Makerere University

Information and Communication Technology:

ICT Policy Master Plan Phase 2 (2005 – 2009)

(ICT Services and Systems; Management, Control and Maintenance; Master Plan)

Vision

".. university-wide access to, and utilisation of information and communication technology to enhance the position of Makerere University as a center of academic excellence, and its contribution to the sustainable development of society.."

LIST OF ABBREVIATIONS AND ACRONYMS

ARIS	Academic Records Information System
AWG	Architecture Working Group
CAD	Computer Aided Design
CAM	Computer Aided Manufacture
CBT	Computer Based Training
CCE	Center for Continuing Education
DBMS	Data Base Management System
DC	Data Communication
DICTS	Directorate for ICT Support
DLE	Digital Learning Environment
DNS	Domain Name Service
Email	Electronic Mail
FAQ	Frequently Asked Questions
FINIS	Financial Information System
FTP	File Transfer Protocol
GIS	Geographical Information Systems
HURIS	Human Resource Information System
ICS	Institute of Computer Science
ICT	Information and Communication Technology
CICTC	Council ICT Committee
IP	Internet Protocol
IRM	Information Resource Management
LAN	Local Area Network
LIBIS	Library Information System
TCP	Transmission Control Protocol
URL	Universal Resource Locator
WAN	Wide Area Network
WWW	World Wide Web

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1.3 It is the University Policy to promote office computing in all offices.

1.4 It is the University Policy to improve both the efficiency and effectiveness of library operations and services through the implementation of an integrated on-line *Library Information System* ***(LIBIS).***

1.5 It is the University Policy to enhance and streamline student education related administrative and managerial processes and to improve academic reporting facilities at both central and faculty level through the implementation of an integrated *Academic Records Information System* ***(ARIS).***

1.6 It is the University Policy to enhance and streamline financial management processes and reporting facilities at both central and faculty levels through the implementation of an integrated *Financial Information System* ***(FINIS).***

1.7 It is the University Policy to enhance and streamline the human resource management and administrative processes through the implementation of a *Human Resource Information System* ***(HURIS).***

1.8 It is the University Policy in the broadest sense to promote the deployment of ICT in all areas of education and research through creating technical and organizational preconditions.

1.9 It is the University Policy to ensure and require that all students, academic staff, administrative and support staff, and managerial staff are trained on a continuing basis to equip them with the requisite skills to fully exploit the ICT environment in their different functions

1.10 It the University Policy to ensure sustainable management of the university's ICT policy and resources through the creation of appropriate policy, advisory management and operational organs that will cater for the broad interests of all users

1.11 It is the University Policy to provide for the growth and financial sustainability of its ICT resources through appropriate funding and operational mechanisms

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2. Common Data Services and Office Automation

2.1. Common Data Services

Data Communication forms an essential component of the University ICT policy. It must assure availability of all anticipated ICT services/systems at any workplace in the university ***The University Policy gives priority to the development and implementation of Data Communication Services at two different but related levels:***

- Common Network Services (Network Infrastructure) forming the collective data transport means for *all* current and future ICT services/systems.

  Common Network Services, mainly comprising physical network infrastructure (wiring, switches, routers, servers, etc) and communication protocols (TCP/IP), are prerequisites for running systems such ARIS, LIBIS, and application level communication services, such as email and Internet access.

- User-level Data Communication Services such as email, access to Internet, Internet/Intranet Services, which actually are major "users" of the low-level network services.

2.1.1. Electronic Mail Services

Email systems are designed to enhance communication within the institution and with other institutions. An electronic mail system consists of the following components:

- The user's front-end application, providing facilities for creating, addressing, sending, receiving and forwarding messages.

- The back-end email server application that forwards messages from the sender to the receiver.

- A directory service, the Domain Name Service (DNS), that maintains a database with users and services on the network. Users access this service to locate the addressee and his or her email address.

2.1.2. Access-to-Internet Services

This is (or becomes) one of the most valuable communication services for institutions of higher learning. It provides access to a wealth of information sources, located on computer systems around the world.

2.1.3. Internet/Intranet Services

Intranet Services include facilities to design, develop and store information formatted as web pages and make them accessible through the LAN of the institution, while Internet services publish information on the World Wide Web. In general, both services use similar software and hardware technology.

Intranet Services may be used for on-line publication of parts of corporate databases, maintained by systems like FINIS, LIBIS, ARIS and HURIS. Further, in an academic environment Intranet Services are applied to access course manuals and other study and research documentation.

2.1.4. General user administration system

The administration of all users, employees, guest accounts and others as well as students is tedious work. In order to handle the large numbers at Makerere University (more than 30,000) there will be one user database, for the university common system. For students, as an example, names, addresses and departments/courses are collected. The information on students is imported from ARIS while the information on employees is imported from HURIS.

For the students, this means that the same account/e-mail-address and user-id can be used for the length of the program. The account automatically expires when the student is no longer active in ARIS. In the same way, expiry of employee accounts will be flagged by HURIS.

2.2. Office Computing Services

It is the university's policy to promote office computing in all offices. In this context the term office *computing* is used for the application of ICT, mostly desk-top computers, to support general office tasks. Major office computing applications are: word processing, electronic mail, spreadsheet processing, document storage and retrieval, desktop publishing, and access to internet.

It is the university policy to, as far as possible, use open source software as a first option in all office computing.

3. End User Skills Development

In an environment where pedagogic, administrative and managerial processes are automated, the necessary skills to utilize the services/systems, keep them running, and develop and implement them demand new, often high-level, skills.

It is the University Policy in the broadest sense to promote the deployment of ICT in all areas of education and research through creating technical and organizational preconditions.

It is the University Policy to ensure and require that all students, academic staff, administrative and support staff, and managerial staff are trained on a continuing basis to equip them with the requisite skills to fully exploit the ICT environment in their different functions

The following are university policy level requirements:

(a) Effective September 2005, all students in all faculties are required to take the prescribed introductory level module(s) that will be credit carrying modules within twelve months of first registration.

(b) Effective September 2005, all staff recruited into positions at or above M14 are required to demonstrate the prescribed level of competence before formal appointment.

(c) Before appointment to Assistant lecturer level, academic staff are required to demonstrate the prescribed level of competence in technology enhanced interactive learning techniques. Staff already at or above this level will be required to acquire the prescribed competence by the end December 2005, or such other deadline as may be set by Council.

(d) It is required that each faculty, school or institute has at least 1 computer per 5 students enrolled for undergraduate degree and postgraduate diploma courses, and 1 computer per Masters or PhD student, by the end of December 2009. All faculties shall be required to incorporate a component in their budgets, starting from the 2004/2005 financial, that reflects the plan to achieve the set target vis a vis current and planned enrolment.

In line with the implementation of the different ICT services and systems, considerable knowledge and skills have to be developed among the end-users so that they are able to:

- Use ICT services and systems effectively and as independently as possible.
- Contribute to the specification, design and implementation of ICT applications.
- Be aware of the shared responsibilities for equipment, software and data, and enforce an atmosphere of collective responsibility and system ownership.
- Manage and control complex project oriented processes, like implementing University-wide infrastructure or information systems.

- Establish and sustain effective, efficient application and data management and systems maintenance.

The University Policy provides for the development and implementation of a consistent set of training programs with different levels for different categories of (potential) ICT users: Students, teaching and research staff, clerical and secretarial staff, and general management staff.

Additionally, it is the University Policy to create organizational (trainer capacity, training management) and technical (practice labs for students and staff; computer based training tools, self-paced training mode; general access computer labs) conditions assuring continuous in-house ICT training capabilities, as well as sufficiency of access to computers for learning and research, in the long-term.

The short- and medium-term goals shall be aimed at creating, as rapidly as possible, a sizeable proportion of staff that are familiar with, and able to effectively use the ICT infrastructure in their daily work. At the end of the first phase of the training, the University expects that:

- All students and staff at all levels are able to use standard application packages (word processors, spread sheets, data bases) as well as email and the Internet.
- Administrative chores like calling meetings and distribution of minutes and other documents are handle via email
- Students and staff interact more using online message boards, email, and online discussion fora. The traditional modes of interaction (notice boards, circulars) should be replaced for most activities.

4. Information Systems

4.1. Library Information System

As more information is made available in a variety of formats and media and in a variety of locations, the need to manage information efficiently becomes more and more critical. Both library staff and library users want access to more information and want to access it more efficiently.

It is the University Policy to improve both the efficiency and effectiveness of library operations and services through the implementation of an integrated on-line Library Information System (LIBIS).

The anticipated Library Information System will integrate the following functionality:

Essential functional requirements

- Circulation Control System.
- Catalogue Maintenance System giving a high quality of bibliographic records in conformity with the standard cataloguing codes.
- On-line Catalogue Access.
- Ability to share resources (catalogues) among libraries at different locations.
- Acquisitions Control, including search of on-line sources of publications, on-line access to book dealers and book publishers and order placement, checking in, query on-order records.
- Serials Ordering and Control.
- On-line (through Internet) access from any workplace to Reference and Information Services (indexes, abstracts, etc) in the University library and other universities, libraries, and institutes.
- Statistical reporting and management information provision.

4.2. Academic Records Information System

Academic Records Information System (ARIS) is the generic term for the collection of ICT services designed to support student and education related administrative and managerial processes.

It is the University Policy to enhance and streamline student education related administrative and managerial processes and to improve academic reporting facilities at both central and faculty level through the implementation of an integrated Academic Records Information System (ARIS).

The ARIS will include the following functionality:

Essential functional requirements

- Management of student personal records.
- Admission of students.

- Management of student academic performance records and student academic performance analysis.
- Curricula and course records management (Academic Program Offerings).
- Class scheduling (time tabling).
- Space and teaching staff requirements analysis.
- Students' financial transaction management.
- Students' health records management.
- On-line database query and reporting facilities.
- Alumni records and activities.

4.3. Financial Information System

The financial management function in any organization encompasses a great number of closely related administrative and managerial processes.

It is the University Policy to enhance and streamline financial management processes and reporting facilities at both central and faculty level through the implementation of an integrated Financial Information System (FINIS).

The following functionality is regarded essential to the University financial management.

Essential functional requirements

- Budget preparation, implementation, monitoring, reporting and evaluation. *Given the decentralized nature of budgetary management, it is the University policy to make these functions available to faculties.*

- Debt management.
- Cash management.
- Foreign aid management.
- Revenue management including assessment of financial needs, collection of gifts, determination of tuition fees, government appropriations, contracts and grants, investments, sales.
- Expenditure management including authorization of expenditures, personnel costs, vendors, awards.
- Personnel cost administration (payroll).
- General Ledger.
- Budget Ledger.
- Commitment Ledger.
- Accounts Payable.
- Account receivable.
- Fixed assets management.
- Inventory Control.
- Cost accounting functions.
- Financial analysis and (Web technology based) reporting capabilities.

4.4. Human Resource Information System

Human resource management refers to adequate utilisation of human labour for productivity and attainment of the organisational mission, goals and objectives. In an institution of higher education human resources form a primary organisational resource, which is scarce, expensive and difficult to maintain. A university spends over 70% of its financial resources on personal emoluments and the university must concentrate its efforts on effective management of its employees for optimum returns on its investment in human capacity.

It is the University Policy to enhance and streamline the human resource management and administrative processes through the implementation of a Human Resource Information System (HURIS).

A policy element the university has to address at a higher level is the establishment of a guide about the acceptable relative sizes of academic (line function) and administrative (support function) staff. This will also be reflected in the financial outlays for the core versus the support functions in the university.

Essential functional requirements

- Establishing a human resource policy.
- Plan short- and long-term staff requirements.
- Recruitment of staff.
- Job evaluation.
- Training of staff.
- Salary administration.
- Pension fund administration.

4.5. High level reporting applications

The university will promote and support the development of high level reporting applications that cut across all the corporate data bases using data mining and/or other approaches.

4.6. Software Development

It is the university policy to develop internal capacity and to develop its own software for the major information systems in collaboration with other institutions/ organisation.

4.7. Access rights

The university will, from time to time, establish access levels, rights, privileges, obligations and sanctions consistent with the University Information Policy, aimed at enabling easy access to corporate data and information needed for the different roles of the university community, while assuring the integrity of such data and information and respecting the privacy of individuals.

5. E-learning

5.1. Policy

It is the University Policy to leverage faculty/unit effectiveness and enable easier access to and coverage of university education by using ICT in instruction, learning and research through the university wide implementation E-learning.

To support this policy, Makerere University will:

i. Create organizational (trainer capacity, training management) and technical (practice lab and computer based training tools, self-paced training mode) conditions assuring continuous in-house e-learning training capabilities in the long-term.

ii. Ensure and require that all students and academic staff are trained on a continuing basis to equip them with the requisite skills to fully exploit the Digital Learning Environment (DLE) in their different disciplines.

iii. Develop university wide and global e-learning networks based on academic interests groups and research collaborations.

iv. Establish the appropriate common DLE infrastructure and software responsive to academic needs through the designated central technological unit.

5.2. E-Learning Goals

The following are the specific University goals and strategies that relate to the integration of ICTs in the teaching and learning processes.

Goal 1: To improve the quality of graduates, by utilizing modern instructional materials and methods, including increased use of ICT in teaching and research.

Goal 2: To provide greater access to university education, by developing capacity for increased enrolment through non-conventional approaches in teaching and learning i.e. Distance education and virtual university

5.3. User Skills: Policy Drivers (See also End User Training)

- ***All students shall be required to take the prescribed introductory level module(s) as a requirement for e-learning.***
- ***All academic staff shall be required to demonstrate the prescribed level of competence for content development of e-learning within the DLE.***
- ***All new staff shall undergo training in education technology techniques with emphasis on e-learning.***

- ***Each unit shall set up an e-learning laboratory to develop local capacity in development and evaluating appropriate training software.***
- ***Units shall develop and nurture complimentary methods of teaching and learning to e-learning as a medium of distance learning both within campus and outreach /upcountry centers, in the long term.***
- ***The trainers shall use an interdisciplinary approach to e-learning.***

5.4. Common DLE Infrastructure and Software

It's the university policy to select the appropriate common DLE infrastructure and software responsive to academic needs through the designated management unit. To the extent possible, preference shall be given to open source platforms.

5.5. E-learning Management Policy

It the University Policy to ensure sustainable management of the university's e-learning policy and resources through the creation of appropriate funding, advisory, management and operational organs that will cater for the broad interests of all users.

5.6. High level E-learning Management

A committee, chaired by the Dean, School of Education, will be responsible for high level direction, management, implementation of the E-learning function. This committee will also be responsible for establishing the Educational Technology Resource Unit. The other members of the committee will be the Academic Registrar, the Director DICTS, the Director ICS, the Dean Faculty of Science, and the Dean Faculty of Arts.

The University Senate shall have the authority to review the functions and composition of this committee.

5.7. Educational Technology Resource Function

An Educational Technology Resource Function will be established, initially based within the Directorate for ICT Support (DICTS) but evolving to an independent unit in the short to medium term, with the mandate of

- Working as an E-learning Service function.
- Coordinating e-learning activities.
- Vetting proposals on e-learning.
- Monitoring and evaluating e-learning at Makerere University.
- Promoting e-learning through awareness seminars, workshops etc.

The proposed unit will consist of people with ICT skills, teaching experience, technical skills, operational skills, and good communication skills.

5.8. Faculty/Unit E-learning Team

Within a unit/Faculty an E- learning team will be formed. This will liaise with the central Resource Unit, ensure implementation of agreed policies in the faculty, and guide the development and implementation of faculty-specific e-learning activities.

6. Data Communication Infrastructure Policy

Data communication (DC) systems provide essential links between users of information and sources of information, and form the basis of the network infrastructure.

It is the University policy to develop a University-wide data communication network consisting of the following building blocks:

- ***Inter-campus WAN connections between campuses.***
- ***Campus backbone for each campus.***
- ***Building backbone for each building.***
- ***Individual Local Area Networks identified on the basis of adjacent rooms and/or workplaces and user groups.***

By concentration of all university general servers (mail, web, administrative, library, etc) into one room (the new ICS building) specially designed with cooling, air-filtering, UPS, backup-facilities and physical protection, better availability and service may be achieved. With a high speed backbone, it will not be necessary to place the servers close to the users.

6.1. Network Implementation Policy

A university-wide network infrastructure cannot be built overnight and will take a substantial period of time. For reasons of planning, management, and resource availability the actual implementation will take place in a phased approach and will be synchronized with the implementation timing of different ICT services and systems as well as with the (expected/required) physical distribution of future clients (users) and servers of each of the services and systems.

It is the university policy to design and implement all network segments under a single project management structure. However, the timing of those components of the infrastructure, which are a prerequisite to particular services or systems, must be synchronized with the implementation process of those services or systems.

6.2. Security Policy

The University's ICT Security Policy is the collection of rules by which people who are given access to the University's information technology and data must abide. The main purpose of a security policy is to inform and guide users, staff, and managers of the requirements and their obligations in protecting technology and information assets.

The following are the basic requirements of securing network resources :

- Ensuring that only authorized individuals have access to information.
- Preventing unauthorized creation, alteration, or destruction of data.
- Ensuring that legitimate users are not denied access to information.
- Ensuring that resources are used in legitimate ways.

Several characteristics are associated with an effective and feasible ICT security policy:

- Implementability.
- Enforceability.
- Privacy.
- Access.
- Accountability.
- Response.
- Flexibility.
- Sustainability/Maintainability.

The following measures shall be taken as part of ensuring security:

- ***Networks will be built entirely with switches since this nearly eliminates the possibility for users of "snooping" accounts and passwords from the net.***
- ***All links between switches will be optical fiber.***
- ***Encrypted communication methods (like ssh instead of telnet, https,.....) will be used by all university critical systems (e.g. financial, student databases and so on).***

Security policy will be governed by the higher level University Information Policy.

7. ICT Management Policy

It the University Policy to ensure sustainable management of the university's ICT policy and resources through the creation of appropriate policy, advisory, management and operational organs that will cater for the broad interests of all users.

It is the University Policy to provide for the growth and financial sustainability of its ICT resources through appropriate funding and operational mechanisms.

7.1. General ICT Management Policy

The University has decided on the following general policies for the development of appropriate Information Resources Management (IRM) capabilities. The general policy includes short-term IRM policies, long-term IRM policies and ownership policies.

7.2.ICT Management Policy

7.2.1. Council ICT Committee

The Council ICT Committee will be responsible for providing a high-level mechanism to:

- Monitor and control the progress of all activities arising from the implementation of the University's ICT Policy;
- Monitor and control the progress and operations of of DICTS (See 7.1.2)
- Allocate resources according to the agreed master plan
- Budget for the cost of management, operations, maintenance and expansion through the university budget
- Recommend proposals for cost-recovery and cost-sharing
- Determine /approve ICT Policy adjustments arising from technology trends or new visions and strategies.

CICTC will be set up by Council, and will include members nominated from both the management of academic functions (faculties) and the management of administrative and support function of the university. It will be chaired by the Vice Chancellor. DICTS will be the secretariat to this committee.

7.2.2. Directorate for ICT Support

One centrally organized, service oriented, unit (not necessarily geographically concentrated) will be formed. The primary tasks of this unit/department are management and maintenance of common ICT systems and End-user support. This organizational unit will be called the *Directorate for ICT Support (DICTS)*. Because of the cross-cutting nature of the duties of DICTS,

affecting all academic and administrative units of the university, the head of this unit, the Director, will report to the Vice Chancellor.

7.2.3. Architecture Working Group

There will be established an Architecture Working Group (AWG) composed of representatives from all faculty level academic units as well as administrative units. This will provide a forum for the development and continuous review of the University's information architecture, ensuring that it conforms to the common vision of the end users. The AWG will be a change driver, providing inputs for DICTS and the Council ICT Committee, and shall therefore be a high level forum where faculties are represented by the Dean or the Deputy Dean, and administrative units by the Head of the unit or the Deputy to the Head. DICTS will provide the secretariat to the AWG. The AWG will be operationalised by Council after the end of the project phase of the University ICT project.

7.3.General information resource ownership policy

7.3.1. Ownership

For each ICT resource (computer, data communication device, software, network components, data storage) an "owner" will be defined. Ownership of specific ICT resources will be determined by the university's general management. For example: the Finance Department would be the owner of the Financial database server computer and the financial database.

Ownership of common ICT resources (e.g. communication infrastructure, general services) will be delegated to DICTS.

7.3.2. Hiring of External Expertise

Owners are allowed to hire certain support services from external professional providers only if cost-effective and if the expertise involved is not (yet) available in the University and will (cannot) not be developed by DICTS.

7.3.3. Service Levels

Service levels of DICTS will be determined in line with the ICT services/systems provided and related service level requirements.

7.4. Technology Fee

The University Council will put in place a technology fee payable by each student to ensure that ICT services and systems can be expanded and sustained at the level compatible with the University's needs.

Makerere University

Information and Communication Technology:
Master Plan Phase 2
(2005 – 2009)

1. Introduction

The first phase of the Makerere University ICT Master Plan was aimed at:

- establishing the basic minimum infrastructure necessary for computerization, and using this as a platform to shift the university's academic and administrative operations to a computerized environment through the implementation of the major corporate information systems (Library, Academic Management, Human Resource Management and Financial Management);
- increasing ease and efficiency of communication;
- enhancement of learning and research through access to online resources;
- user training to ensure optimal utilization of the computerised environment;
- creation of a unit of experts who would assure the sustainable availability of all ICT resources through proper information resource management.

By the end of 2004, these will have been achieved (with the exception of user training which is an ongoing process) and the foundation completed. Major support for achieving Phase 1 objectives came from:

- The Swedish Agency for International Development, through its research arm, SAREC. The major motivation for Sida/SAREC was building research capacity (including capacity to supervise research) and improving the quality and efficiency of research output and research collaboration.
- The Norwegian Agency of International Development, NORAD, who main motivation was institutional development;
- The United States Agency for International Development, USAID, whose main motivation was supporting democracy and development through the Education for Democracy and Development Initiative, implemented through the Leland Initiative;
- The Uganda Government, through a loan from the African Development Bank and other resources (including resources internally generated in Makerere), with the aim of supporting Makerere's recovery and modernization to ensure that the human resource produced would effectively run Uganda's recovery, modernisation and poverty alleviation programmes.

Many other local and international development partners, including the Ford Foundation, the Rockefeller Foundation, the Carnegie Corporation and Uganda Telecomms Ltd supported Phase 2 through assistance targeted through various faculties.

In all cases, funding responded to needs and priorities as defined through the first Master Plan, now referred to as Phase 1. Table 1 gives a status summary of the major elements of Phase 1 of the Master Plan, including original estimated cost, funds mobilized, and status as 31st July 2004. Table 2 gives a summary of major funding mobilized, and Table 3 gives some key indicators during July 2000 and July 2004.

Table 1: Status summary of major elements of Phase 1 of the Masterplan

	Project	**Amount (USD)**	**Status**
1	Skills Training for End Users	600,000	Ongoing
2	Library Information System	300,000	Operational
3	Academic Records Information System	500,000	Operational
4	Finance Information System	300,000	Operational
5	Human Resource Info. Sys	200,000	Operational
6	Data Network (Backbone	2,000,000	80% complete
7	Email and Internet Access	350,000	Operational
8	Computers and LANS	6,600,000	*Only 20% funded*
9	Set up of ICT Support Unit	650,000	Phase 1 completed
	Total	**11,500,000**	***6,320,000 funded***

Table 2: Funds Mobilized during July 2000 and July 2004

	Funding Agency	**Amount (USD**
1	USAID/Leland Initiative/Avaya/Hewlett Packard	800,000
2	NORAD (NOK 9.5million)	1,100,000
3	Sida/SAREC (SEK 35.3 million)*	3,300,000
4	Government of Uganda (ADB loan)	1,000,000
5	NUFFIC (E-learning pilot training) (dfl 497,525)	120,000
6	Makerere University (Internal funds to-date)	1,000,000
7	Carnegie Corporation *(Support to main Library)*	650,000
8	Various partners working through different faculties *(computers and LANs)*	500,000
	Total	**8,470,000**

**Includes access to online journals – not part of Master Plan cost*

Phase 2 of the Master Plan has the overall objective of ensuring and consolidating the real efficiency gains of a fully computerized environment, with the following broad goals:

- Modernizing instruction and learning and creating increased opportunity for access to quality education through E-learning.
- Achieving the full potential of efficiency gains by ensuring that the University community is not only fully computer literate, but has got easy access to computer resources that will have a ubiquitous presence on campus by the end of 2009.
- Mitigating the risk of failure in a highly computerized environment through institutionalized data backup and disaster recovery.
- Creating ease of access to all services by the University community while preventing unauthorized access and abuse.
- Continuing training of DICTS staff beyond the technical level(PhD research) to equip them with those conceptual skills necessary for applying ICTs in

transforming the University through the their effective Integration into its functions

The definition of the implementation Master plan for Phase 2 of the Makerere ICT Project has taken full cognisance of the following:

- The need for full stakeholder involvement and ownership.
- The continuing complexity of the process of integration of ICT in all organizational functions in a major institution like Makerere – demanding a competent human resource and time.
- The challenges of sustainability – recurrent and replacement costs have to be met by the University, and acquisitions have to take this into account.
- The fact that infrastructure is a common challenge for all ICT projects.
- The limited funding available from Makerere University due to multiple demands on limited resources.
- The fact that most development partners will be able to support only parts of the master plan.

The Master Plan matrix has been developed to allow distinctive sub-components to be funded independently, with all sub-components contributing to the planned whole.

Table 3: Key Indicators during July 2000 and July 2004

	Indicator	**Year 2000**	**Year 2003**
1	ICT Literate staff	300	3,000
2	Networked computers	300	1,700
3	LANs	15	40
4	Campus Backbone	None	16km of Single mode optical fiber cable
5	Bandwidth (In)	128kbps	2.5Mbps
6	Email Users	300	5,300

2. Phase 2 Projects and Prioritization

Table 4 gives the Phase 2 Projects and Project elements as have now been defined by the stakeholders as well as the priority rating given to each (5 is top priority).

TABLE 4
PROJECT ELEMENTS AND PRIORITISATION

	Project	**Sub-Project**	**Purpose**	**Priority Rating (Max 5)**
1	MakLIBIS II (Addressing the Library information system)	On-line journals	Expanding the range of online resources	5
		Computer resources	Ensuring the availability of user networked computers in the Main Library and all sub-libraries; includes the necessary servers for local mirroring or short-term caching	
		Capacity building	Creating expertise among the library staff to be effective information researchers and mediators	
		User training	Creating information literacy among users	
2	Information System II (Addressing the Academic Records, Finance and Library Information Systems)	Student Web Module	Enabling student access to their academic records	5
		Processor based license	Enabling access to administrative systems by all staff and students	
		User-training	Imparting skills to all front line users	
		Effective Intranet	Implementing the necessary soft support and server capacity for access to all the university services and databases	
		Backup	Assuring security and availability of data	
		Disaster Recovery	Assuring continuity of operations	
		Capacity building	Training and facilities for database and system administrators for the four information systems	
		Establishing a software developmen t unit	Establishment, equipping and capacity building to respond to the ICT policy on developing in-house applications	
3	E-Learning 1	Capacity Building	Establishing, equipping and training of personnel for the E-learning Unit	4

		Multimedia lab	Setting up a facilities for multi-media learning material production and video-conferencing	
		User Training	Equipping academic staff with skills for developing courses and implementing them in an e-learning environment	
		Computer Resources	Equipping the pilot faculties (Science, Technology, Computer Science, Medicine, Women and Gender) with sufficient net-worked computers to implement E-learning	
		Revolving loan for computers	Enabling staff to acquire their own lap tops or PCs	
4	MakNET II	Optical Fibre network	Extending the campus backbones to all buildings, including halls of residence	4
		Wireless Network	Creating wireless hotspots in common areas and conference rooms	
		Structured cabling for building LANs	Ensuring that all academic and administrative buildings, and to a limited extent halls of residence have local area networks with wired and/or wireless access.	
5	Student computer and training resources	Computer Resources	Equipping existing space in various faculties as well as the general purpose computer labs with networked computers to enable access by students to online resources for research and e-learning	3
		Capacity building	The installed computer facilities shall serve the dual purpose of access to end-user training materials on a central server.	
		Building construction	Provision of space for general purpose computer labs for students;	
6	Smart Campus Project 1	Capacity Building	Establishing, equipping and training of personnel for the Smart card system project Unit	2
		Smart card support infrastructure	Setting up a online facilities for supporting use of smart card system function	
7	DICTS	Ongoing staff training	Building research capacity within unit staff through training at PhD level	4

2.1 IRM Unit/DICTS Staff training

Training of DICTS staff has been ongoing since October 2001. This has included training at undergraduate and graduate level. Three staff members currently enrolled for PhD studies are at various stages of their research. Three more staff members who are to complete their Masters programmes by July 2005 are included in this proposal for enrollment for PhD research starting October 2005.

The first training phase aimed at imparting skills to staff to effectively implement and manage the basic ICT Support function to the University. This therefore mainly focused on short-term training/attachments, Undergraduate and Postgraduate training (Masters level).

The second phase of the training, as proposed in this submission, focuses on PhD research.

Rationale:
Whereas DICTS has primarily focused on basic ICT support to the University since its inception four years ago, its bigger vision is transforming the University through the effective Integration of ICT into its functions, in support of the global University Mission and Vision. DICTS strongly believes that within the context of Makerere University *(a higher learning institutional setting where the ICT personnel must push organizational change)*, this level of support requires staff with a high level of thinking and conceptual skills, the kind you only find among individuals who have matured their philosophy of approach to the resolution of challenges, who can literally think and evolve and implement solutions on the "run". People who think far, think wide, and think deep (n-dimensional thought). DICTS staff, who have now built the technical capacity to manage the basic network services are now at that stage where the capacity to think beyond the technology and instead focus on the more challenging organizational transformation through innovative ICT initiatives has to be developed.

Short-term attachments of staff to well established University ICT units in Europe, America and South Africa has benefited DICTS under the current phase, particularly with best practices and skills obtained from working with and learning from experienced technical staff An allowance for this training approach has been made under the proposed staff training plans.

3. Planning Budget and Master Plan

The planning budget for implementation of ICT Services and Systems is given in Table 5, while the timeline for the phased implementation is given in Figure 1. Table 6 is the approved recurrent cost expenditure as approved by the University ICT Council committee.

TABLE 5

PLANNING BUDGETS FOR THE DIFFERENT PROJECTS

Project	**Provisional budget estimate (US$)**
MAKLIBIS II	1,696,000
Information Systems II	1,066,000
Student computing and training resources	6,208,000
E-Learning I	2,410,000
Smart Campus I	60,000
MAKNET-II	3,054,000
DICTS Staff training	287,500
TOTAL	**14,781,500**

TABLE 6

ICT RECURRENT COSTS APPROVED BY MAKERERE ICT COUNCIL COMMITTEE

	Expenditure over planning period (USD)				
Item	**2005**	**2006**	**2007**	**2008**	**2009**
INCOME SIDE					
Student population[1]	30,000	35,000	40,000	45,000	45,000
2% contribution from student fees (current level).[2]	600,000	700,000			
Student Technology Fee *(@USD 30 p.a)*[3]			1,200,000	1,350,000	1,350,000
Govt contribution to[4] Bandwidth *(2 years)*	240,000	240,000			
Govt support for DICTS Salaries & Wages	200,000	200,000	200,000	250,000	250,000
TOTAL (USD)	**1,040,000**	**1,140,000**	**1,400,000**	**1,600,000**	**1,600,000**
EXPENDITURE SIDE (Based on current budget and projections).					
Internet Bandwidth	480,000	480,000	540,000	600,000	600,000
Salaries and Wages[5]	250,000	300,000	300,000	350,000	350,000
New computer stock and Re-stocking of Computers *(300 PCs per year)*	200,000	200,000	350,000	400,000	400,000
Maintenance and DICTS Operational Expenses	150,000	150,000	210,000	220,000	250,000
TOTALS (USD)	**1,080,000**	**1,130,000**	**1,400,000**	**1,570,000**	**1,600,000**

[1] The current actual number is higher: this is a current estimate of fee paying students
[2] The 2% recovery from all income has been in operation for 3 years
[3] The technology fee is planned to be implemented starting 2007
[4] This commitment has been made by government to support outsourcing. Payment for first half of 2005 ($120,000) has been made
[5] Note that the DICTS establishment will more than double because they are taking over ICT staff who have been working directly under faculties)

Project		2005	2006	2007	2008	2009	Cost (USD)
MAKLIBIS II	Phase 1						454,000
	Phase 2						460,000
	Phase 3						482,000
	Phase 4						300,000
MAKNET II	Phase 1						2,171,000
	Phase 2						851,000
	Phase 3						32,000
STUDENT COMPUTER AND TRAINING RESOURCES	Phase 1						952,000
	Phase 2						952,000
	Phase 3						816,000
	Phase 4						3,488,000
INFORMATION SYSTEMS II	ARIS, HURIS, FINIS requirements						140,000
	Disaster recovery and Backup systems						290,000
	Training						360,000
	Establishment of a software development unit						40,000
	Establishment of an effective Intranet						236,000
E_LEARNING I	Group 1						510,000
	Group 2						400,000
	Group 3						1,500,000
SMART CAMPUS I	Central service function and infrastructure						60,000
DICTS staff training							287,500
Cost		**2,600,000**	**2,612,000**	**2,84,500**	**3,915,000**	**3,570,000**	**14,781,500**

Figure 1: Phased Implementation Timeline