

Development of Policy and Master Plan of Information and Communication Technology at University: Case Study in Cambodia, the Royal University of Phnom Penh

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Abstract

The need of consideration all attributes or factors during development of university Information and Communication Technology (ICT) policy and master, especially in the university at developing country. In the paper, there will be showing in detail of: 1) Priorities and Project Identification; 2) Key Project Elements in each Project; 3) Project Management; and 4) Planning Timeline. The list of key elements and attributes will be an important information or report for other universities (especially in Cambodia), for development ICT policy and masterplan.

Keywords: ICT, Policy, Master Plan, ICT for Education; Cambodian University.

Introduction

At the present, Information and Communication Technology (ICT) is playing key roles in different areas, especially in education. Where all universities in the world are using ICT to support academic, research, and other universities service. The universities need to establish ICT systems (hardware and software) properly accordingly to their own context or environment. In this case, the need to develop plan and policy to install and use the ICT service, more efficiency and effectively. The needs to consider many different points during creating the policy and master plan. In this paper, we will propose activities plan, criteria, and stakeholders to be considered for the development of policy, we are going to make a ICT Policy and Master for the Royal University of Phnom Penh, as case study.

The full integration of ICT in any organization must first and foremost be driven by organizational priorities, focusing on those elements that are closest to the mission and vision of the organization. A lot of other considerations however also come in. These include:

i. Pre-requisites (and co-requisites): the data communication infrastructure or a minimum component thereof, for example, must be implemented before Intranet services or information systems can be rolled out. Some elements of the Academic and Human Resource management information systems must be in place, along with the infrastructure to support utilization, before electronic identity cards are issued;

ii. Human resource: For each service or system to be implemented, there must be competent human resource to handle management, control, and maintenance. Users must also be trained as a concurrent requirement (just in time training approach);

iii. Implementation Funding: The funding flow must be sufficient to enable the planned speed of implementation;

iv. Decision processes: The speed of decision making can have severe impact on implementation timelines if it is slow. This carries the additional risks of buying items at prices well above market value; and getting equipment that is no longer an industry standard. Both are the result of the rapid evolution of ICT;

v. Maintenance and Replacement Funding: Before any service or system is implemented, there should be steps taken to ensure that there are sufficient funds to support operations and maintenance, and later replacement. Funds for expansion should also be considered at the same time.

While the implementation Master Plan has taken these considerations into account to the extent possible, all these factors need to be reviewed on an on-going basis. During this foundational phase, the following are expected to be achieved:

i. All staff and continuing students will be fully ICT literate, albeit with varying levels of Internet literacy, and committed to the transformation of RUPP;

ii. There will be a data network covering both campuses and offering “anywhere on campus” broadband access to enable campus, national and global communication;

center to provide and support ICT service) will be fully established and staffed as a functional
iii. There will be significant progress on the core corporate information systems, with a target of having the academic management and library information systems fully operational.

iv. Information Technology Center (ITC –Information Resource Management unit.

v. ICT recurrent costs will be mainstreamed in the university budget or by students' contribution or payment.

Related works

[1] In 2010, Ministry of Education, Youth and Sport (MoEYS) have developed Master Plan for Information and Communication Technology in Education 2009-2013, the Master plan aims at enhancing efforts to achieve the goals of education for all and to make education administration and management more efficient and effective through usage of all forms of ICT and multimedia; it also serves as a master guideline for the implementation of the Policy and Strategies on ICT in Education. But there is not clear on priority of components or service or infrastructures which universities take the first steps.

[2] In 2014, Korean International Cooperation Agency (KOICA) has developed Cambodian ICT Masterplan 2020, the Masterplan has been covered in general with the following parts likes: 1) empowering people; 2) ensuring connectivities; 3) enhancing capabilities; and 5) enriching e-Service. There were also showcase of pilot project in Cambodia. But the documents, is very hard to benchmarking to develop university ICT policy and master plan.

[3, 4, 5, 6, 7] There are also publications on the development of ICT policy and master plan, however some authors did cover on input attributes, defining priority identification, key element of each component, and so on. Some author just focused on the development of policy and masterplan.

Since, during development of university ICT policy and master plan, there are necessarily the need to consider many factors, attributes, and defining priority of each component of the university infrastructure & Management Information Systems (MIS). In the next point of this paper, there will be cover the important attributes or factors to be considered and defining priority of each component of university MIS.

Development of Policy and Master Plan of Information & Communication Technology at University

Priorities and Project Identification

To define priorities and project identification, there were conduction Stakeholders' workshop and the results is Table 1 that are listed according to the agreed priority. It should be noted that this is a starting point rather a comprehensive listing of all the information systems that will be implemented over time. The Master Plan, like the Policy, should be continually reviewed to take

into account the evolving environment, corporate priorities, and user-needs. It should also be noted that the prioritization does not mean that the projects are done in sequence: Priority 2, for example, will start just a step behind the start of Priority 1 so that major phases of both are concurrent.

Table 1: Prioritised Projects

Item	Project Description	Agreed Priority Rating
1	Improving and Expanding the Campus data backbone	1
2	Improving and Setting up Local Area Networks in Buildings	1
3	Strengthening of ITC (personnel, capacity, and equipment)	1
4	Strengthening the Network Operations Centre and the Data Centre (along with possible relocation)	1
5	Intranet/ Internet (Includes Email and Access to Intranet and Internet services as well as Automation)	2
6	Academic Management IS	2
7	Library Management IS	2
8	Human Resource Management IS	3
9	Finance Management IS	3
10	Executive Management IS	4
11	Training End-Users	Underlying throughout

The following specific projects emerge from the prioritization:

i. Data Network Project: Improving and Expanding the Campus data backbone and LANs, including Wi-Fi;

ii. ITC Project: Strengthening ITC in terms of having a sufficient range of expert personnel, requisite skills, and equipment/ facilities;

iii. Network Operations Center/Data Center Project: Improving and Expanding the NOC and Data Center, along with possible relocation;

iv. Intranet/Internet and Automation Project: Includes Email and Access to Intranet and Internet services as well as Automation. Automation refers to the provision of sufficient computer resources as detailed in the policy to students and staff to ensure a fully online environment and sufficiency of access.

v. Corporate Management Information Systems Project with five major sub-projects, each of which will be implemented by a different team but with a very high level of collaboration and coordination among the teams:

- a. Academic
- b. Finance
- c. Library
- d. Human Resource
- e. Executive Management

End User Training Project

Key Project Elements in each Project

Data Network Project

This has got several elements as listed below:

i. A technical audit to confirm that the current network design along with any associated routing is consistent with a well-engineered data communication network.

ii. Based on the audit, design and dimension modifications and/or additions to the campus backbone (including building LANs) that are consistent with sufficiency of capacity for projected needs and utilisation over the next 15 – 20 years, including active devices scaled for sufficiency over a 5-year minimum life-time. This would include phasing the implementation according to university priorities and resource envelope. It would also involve acquisition of sufficient public IP addresses to address the foreseeable needs of the university.

iii. Assess bandwidth requirements and agree strategies and a growth path for improved bandwidth, along with delivery of connectivity to the end-user that includes Wi-Fi, Internet kiosks, computer labs, or a scheme for owned laptops/tablets.

ITC Project

The gaps in the range and skills of staff as well as facilities within the ITC have to be assessed as a basis for interventions that will include:

- i. A review of the organisational structure and terms of service;
- ii. Recruitment to fill key gaps initially, and to gradually have a full staff complement by the end of 2020;
- iii. Capacity building based on “just in time” approaches through exposure to best practices in the management, control, and maintenance of university ICT resources based on attachments and

secondments, and longer duration training where justified. It should be noted that for the manager level staff in ITC, this should include executive skills development.

iv. Provision of equipment and tools to enable their day to day work;

v. Provision of a working environment (furniture and facilities) compatible with the need to stay long hours on duty.

NOC /Data Centre Project

Establishment of the NOC and Data Centre requires first for an assessment of the switching requirements, data storage capacity and 24x7 availability requirements, as well as Network Operations Centre (NOC) requirements to provide all-inclusive services that include:

i. Network operations management;

ii. Systems' applications and databases;

iii. General data storage needs for RUPP and its units as well as students and staff;

iv. Intranet as well as Internet access;

v. Security of the network and the systems.

ITC has its main switching center and NOC in space allocated in two large rooms in Building 1. While these are sufficient for now, the location is far from ideal in terms of access and protection from direct heat. The locations also make the provision of physical security very hard. The first consideration is therefore a purpose-designed location in one of the new buildings coming up; or a better location in an existing building.

The NOC will require network and Data Centre monitoring and control stations, along with display screens that enable visual monitoring of the status of all links, switching centres.

As part of this project, RUPP will need to simultaneously develop a Disaster Recovery Centre in a different location that is geographically separate but easily accessible. Consideration can be given to the Institute of Technology of Cambodia as a possible location, working on a reciprocal basis.

Intranet/ Internet and Automation Project

This project is focused on ensuring access to all services (according to access levels) by staff and students and will include

i. Access to the Intranet and the Internet;

ii. Automation: this ensures "Last inch" access, to ensure that each member of staff and each student has sufficient access to a computer to enable their day to day activities through the provision of dedicated computers, or shared computers in computer labs;

iii. Email services

- iv. Access to internal applications and resources (information systems and services that include library services, e-learning, etc.) along with the associated corporate databases
- v. Access to applications (with identified priority software with a sufficient number of user licenses)
- vi. Other services to be identified during the Policy and Master Plan exercise.

Management Information Systems

Implementation of information systems will be guided by policy, systems analysis and re-engineering, and requirements statements led by the technical people in each area (student records, human resource, finance, and library). It should be noted that effective systems re-engineering also leads to organizational changes, and that change management as detailed in the Change Management Policy will be a major element in implementing information systems. A key consideration in procurement will be the need to exchange information by operating from corporate databases that are able to exchange information at the back-end.

The implementation of Information Systems will follow the following three phases.

The first phase:

- a. Creating awareness and getting involvement and ownership of functional staff and other stakeholders;
- b. Systems analysis and business process redesign, including approval by university management of consequential policy and structural changes;
- c. Functional specifications;
- d. Decision on make or buy;
- e. If make, following direct award of contract to an internal team. Award of contract in this context means that even an internal team must be subject to contractual requirements that include conforming to the functional requirements, deliverables, and timelines.
- f. If Buy, Request for Proposals; evaluation of bids; contract negotiations; and award of contract.

The major deliverables of this stage are: the final decision about the specific software package (internally developed or procured from outside); service levels, and contract terms.

The second phase:

- a. Procurement of the hardware facilities;
- b. Development OR procurement of application software and other resources; and
- c. Implementation of the information system.

The main deliverables of this stage is an operational information system along with complete, documentation and trained personnel.

The third phase (transitioning):

a. Even after commissioning, major applications are prone to inconsistencies and glitches that need to be fully identified through live operations under full load. Business continuity demands may require that the associated risks be addressed by running both the old manual system and the computerised system in parallel for some time.

b. While every effort must be made to have data in electronic form before the electronic information systems are brought on line, it is a reality that data migration will take a considerable amount of time (and may run for several years) because of the resource demands it imposes. This means, for example, that a current final year student will go through their graduation based on the manual system while a new first year student will have all their data captured in electronic form and will be administered through the computerised system throughout their stay.

End User Training

The End-User Training Project Team will address the following core activities:

i. Carry out a comprehensive assessment of the training needs of students and staff in order to develop suitable curricula for addressing the needs of both general and specialized users;

ii. Identify and develop the capacity of a sufficient number of trainers from among the current university staff or senior students;

iii. Develop training content mainly based on an online self-led learning approach, but with provision of initial direct training for those who lack basic computer skills (especially first year students and some of the continuing staff);

iv. Work with the Automation sub-project to ensure that all trainees will get sufficient access to computers through general computers;

v. Conduct training to achieve the policy objectives.

Project Management

Each of these projects, and each major sub-project, will be assigned to a Team that has the functional knowledge and technical capacity to plan and implement the project, including tactical and strategic changes in the implementation plan based on a sound framework for monitoring and evaluation. This will make ten (10) Project Teams. For avoidance of doubt, each team will be led by a person trained in the major functions of unit and is also empowered to take key administrative decisions: as an example, the Library Management Information System should be led by the

Librarian. Each team will be composed of individuals with expertise in the area (for example Finance and Accounting) as well as end-users.

Each Team shall be required to prepare for approval a detailed implementation plan and detailed budget, along with a clear identification of assumptions/ risks and how these will be dealt with.

This multiplicity of teams working towards a common end will call for close coordination at different levels:

i. RUPP ICT Committee: It will be required that all Teams report to this Committee at a formal meeting once a month or, in the worst case, once every two months during the project phase.

ii. Consultation with the Architecture Working Group (when in place) for assurance that all plans conform to the agreed information architecture.

iii. Inter-Committee consultations as often as needed to ensure that pre-requisites and co-requisites are always in place in time for successful implementation.

The RUP ICT Committee will appoint an overall Project Coordinator with both the ability and experience to lead and manage this major project. This person should ideally be one of the members of staff of RUPP who will be able give this assignment full time during the project phase. The Project Coordinator should also be positioned to have easy reach to all officers of the university.

Planning Timeline

The indicative planning time line will need to be adjusted periodically based on a realistic internal assessment that takes into account:

i. the sufficiency and range of skills to carry out implantation, especially the applications development for the major information systems;

ii. availability of funding, both for implementation as well as recurrent funding for sustainability;

iii. the speed with which decisions can be taken, especially relating to major changes as these will involve consultations with government.

It is assumed that for each project, the first six months will be used for project planning and design (includes both technical design and project planning as appropriate).

Conclusion and future work

This paper presented attributes or factors to be considered in developing university ICT policy and master plan, as study in the Royal University of Phnom Penh whereas limitation of human resource, equipment or facilities, and ministry or governmental support policy. Such as good case

study and other universities (especially in universities Cambodia) can follow the guideline in finding attributes or factors to consider and also component priority of university MIS, as well as hardware infrastructure.

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