ICT infrastructure during power outages.

(e) Given the UDSM vision and ambition of going digital, there is a need for all UDSM staff and students to get reliable access to computers and other ICT facilities such as multimedia equipment, projectors, centralised printers, and photocopiers.

(f) There is no centralised data centre and file management system, resulting in poor management of institutional data and information. Each UDSM unit handles its data/information, mostly on staff computers, which jeopardises the security and

confidentiality of information.

(g) There is no comprehensive plan for maintenance of ICT infrastructure and other ICT resources, and the capacity to conduct preventive and corrective maintenance is low.

(h) The existing ICT resources do not cater for the needs of staff and students with special needs, and access to existing ICT resources is unfriendly for people with special needs.

(i) The UDSM ICT business continuity and disaster recovery plan has not been operationalised as it is being developed alongside this policy.

(j) Most of the critical systems and application software needed by staff and students across UDSM campuses are not provided, causing rampant use of counterfeit systems and application software by staff and students.

(k) There is no mechanism to ensure that all software used by all computers connected to the UDSMNet are genuine and secure.

(l) The existing physical and logical security of ICT resources cannot adequately protect UDSM systems and information resources.

3.1.2. Objectives

(a) To enhance and improve Internet connectivity bandwidth.

(b) To expand and upgrade network infrastructure for UDSMNet (LAN and WLAN).

(c) To build a centralised data centre for use by all UDSM units.

(d) To increase and improve availability and accessibility of ICT facilities (computers, multimedia equipment, printers, photocopiers, etc) in a gender responsive way.

(e) To establish computer public access rooms in halls of residence, units and student centres.

(f) To improve existing computer laboratories and expand them to all academic units as per the needs.

(g) To ensure availability and use of genuine system software to support UDSM ICT resources.

(h) To ensure availability and accessibility of ICT facilities and services for staff and students with special needs.

(i) To ensure deployment of necessary facilities to support business continuity (data centre, backups, data recover sites, etc).

(j) To ensure UDSM ICT resources are secure and protected.

(k) To build technical capacity for in-house development, implementation, support,

management, and maintenance of ICT resources.

(l) To improve the reliability of UDSM email services and expand their usage.

(m) To implement and enforce usage of file management systems across UDSM units.

(n) To expand/extend UDSM Internet service to students' halls of residence and staff houses within UDSM campuses.

3.1.3. Policy statements

3.1.3.1. Internet connectivity, LAN and WLAN

The University shall:

(a) Upgrade Internet bandwidth to meet UDSM needs and ensure reliability of Internet service.

(b) Acquire and implement relevant mechanisms for managing Internet bandwidth to optimise its usage.

(c) Upgrade and improve the backbone network of the UDSMNet.

(d) Link all UDSM campuses to the UDSMNet infrastructure.

(e) Upgrade and expand LAN and WLAN (Wi-Fi) to all buildings, offices, and study areas.

(f) Optimise the use of UDSM Internet service by extending it to students' halls of residence and staff houses within UDSM campuses for commercial purposes.

3.1.3.2. Access to computing, printing and multimedia facilities

The University shall:

(a) Ensure all eligible staff are provided with good quality computers for office use and have access to shared printers, photocopiers, and scanners at the lowest unit level.

(b) Ensure all students have access to computers, printers and photocopiers through computer laboratories, workshops, and computers public access rooms.

(c) Ensure availability of UDSMNet connectivity and digital teaching facilities such as smart boards, projectors, and public addressing systems (PAS) in all classrooms (lecture rooms, seminar rooms, laboratories, and workshops).

3.1.3.3. Data centre, backups, and disaster recovery

The university shall:

(a) Establish a reliable and adequately equipped UDSM data centre.

(b) Expand and improve data storage capacity.

(c) Implement state-of-the-art data storage and management technologies.

(d) Adopt a five-year upgrading plan for servers and associated hardware and software.

(e) Deploy data recovery facilities in safe and secure locations.

(f) Deploy and maintain a redundant data backup mechanism.

3.1.3.4. File Management System

The university shall:

(a) Introduce and deploy cost-effective file management systems as a service for each unit.

(b) Implement access control for file management systems as per UDSM ICT SOPs.

3.1.3.5. E-mail Services

The University shall:

(a) Strengthen the capacity and reliability of email infrastructure and service.

(b) Provide all staff, students and relevant third-party stakeholders with UDSM email accounts.

(c) Establish and enforce a mechanism for mandatory use of UDSM email accounts for all official communications and access to UDSM ICT services.

3.1.3.6. Computer Laboratories and Computer Public Access Rooms

The University shall:

(a) Establish computer laboratories at each academic teaching unit in gender responsive consideration.

(b) Equip each computer laboratory with relevant computer hardware and application software as per unit teaching and training needs.

(c) Establish, equip, operationalise and maintain computer public access rooms in students' halls of residence and student centres across UDSM campuses.

(d) Ensure outdoor studying areas are shaded and supplied with electricity.

3.1.3.7. Systems Software

The university shall;

(a) Centrally acquire all important system software that are needed to support UDSM ICT facilities and services.

(b) Ensure that all system software used by staff and students are genuine and, whenever possible, procured in bulk.

3.1.3.8. Maintenance Strategy and Power Backup Systems for ICT Resources

The University shall:

(a) Develop and institutionalise a maintenance strategy for all ICT facilities.

(b) Require the DICT to routinely conduct preventive and corrective maintenance of all ICT resources.

(c) Require the DICT to timely update and upgrade all system and application software.

(d) Ensure timely replacement and proper disposal of outdated hardware and software.

(e) Acquire and deploy relevant power backup systems for all critical ICT resources.

3.2. Information Systems and Application Software

3.2.1. Issues

(a) The existing information systems and application software do not meet the needs of users and/or UDSM operations, hence there is a need for additional resources. Also, most of the existing information systems do not exchange data because they are not integrated.

(b) UDSM relies largely on proprietary software, which means open-source software (OSS) solutions have not been prioritised. Yet, there are limited resources to meet ICT needs. There is a potential for significant cost saving associated with the use of OSS solutions.

(c) Several proprietary software which are not acquired through genuine means are used within the University because a good number of users cannot afford to purchase licenses. This practice has critical legal implications to the University if license owners decide to investigate.

(d) A functional and secure UDSM ICT infrastructure requires secure and well tested system and applications software. Thus, there is a need to ensure the quality and security of

information systems and software solutions adopted and used in the UDSM ICT environment.

(e) Most of the important application software needed to support teaching, learning, and research are not centrally available. Thus, it is expensive for individual units to acquire them separately.

3.2.2. Objectives

(a) To identify and acquire important application software to support university core functions.

(b) To prioritise and promote the use of secure and reliable open-source software.

(c) To ensure all proprietary application software used in UDSM campuses are genuine and cost-effective.

(d) To promote and prioritise in-house development of information systems and software applications.

(e) To prioritise integration and interoperability requirements when implementing information system solutions.

(f) To institute mechanisms to ensure security and quality of acquired information systems and application software.

(g) To improve administrative functions and reduce physical interaction in service delivery, through the implementation of integrated information system solutions.

3.2.3. Policy statements

3.2.3.1. Acquisition of Application Software

The DICT in consultation with the UDSM units shall:

(a) Identify and acquire important state-of-the-art application software required to support generic and unit specific core functions.

(b) Coordinate the development of all information systems and other software applications.

(c) Prioritise the use of stable, secure, and supported open-source software, if available in the application domain.

(d) Ensure all proprietary application software used across UDSM campuses are genuine.

(e) Ensure consideration of cost-effectiveness in the acquisition of application software.

(f) Use the expertise available within UDSM to develop information systems and other digital solutions.

(g) Develop and enforce integration and interoperability guidelines in developing all information systems and other digital applications for use across UDSM campuses.

3.2.3.2. Quality Assurance of Application Software

The DICT shall:

(a) Ensure that all application software used at UDSM meet quality and security standards.

(b) Use software and information systems experts to validate requirements of each information system or application to be developed, acquired or upgraded.

(c) Use software and information systems experts to approve the quality and security of each developed/acquired information system or digital application before deployment.

(d) Ensure that developed information systems and applications are well documented and source code are submitted to the University.

(e) Coordinate the innovation and development of digital solutions to be used for different purposes across UDSM campuses.

3.3. Websites, Online Visibility, and Information Sharing

3.3.1. Issues

(a) The UDSM websites have evolved over time in terms of technologies used, designs, as well as contents and their presentations. However, these changes have always attracted different views from the UDSM community. Recently, a decision was made to use a standardised website framework for all UDSM websites. However, this need requires a second thought. The University should continuously review its website standards, frameworks, designs, and technologies for the sake of making improvements. The use of standards should not only focus on uniformity but also on improving designs, promoting innovation, encouraging creativity, and accommodating relevant technological changes.

(b) Relevance, completeness, and update of UDSM web contents has been a big challenge across the University. As a result, most of the UDSM websites contain poor contents, miss relevant information, are not well presented, and are not updated on time. Outdated and inadequate web contents have negatively impacted UDSM visibility and web rankings in the recent past.

(c) There are no University guidelines or standards on what, who, when, why, and how of

the UDSM website contents. This has a negative effect on the quality of contents in UDSM websites, which in turn hinders visibility and harms the reputation of the UDSM. There is a need for guidelines, standards, and mechanisms to address these issues.

(d) Websites have been used as primary means of information sharing and communication to the public. However, given their increasing popularity, social media and online platforms such as Facebook, Twitter, Instagram, LinkedIn, YouTube, blogs, and mobile apps provide useful and effective platforms to complement websites. However, there are no University guidelines or standards on what, who, when, why, and how of platforms selection, opening and managing accounts, preparing, posting, and updating contents, and affective use of social media platforms.

3.3.2. Objectives

(a) To establish and institutionalise basic standards and quality metrics for designing and developing websites across the University.

(b) To promote and facilitate innovation and creativity in designing and developing websites across the University.

(c) To maintain websites with relevant, comprehensive, and updated contents.

(d) To improve UDSM visibility, communication, and information sharing through the use of vetted social media platforms.

(e) To institute mechanisms for vetting contents to be posted on websites and social media accounts across UDSM units.

3.3.3. Policy Statements:

The University shall:

(a) Ensure the university main website and unit websites are designed and developed using state-of-the-art website development technologies and frameworks.

(b) Ensure all websites are user friendly and contain all relevant and up-to-date information that should be shared to the public by respective units/projects/initiatives.

(c) Introduce basic guidelines and standards to guide the design all UDSM websites without constraining creativity and innovation.

(d) Ensure that information posted on UDSM websites is correct and consistent across different websites.

(e) Require DICT to vet social media platforms for use by UDSM units.

(f) Ensure each unit has active accounts on vetted social media platforms, for posting information related to its functions and activities.

(g) Ensure each unit forms a team of two to four members led by the unit head to regularly prepare, validate, and approve contents for posting on unit websites and social media accounts.

3.4. Teaching and Learning

3.4.1. Issues

The University has implemented several ICT solutions to facilitate and improve teaching and learning processes. However, the use of ICT in teaching and learning faces several challenges.

(a) The existing ICT infrastructure and facilities are inadequate to support ICT-mediated teaching and learning and delivering of online programmes.

(b) Digital library services and resources are inadequate.

(c) The university does not have an e-Learning policy and the associated implementation strategy.

(d) The existing human resource capacity for supporting e-Learning activities is in insufficient in terms of personnel and skills.

(e) UDSM staff are not well trained and equipped to produce digital material, use digital platforms for teaching and assessment, and manage online programmes.

(f) The design of existing courses and programmes did not consider online delivery or use of ICT-mediated approaches for teaching and learning.

(g) The position of CVL within the UDSM organogram limits its mandate to implement e-Learning activities across the university.

(h) Little consideration is given on ICT needs and access to ICT resources by staff and students with special needs.

3.4.2. Objectives

(a) To improve the availability and accessibility of application software and other ICT facilities for supporting teaching and learning in all teaching units.

(b) To improve digital library services and access to other digital learning resources.

(c) To improve, upgrade, and expand ICT facilities and services for staff and students with special needs.

(d) To develop and implement a UDSM e-Learning strategy.

(e) To review curricula to include online and blended teaching and learning perspectives in delivering courses.

(f) To enhance the capacity of CVL and review its position in the UDSM organogram to give it the mandate needed to effectively support the implementation of e-Learning strategy across UDSM campuses.

(g) To establish state-of-the-art multimedia studio and associated facilities for production of teaching and learning materials.

(h) To improve existing e-Learning application software and other supporting tools for online and blended teaching and learning; and acquire new ones as per the needs.

(i) To ensure the quality of teaching and learning delivered through ICT-mediated methods.

3.4.3. Policy Statements

3.4.3.1. Availability and Accessibility of ICT Facilities and Services for Teaching and Learning

The University shall:

(a) Acquire latest application software to support teaching and learning as required by each teaching unit.

(b) Improve the quality and reliability of information systems for digital library services.

(c) Increase and improve access to good quality and latest digital learning resources (books, videos, audios, images, etc).

3.4.3.2. Facilities for Staff and Students with Special Needs

The University shall:

(a) Identify, acquire and deploy application software for staff and students with special needs.

(b) Ensure that public addressing systems in teaching facilities across UDSM campuses are functional at all times.

(c) Ensure friendly physical access to ICT facilities and services needed by staff and students with special needs.

(d) Ensure that hearing-aid facilities are available in classrooms when needed.

3.4.3.3. E-Learning Policy, Strategy and Guidelines

The University shall:

(a) Develop and institutionalise an e-Learning policy, strategy, and implementation guidelines.

(b) Conduct a university-wide curriculum review to include online and blended teaching and learning perspectives in delivery of courses.

(c) Incrementally identify existing programmes that can be successfully delivered online and start implementation of the same immediately.

(d) Develop new courses and programmes to be delivered online.

(e) Improve and upgrade the existing e-Learning facilities and services.

(f) Acquire new application software and tools to support the implementation of the e-Learning strategy as per the needs.

(g) Promote and create awareness of the UDSM e-Learning strategy to staff, students, and the general public.

3.4.3.4. Organisation Structure to Support e-Learning Strategy

The University shall:

(a) Enhance the human resource capacity of CVL and teaching units to reflect the needs for implementation of the e-Learning strategy.

(b) Position CVL under the office of DVC Academic to give it the mandate to effectively support the implementation of e-Learning strategy across UDSM campuses.

(c) Relocate CVL and DICT operations to the same complex to improve performance and optimise the use of shared resources.

(d) Build state-of-the-art multimedia studio for production of teaching and learning materials.

(e) Build capacity of academic staff on pedagogical skills required for ICT-mediated teaching and learning.

3.4.3.5. Quality Assurance

The University shall:

(a) Adapt existing quality assurance mechanisms for teaching and learning to the

requirements of the UDSM e-Learning strategy.

(b) Train staff and students on ethical considerations and practices in implementation of the e-Learning.

(c) Ensure that all academic staff have the competencies required to optimally use applications and platforms that support e-Learning.

(d) Ensure availability of relevant technical support on e-Learning facilities, application software, and online platforms.

(e) Extend and enforce the use of plagiarism detection software in assessing materials for coursework and final examinations.

3.5. Research, Consultancy, and Delivery of Public Services

3.5.1. Issues

Apart from teaching, other core business of the UDSM are research, consultancy, and delivery of public services. The four functions together form the pillars of the UDSM Vision 2061. The University has made some significant strides in implementing information systems to facilitate management of research and consultancy activities. However, UDSM has not realised the full potential of ICT to strengthen research and consultancy. Online research resources are limited, access to academic/research databases is limited, existing information systems for research and consultancy are not integrated, there are not central services for storage and access of research data, and important software for research and projects management are not provided centrally. Also, the UDSM policy governing intellectual property is not well promoted and considered in protecting ICT innovations and solutions developed by UDSM personnel and students.

3.5.2. Objectives

(a) To improve existing research information systems.

(b) To establish a robust digital repository for research data.

(c) To strengthen the effectiveness of the UDSM policy governing the ownership and disposition of intellectual property (IP) assets for ICT-related innovations and solutions developed by UDSM staff and students.

(d) To avoid the violation of third-party IP rights (IPR) from being infringed within, by, or through the massive ICT infrastructure that the University has deployed for use by staff and students.

(e) To acquire crucial application software to support research activities.

(f) To enhance access to reputable online scientific research databases and high impact journals.

(g) To improve the existing university consultancy information system and integrate it with other administrative information systems.

(h) To strengthen research dissemination and knowledge exchange through the use of online ICT platforms.

3.5.3. Policy Statements

3.5.3.1. Research Information Systems and Application Software

The University shall:

(a) Redesign and upgrade the existing research and consultancy information systems into a robust integrated UDSM Research and Consultancy Information System.

(b) Link the UDSM Research and Consultancy Information System with other UDSM academic and administrative information systems.

(c) Establish a centralised database systems for registering and managing ICT-related IPR of UDSM staff and students.

(d) Establish mechanisms for limiting and punishing the violation of third part IPR from infringement within the UDSM ICT environment by staff and students.

(e) Establish a centralised information system for storing and managing research data.

(f) Acquire all important application software to support research activities across UDSM campuses.

(g) Acquire an information system to facilitate and manage multidisciplinary research and collaboration activities across the University.

(h) Train staff and students on using research software.

3.5.3.2. Online Academic Resources

The university shall:

(a) Increase and maintain subscriptions to online academic databases and high impact journals to cater for the needs of different academic disciplines across the University.

(b) Support UDSM units to improve the quality and reliability of UDSM journals to meet

international standards and become globally accessible.

3.5.3.3. Research Dissemination and Knowledge Exchange

The university shall:

(a) Improve, expand, and promote the use of online platforms (websites, blogs, YouTube channels, social media platforms, etc) to disseminate research information by staff and students.

(b) Establish dedicated online platforms for research dissemination and knowledge exchange.

(c) Improve the quality and presentation of research dissemination information shared through online platforms.

(d) Train and support staff and students on the use of dedicated online platforms for research dissemination and knowledge exchange.

3.6. ICT Governance

3.6.1. Issues

Strong ICT governance is key for success of the ICT Policy implementation strategy. Individuals responsible for ICT governance have to clearly understand the University core business, develop a feasible ICT strategy that aligns with the University vision and goals, and should prudently execute the strategy to enable the achievement of the set goals. ICT governance requires a strong support and commitment from the University management and a functional ICT unit to coordinate the development, management, maintenance, and support of ICT resources and services across UDSM campuses. The newly created UDSM ICTSC and DICT have to be strengthened, facilitated, and provided with adequate resources to deliver and support ICT services as per the needs of the University community. The roles and mandate of the ICTSC and the DICT have to be clearly defined and enforced to operationalise the new ICT governance framework. Also, to enable smooth and objective execution of the functions stipulated in the UDSM ICT governance framework, and to enable the University to harness the full potential of ICT in enabling its core business and administrative functions, the University should ensure that conflicts of interest of any form in the governance or provision of ICT services by service providers, members of the ICTSC, and leadership or staff of the DICT or any other UDSM unit, should be avoided at any cost.

3.6.2. Objectives

(a) To continuously improve the structure and functions of the ICTSC and the DICT.

(b) To continuously build capacity and improve the performance of the DICT.

(c) To mobilise financial resources for development, support, and maintenance of ICT facilities and services.

(d) To coordinate procurement of all ICT resources and maintain their inventory and corresponding monetary values.

(e) To continuously identify and address institutional ICT needs for the UDSM community, in line with advancements in technology.

(f) To institute coordination mechanisms for obtaining affordable costs of Internet bandwidth, computers, and system and application software.

(g) To coordinate the development of all ICT resources across UDSM campuses.

(h) To establish a permanent and adequate office space to accommodate the operations of DICT and the reformed CVL.

(i) To develop and enforce SOPs and guidelines for the use of ICT resources across UDSM campuses.

(j) To ensure conflicts of interest of any form are avoided in the governance and provision of ICT services at UDSM.

3.6.3. Policy Statements

3.6.3.1. ICT Management

The University shall:

(a) Improve the structure and composition of the ICT Steering Committee to facilitate and accelerate the development of ICT resources across UDSM campuses.

(b) Periodically review the structure and functions of the ICT Directorate in line with the need of ICT services for all users across UDSM campuses.

(c) Ensure adequate staffing of the ICT Directorate, to meet the needs of users and provide good quality and timely support.

(d) Ensure that ICT technical staff have professional skills and knowledge required to support users and develop, maintain, and troubleshoot ICT resources across UDSM campuses.

(e) Establish and address ICT needs of units, staff, and students.

(f) Periodically evaluate the performance of the ICT Directorate and implement necessary changes based on evaluation findings and recommendations.

(g) Ensure that conflicts of interest of any form by service providers, members of the ICTSC, DICT personnel, and staff and students in any UDSM unit are avoided in the governance and provision of ICT services.

3.6.3.2. Resource Mobilisation for UDSM ICT Resources

The University shall:

(a) Allocate a specific percentage of its annual budget for development, support, and maintenance of ICT resources.

(b) Establish and operationalise sustainable mechanisms for mobilising additional financial resources for development, support, and maintenance of ICT resources.

(c) Institute coordination mechanisms to facilitate affordable and central acquisition of Internet bandwidth, computing hardware and accessories, system software, and application software.

(d) Prioritise bulk procurement of ICT facilities and services.

3.6.3.3. Acquisition and Disposal of ICT Resources

In consultation with units and users, the ICT Directorate shall:

(a) Plan the development and maintenance of ICT resources across UDSM campuses.

(b) Coordinate the procurement of all ICT resources across UDSM campuses as per the needs of units and users.

(c) Maintain the inventory and monetary values of all ICT resources across UDSM campuses.

(d) Establish and adopt latest technologies and solutions to address ICT needs of the UDSM community.

(e) Coordinate proper disposal of ICT equipment and computing accessories.

(f) Be responsible for all ICT projects implemented across UDSM campuses.

3.6.3.4. Office Space and Tools for ICT-related Operations

The university shall:

(a) Dedicate a building with adequate space as permanent offices for staff and functions of the ICT Directorate (ICT complex).

(b) Relocate the operations of the reformed CVL to the "*ICT complex*" to facilitate easy collaboration with DICT and optimise the use of shared ICT resources between the two.

(c) Acquire necessary hardware and software tools to enable DICT to provide good quality and timely services to users of ICT facilities and services across UDSM campuses.

3.6.3.5. Responsible Use of ICT Facilities and Services

The ICT Directorate shall:

(a) Develop and operationalise standard operating procedures for ICT facilities and services across UDSM campuses.

(b) Continuously monitor and periodically evaluate the quality and reliability of ICT facilities and services across UDSM campuses.

(c) Promote and encourage optimal utilisation of ICT resources.

(d) Ensure users of ICT facilities and services have relevant skills and knowledge required to appropriately use ICT facilities and services.

3.7. ICT Services and Technical Support

3.7.1. Issues

The effective use of ICT resources by staff and students requires good quality ICT services and reliable technical support. The latter can be met by having a well organised help desk that is staffed with competent technical team, using reliable communication approaches, and making users aware of important information about ICT facilities and resources.

3.7.2. Objectives

(a) To establish and operationalise ICT help desk within the DICT to support staff and students across UDSM campuses.

(b) To establish and equip a maintenance unit within the DICT complex for troubleshooting and repairing of ICT facilities and services.

(c) To develop and maintain an incentive scheme for retaining competent technical staff to support ICT facilities and services.

(d) To develop a dedicated website for the ICT Directorate

(e) To establish a dedicated workshop within the ICT complex for maintenance and troubleshooting of hardware and software.

3.7.3. Policy Statements

The ICT Directorate shall:

(a) Ensure that end users of ICT facilities and services have good quality and timely support.

(b) Establish and operationalise ICT help desk and provide it with necessary facilities to support staff and students.

(c) Ensure that the ICT help desk has staff with necessary technical and customer care skills.

(d) Establish mechanisms and incentives to retain competent technical staff to support ICT.

(e) Develop and launch a dedicated website for the ICT Directorate, to facilitate easy communication with the University community about the use of ICT resources, services, and technical support.

(f) Develop FAQs and answers for ICT facilities and services at UDSM.

3.8. ICT Security

3.8.1. Issues

Strengthening the use of ICT services at UDSM makes the University more dependent on ICT and vulnerable to ICR security threats. It is against this background that UDSM has to put in place security policies and measures to ensure confidentiality, integrity and availability of its ICT resources. The University ICT infrastructure and systems are not adequately protected against various cyber security threats at the entry andexit points (the gateway) and within the internal network. State-of-the-art ICT security controls and monitoring tools are required. Also, the increasing use of unlicensed and counterfeit software makes the University ICT resources vulnerable to internal and external security threats.

3.8.2. Objectives

(a) To review and operationalise the UDSM ICT security policy.

(b) To develop, operationalise and enforce ICT security implementation SOPs.

(c) To acquire appropriate equipment, software and technologies to secure UDSM ICT resources.

(d) To create awareness of ICT/cyber security issues and legal perspectives to students and staff.

(e) To secure all ICT resources across UDSM campuses.

(f) To strengthen and expand the deployment of directory service.

3.8.3. Policy Statements

The University shall:

(a) Review and operationalise the UDSM ICT security policy.

(b) Develop, operationalise, and enforce ICT security implementation guidelines.

(c) Create awareness of ICT/cyber security issues and legal implications to staff and students.

(d) Acquire appropriate equipment, software, and technologies to secure UDSM ICT resources.

(e) At all times, adequately secure all ICT resources across UDSM campuses.

(f) Acquire and deploy a directory service to secure access to ICT services across UDSM campuses.

(g) Acquire and deploy a centralised antimalware software for use in all University computers.

3.9. ICT Training

3.9.1. Issues

Adoption, implementation, and sustainable use of ICT facilities, services, and solutions require relevant knowledge and skills by end users. As the University embraces the use of ICT facilities and services as enablers of its core business and administrative functions, it has to ensure that staff and students have knowledge and skills needed to effectively and securely use ICT facilities and services. Staff and students need to be periodically trained on how to properly use ICT facilities such as computers, projectors, smartboards, network resources, systems and application software acquired for different purposes, as well as the Internet, online platforms, and online resources for learning, teaching, and research. Similarly, the University management and other decision makers involved in ICT governance need to understand a wide range of issues for consideration in acquisition, implementation, management, development, maintenance and supporting of ICT resources. Currently, the University lacks a strong and well-equipped ICT training unit that should be responsible for coordinating ICT trainings for staff and students across UDSM campuses.

3.9.2. Objectives

(a) To establish the ICT training coordination unit under DICT.

(b) To allocate a dedicated room(s) within the DICT complex with adequate computers and

software applications for ICT-related training.

(c) To regularly establish important ICT skills and training needs and prepare corresponding training courses for staff and students in gender responsive manner.

(d) To establish a training mechanism and schedule to regularly offer different ICT courses.

3.9.3. Policy Statements

The ICT Directorate shall:

(a) Regularly establish training needs on ICT skills for staff and students.

(b) Coordinate the preparation of trainings for developing ICT skills among staff and students.

(c) Develop schedules to systematically offer different ICT trainings to staff and students in each academic year.

(d) Establish a dedicated training room(s) within the ICT complex for training staff and students on ICT skills.

(e) Equip the training room(s) with computers and important system and application software as per the training needs.

(f) Identify and coordinate trainers, and oversee ICT training for staff and students across UDSM campuses.

3.10. Use of social media and other Online Platforms

3.10.1. Issues

The use of social media and other online platforms for social, business and official communications has become the norm. People of different age groups, organisations, social positions, and governments are increasingly using social media to communicate to the public on a wide range of issues. Similarly, academic institutions use social media platforms to communicate their business and services to the public, disseminate information, and share knowledge. Staff and students are using social media for social interaction, sharing information about research and consultancy projects, or representing the interests of a unit/ whole University. For example, the use of groups in social media platforms such as WhatsApp, Facebook, and Telegram has become common among staff in UDSM units to communicate social affairs and official information and activities. Also, UDSM and some of its units use social media platforms such as Twitter, Facebook, and Instagram to communicate some information to the public or promote some services.

However, there are no clear institutional policy guidelines and code of conduct to ensure that staff and students have relevant knowledge on safe, secure, and responsible use of social media and other online platforms. Also, there is no policy for each of the following aspects: data protection and information sharing through online platforms; handling online bullying and sexual harassment; and providing professional support to help staff and students to avoid social media addiction help those who are already affected, and support victims of online bullying and sexual harassment behaviours.

3.10.2. Objectives

(a) To create awareness and ensure responsible use of online social media platforms by staff and students.

(b) To address bullying, abuse, and sexual harassment through online platforms among staff and students.

(c) To develop and enforce guidelines for online data sharing by staff and students.

3.10.3. Policy Statements

The University shall:

(a) Develop a gender responsive guideline to promote safe and responsible use of online platforms by staff and students.

(b) Create awareness on safe and responsible use of online platforms.

(c) Establish support mechanisms to help staff and students who are addicted to the use of social media platforms and support who become victims of online bullying, harassment, and sexual abuse.

(d) Develop a guideline for and create awareness on data protection and information sharing through online platforms.

3.11. Stakeholders Collaboration and National ICT Agenda

3.11.1. Issues

ICT is playing a significant role in business processes for different types of organisations. Among other things, ICT can facilitate management, production, delivery of services, research, and manufacturing. It has become an enabler of organisations' core business functions, both in private and public sectors. Tanzania is increasingly investing in ICT infrastructure, expanding broadband networks and digital solutions, and implementing

strategies for building a digital economy to stimulate socioeconomic development. Alongside these initiatives, there should be efforts to enhance technical and technological capabilities to innovate digital solutions, increase access to ICT services, expand the national ICT infrastructure, strengthen ICT systems to control national security and revenues, build a conducive environment for a flourishing ICT sector, and encourage the use of ICT systems for service delivery in the public sector. For this to happen, there should be active participation and strong collaboration between stakeholders in the public sector, private sector, and academia.

The UDSM stands a better chance of contributing to national strategic ICT goals, initiatives, and projects. This is because of its strength in ICT training, innovation, and research. Specifically, UDSM has a large number of qualified professionals in the field of ICT, with PhD and other academic qualifications, as well as long term experience in doing ICT consultancy in the private and public sectors. Thus, the University can work in close partnership with the government, public organisations, and private sector stakeholders to innovate context-specific digital solutions, implement ICT systems, and conduct research to inform ICT-related policy and practices. In so doing, the University will benefit by learning from the industry, which will in turn inform its research and consultancy activities; it will also strengthen its linkage with ICT stakeholders.

3.11.2. Objectives

(a) To enhance UDSM participation in strategic ICT initiatives at the national level.

(b) To strengthen collaboration with key ICT players in public and private sectors.

(c) To build the capacity for training the Tanzanian public on emerging ICT technologies and on ICT skills that are highly demanded in building a digital economy.

(d) To review ICT-related degree programmes offered by the University to incorporate national ICT agenda and priorities.

(e) To promote ICT-related programmes and trainings offered by the University.

3.11.3. Policy Statements

In consultation with specific units, the University shall:

(a) Strengthen the participation of UDSM staff in national ICT initiatives and projects.

(b) Strengthen and expand collaboration with private and public sectors in ICT research and innovation.

(c) Provide training on ICT skills that are highly demanded in building a digital economy and an information society.

(d) Increase active participation of UDSM in national and international ICT conferences.

(e) Review ICT-related degree programmes to include issues related to national ICT agenda and priorities.

(f) Promote ICT-related programmes offered by the University.

(g) Attract support female-students to enrol in ICT-related programmes.

3.12. Leadership in ICT Innovations and Research

3.12.1. Issues

UDSM has a long history of providing leadership in ICT training, research, and innovation in the country, the East African region, and beyond. It has been producing highly qualified experts in computing and other ICT-related fields such as computer Science, Computer Engineering, Telecommunication Engineering, Information System, Information Technologies, and Electronics Science. Additionally, UDSM has supported other countries in the region to develop their human resource capacities in ICT as well as implementing ICT solutions. These include Makerere University in Uganda and Kigali Institute of Science and Technology in Rwanda.

Given the rapid and dynamic changes and development in the ICT field, which in turn change ICT needs for individuals, organisations, and production sectors, UDSM has to take proactive measure to maintain and strengthen its leadership in ICT research and innovation by taking advantage of its academic reputation, strategic national and regional position, and significant investments in human and infrastructure development. Such measures are supported by the UDSM 2061 Vision, which requires the University to harness the full potential of ICT to support national development efforts including transforming UDSM into e-University in terms of IT infrastructure and services upgrade. The vision provides specific strategies to establish an ICT Park with basic infrastructure for ICT businesses to house a modern data centre; state-of-the-art software development laboratories; state-of-the-art research and development infrastructure; and creating an ICT incubation centre in support of the government efforts for transforming Tanzania into a knowledgeable society through ICT research, innovation, and deployment in various sectors of the economy.

3.12.2. Objectives

(a) To strengthen ICT innovation hubs and establish linkage with other digital innovators in the ICT industry.

(b) To promote and support multidisciplinary research initiatives and innovations enabled and supported by emerging technologies in ICT.

(c) To invest in relevant ICT infrastructure and laboratories for research and innovation in emerging technologies such as Machine Learning, Artificial Intelligence, Bioinformatics, Big Data Analytics, Robotic Science, and Data Science.

(d) To build a state-of-the-art ICT park to host innovative ICT start-ups and business in software engineering, computer hardware, computing devices, online services, and other digital-enabled solutions and services.

(e) To recruit, train, and maintain competent experts in innovation and development of latest technologies in ICT.

3.12.3. Policy Statements

The University shall:

(a) Strengthen existing ICT innovation hubs and establish linkage with other digital innovators in the ICT industry.

(b) Promote, encourage, and support multidisciplinary research initiatives and innovations enabled and supported by emerging technologies in ICT.

(c) Invest in critical ICT infrastructure and laboratories for research and innovation in emerging technologies such as Machine Learning, Artificial Intelligence, Bioinformatics, Big Data Analytics, Robotic Science, and Data Science.

(d) Build a state-of-the-art ICT park to host innovative ICT start-ups and business in software engineering, information systems, computer hardware, computing devices, online services, and other digital-enabled solutions and services.

(e) Recruit, train, and maintain competent experts in innovation and development of latest technologies in ICT.

4. Policy Governance

An effective institutional framework is needed to successfully implement this ICT Policy. It should clearly define roles and responsibilities of key actors who will lead the implementation of this policy through shared vision, mission and goals. The governance for the implementation of this policy considers the following:

- The roles and functions of ICT Steering Committee (UDSM ICTSC) and the Directorate of ICT (UDSM DICT) are briefly described in Section 1.3 of this policy and detailed in the UDSM ICT Governance Framework. The DICT is responsible for providing leadership in panning and supporting the effective use of ICT as an enabler of core and administrative functions of the University. The UDSM ICTSC is responsible for the oversight and delivery of all governance and an institutional strategic direction in development and use ICT across the University.

- This policy does not propose a change of the existing ICT governance and management framework, but it proposes strategic measures to be taken for improvement. Besides, the routine operations related to ICT use by the UDSM community, the DICT and the ICTSC should focus on enabling the University harnessing the potential of ICT to modernise its operations and improve its competitive age. Specific recommendations on administrative measures necessary to strengthen the structure and improve the ICT governance and management functions are submitted annexed to this policy as part of Appendix 1.

- This policy proposes the composition and roles of the ICTSC and DICT to be reviewed regularly, based on the evaluation of their performances, changing ICT needs of the University, institutional structural changes, and emerging issues related to ICT within and outside the University.

- In discharging their functions, the UDSM ICTSC and DICT should consult and work in close collaboration with the University Council, University Management, Head of units, staff, and students for effective development, support, and use of ICT across the University.

5. Implementation Strategy

After this policy is approved by the University Council, its implementation shall be the responsibility of the UDSM management through the Directorate of ICT. ICTSC in consultation with DICT will develop UDSM ICT resources and will make ICT strategic decisions. The ICTD shall lead the management of ICT at the University by working in close collaboration with heads of units across the University. The DICT should involve UDSM units in all major decisions regarding ICT development initiatives, acquisition, maintenance, support, trainings, needs assessment, and projects implementation. Doing so will create and enhance a sense of ownership of ICT resources among UDSM units and will attract the required support in developing and maintaining ICT facilities at unit level. Issues arising from the implementation of this policy should be resolved by the DICT and, when necessary, escalated to the ICTSC. After this policy is approved, the structure of DICT and ICTSC should be immediately reviewed to make it possible to implement the strategies provided herein.

Operationalisation of this ICT Policy will be guided by different strategies, plans, guidelines, and development programmes developed prior to or after its operationalisation. Among them are the UDSM ICT Master Plan, UDSM ICT Security Policy, UDSM ICT Business Continuity and Disaster Recovery Plan, UDSM e-Learning Policy, UDSM e-Learning Implementation Strategy, UDSM ICT Maintenance Plan, and UDSM Sustainability Plan for ICT Resources. Any ICT-related strategy, policy or plan developed during the execution of this policy should be aligned with the guidelines and strategic issues provided in the ICT Policy.

The success rate in implementing this ICT Policy could potentially increase if the University will seek the support of external organisations in implementing specific plans and development projects as detailed in the UDSM ICT Master Plan, which is the key document in realising the development of UDSM ICT resources. The University should collaborate with and seek the support of the government, public organisations, development partners, and the private sector by engaging them in strategic ICT investments, innovation projects, training, and research agenda.

6. Monitoring and Evaluation

The performance of the University in implementing this ICT Policy should be periodically assessed based on strategic goals and objectives stipulated in this document. Mechanisms should be put in place to continuously monitor and evaluate the performance of ICT at UDSM, the resulting value of increasing the effectiveness of UDSM in executing its core business and administrative functions, and the competitive advantage of UDSM toward becoming an e-University. A systematic evaluation of this policy should be conducted after two years of its implementation and a major review should be conducted toward the end of five years. DICT through the directive of the ICTSC will conduct the mid review and the ICTSC will appoint a

team of experts to conduct a major review.

7. Other Associated Policy Instruments

This policy should be implemented with reference to other ICT strategic documents. These include existing ICT strategic documents and any other that will be developed by the University from time to time as deemed necessary. In particular, reference should be made to the following documents:

1. UDSM ICT Master Plan (UDICTMP)

2. UDSM ICT Security Policy (UDICTSP)

3. UDSM e-Learning Policy (UDeLP)

4. UDSM e-Learning Implementation Strategy (UDeLIS)

5. UDSM ICT Standard Operating Procedures (UDICTSOPs)

6. UDSM ICT Business Continuity and Disaster Recovery Plan (UDICTBC&DRP)

7. UDSM ICT Sustainability Strategy (UDICTSS)

8. UDSM ICT Maintenance Plan (UDICTMaP)

9. UDSM IP Policy (UDIPP)

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Appendices

Appendix 1: Issues to consider for effective implementation of this policy

The implementation of the ICT policy in any organisation is affected by both internal and external environments. In particular, effective execution of the policy depends on, among other things, organisational commitment and arrangements to support and facilitate the achievement of the set objectives. During the development of this ICT policy, several issues were observed from UDSM internal and external environments, which, if not addressed, may hinder the achievement of the objectives set in this document. While some of the issues have direct link to the use of ICT at UDSM, and so are being addressed in this policy, others require managerial decisions by the University Management and engagement with external stakeholders. This section provides recommendations of issues to be considered to facilitate effective implementation of this policy.

(A) Strengthening ICT Governance and Leadership
A.1: Challenges:

The governance and leadership structure of ICT at UDSM has to be reviewed. According to the UDSM ICT Governance and Management Framework, the ICT Steering Committee (ICTSC) has about 30 members, and the number is likely to increase because the committee is comprised of:

(1) The Vice Chancellor (Chair)

(2) Deputy Vice Chancellor - Academic

(3) Deputy Vice Chancellor - Administration

(4) Deputy Vice Chancellor - Research

(5) Chief Cooperate Counsel and Secretary to the Council

(6) Principals, Deans and Directors (nearly 30 in total)

(7) Director of ICT (Secretary and Advisor)

(8) Managing Director of UCC as a Service Provider and Advisor.

Section 18 of the e-Government Act, Act No. 10 of 2019, requires that the ICTSCs of public institutions should have a minimum of six (6) and a maximum of seven (7) members. Despite the need for critical view of this this provision, given UDSM's context-specific needs as an academic institution, the current size of the ICTSC at UDSM cannot be justified. The composition of the UDSM ICTSC presents the following challenges:

(a) The size is unjustifiable and it makes it difficult and expensive to organise meetings which are important for making critical decisions about development and use of ICT at UDSM, as well as providing technical guidance on implementation of ICT initiatives;

(b) The composition is not effective for the nature of decisions to be made about ICT governance, because there are no justifications given about the nature of value added by some members of current UDSM ICTSC.

(c) The inclusion of a service provider as a core member of ICTSC is questionable as it presents an obvious conflict of interest.

A.2: Recommendations

(a) The UDSM ICTSC should be composed of a minimum of ten (10) and maximum of twelve (12) members.

(b) Category number 6 in the list of current ICTSC members should provide 3 members only based on the value they can potentially add to the committee. These include heads of CoICT *(ICT domain & technical expertise)*, CoET *(ICT-related domains & technical expertise)*, and UDBS *(management, resources, and business)*.

(c) The Procurement Manager and Bursar should be among core members of the ICTSC.

(d) Any other individual may be invited by ICTSC either as a co-opted member *(no voting rights)* or based on specific needs *(ICT experts, member of specific ICT projects, & leaders of units implementing ICT projects).*

(e) Service providers may also be invited to specific ICTSC meetings to give explanations or respond to queries the committee might have.

(B) UDSM ICT Management

B.1: Challenges

The structure of the Directorate of ICT should be reviewed because it does not take care of some key ICT services needed by the University, as specified in this ICT Policy. The management structure has the Director and only two functional units: information systems and ICT infrastructure, and ICT services management.

B.2: Recommendations

(a) The UDSM ICT management structure and functions should be reviewed to strengthen the directorate of ICT.

(b) Besides the current two functional sections, five other sections are required to take care of the following functions:
  • ICT training for UDSM executives, staff, and students
  • ICT user support
  • ICT maintenance services
  • ICT resources mobilisation (refer to the ICT Master Plan)
  • ICT innovation *(to develop ICT solutions for the university)*

(c) The University should change its perspective and approach to management and leadership of ICT services.
- ICT leaders should not be appointed based on statutory positions or certificates. Instead, they should be appointed based on proven ability to deliver as per the University vision and plans.
- Section heads in the DICT should be hired or appointed based on competence, skills, ability, and innovative thinking necessary to deliver best services and help the University harness the full potential of ICT to gain a competitive advantage.
- Recruitment of ICT experts should be more rigorous and objective.

(d) There should be intentional efforts to mobilise specific resources for ICT development, maintenance, and support.
- The University may wish to implement the recommendations provided in section 6 of the UDSM ICT Master Plan (2022-2031) on ICT resources mobilisation for ICT.

(C) ICT-enabled teaching and learning
C.1: Challenges
For the past twenty years, the University has progressively been improving the use of ICT solutions in teaching and learning. Currently, there is an increasing pressure to provide blended and online programmes at undergraduate and postgraduate levels. However, the University does not have an e-Learning policy and its implementation strategy, which are necessary tools to guide the use of ICT to enable teaching and learning.

C.2: Recommendations
(a) The University should urgently develop and operationalise the UDSM e-Learning policy and its implementation strategy, to guide the use of ICT for teaching and learning and facilitate offering of online and blended programmes.
(b) The current Centre for Virtual Learning should be elevated to a new position in the UDSM organogram to give it the required mandate to lead the implementation the e-Learning strategy across UDSM campuses.
- Rename CVL to **UDSM eLearning Centre (UDeCE)** and relocate its offices to the Mlimani Campus to give it a university-wide outlook.
- Provide a specific building to house DICT and CVL (call it UDSM ICT Complex) because the two have shared resources and functions.
- The proposed UDSM ICT Complex should also house the proposed ICT maintenance workshop and ICT training room(s).

(D) UDSM expenditure on ICT

D.1: Challenges

The university needs to establish the actual expenditure used on ICT-related services, infrastructure, and equipment. This is important as it enables the University to plan and set budget for ICT resources. Currently, establishing the total amount of funds the university spends on ICT has been a bit challenging because recording of such expenditures is not consistently done across units. Units and projects fund ICT-related activities, facilities, and services, but in uncoordinated approach and some expenses are not marked as ICT-related.

D.2: Recommendations

(a) All units should consistently record ICT-related expenses categorised into components such as ICT infrastructure, ICT devices / equipment, ICT maintenance, ICT support, System software, application software, information systems, and ICT Training.

(b) All units, staff and students should know that all ICT-related activities, resources and acquisition of ICT resources are coordinated by DICT as provided in the UDSM ICT Governance and Management Framework and as per this ICT Policy.

(E) The role of e-Government Authority

E.1: Challenges

As a public institution, UDSM is required to comply with the standards, regulations, and directives given by the e-Government Authority, which is a public organisation that has a mandate to coordinate, oversee and promote e-Government initiatives, as well as enforce e-Government policies, laws, regulations, standards and guidelines in public institutions. The policies, laws, regulations, standards and guidelines provided by e-GA are generic across all government departments and public institutions, regardless of their functions. They do not consider specific ICT needs, functions, and processes of the University as an institution of higher learning with a culture, arrangements, needs, and functions that are different from other public institutions. Consider the following few examples:

(a) Without considering the University mode of operation and a multitude of needs for ICT facilities, services and applications, the regulations require the University to seek recommendations and approval of eGA whenever it wants to acquire any ICT resources.

(b) eGA has started to impose the use of some software systems on the University, but these software systems were meant for other public organisations and government departments. This requirement contradicts the vision and statutory function of the University as a centre of innovation and creativity, which include the development of ICT solutions for internal use, the public sector, and the broader ICT market. The University is not supposed to receive ICT solutions for its core and administrative functions from

anywhere; it should develop them as per the needs. Receiving solutions from the central government kills innovation at the University.

(c) Without exceptions, the regulations by eGA require the University to host all its websites, information systems, email servers, and other applications in local servers. Meanwhile, the University uses a lot of information systems and application software that require stable and reliable ICT infrastructure which cannot be obtained locally.

E.2: Recommendations:

- The UDSM management should initiate discussions with eGA and other relevant government authorities to review eGA regulations which could potentially cripple the innovative development and use of ICT in public universities.

- eGA regulations should have specific provisions for public universities, instead of being generic to all public institutions.

- The University should be able to decide where to host its software applications and information systems based on ICT needs and type of service.

Appendix 2: University of Dar es Salaam Academic units by May 2022

S/n	Academic Unit	Location
UDSM Constituent colleges		
1.	Dar es Salaam University College of Education (DUCE)	Temeke -Dar es Salaam
2.	Mkwawa University College of Education (MUCE)	Iringa
UDSM Mwalimu Nyerere Campus Colleges		
1.	College of Engineering and Technology (CoET)	Mlimani
2.	College of Information and Communication Technologies (CoICT)	Mikocheni - DSM
3.	College of Natural and Applied Sciences (CoNAS)	Mlimani
4.	College of Humanities (CoHU)	Mlimani
5.	College of Social Sciences (CoSS)	Mlimani
6.	College of Agricultural Sciences and Food Technology (CoAF)	Mlimani
7.	University of Dar es Salaam-Mbeya College of Health and Allied Sciences (UDSM-MCHAS)	Mbeya
UDSM Schools		
1.	University of Dar es Salaam Business School (UDBS)	Mlimani
2.	School of Education (SoED)	Mlimani
3.	University of Dar es Salaam School of Law (UDSoL)	Mlimani
4.	School of Journalism and Mass Communication (SJMC)	Makumbusho – DSM
5.	School of Aquatic Sciences and Fisheries Technology (SoAF)	Kunduchi,- DSM
6.	School of Mines and Geosciences (SoMG)	Mlimani
7.	University of Dar es Salaam School of Economics (UDSoE)	Mlimani
UDSM Institutes		
1.	Institute of Development Studies (IDS)	Mlimani
2.	Institute of Kiswahili Studies (IKS)	Mlimani

S/n	Academic Unit	Location
3.	Institute of Resource Assessment (IRA)	Mlimani
4.	Institute of Marine Sciences (IMS)	Zanzibar
5.	Confucius Institute (CI)	Mlimani
6.	Institute of Gender Studies (IGS)	Mlimani
7.	Mineral Resources Institute (MRI)	Dodoma
UDSM Centres		
1.	Directorate of Innovation an Entrepreneurship Centre (UDIEC)	Mlimani
2.	Centre for Virtual Learning (CVL)	Kijitonyama - DSM
3.	University Of Dar es Salaam Computing Centre (UCC)	Mlimani
4.	Humanities Research Centre (HRC)	Mlimani
5.	Centre for Climate Change Studies (CCCS)	Mlimani
6.	Centre for Behavioural Studies (CBS)	Mlimani
7.	Centre for Communication Studies (CCS)	Mlimani
8.	Korean Studies Centre (KSC)	Mlimani
9.	Centre for Educational Research and Professional Development (CERPD)	Mlimani
10.	Technology Development and Transfer Centre (TDTC)	Mlimani
11.	Research and Education for Democracy in Tanzania (REDET)	Mlimani
12.	COVID-19 Information Desk & Resources (COVID-19)	Mlimani
13.	Centre for Chinese Studies	Mlimani