

ICT Implementation Challenges and Strategies for Enterprises in Africa

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Abstract

Integration of information and communication technology (ICT) in all functions and operations of any large enterprise poses a lot of challenges. These include creation of awareness and ownership, elimination of mindset, identification of a proper process, and information resource management. The path Makerere University is following, incorporating a well-defined ICT Policy and Master Plan, is used as a vehicle to highlight the major challenges and to give what we believe is a winning strategy in assuring successful integration of ICT in enterprises.

1. INTRODUCTION

For several years now, the issue of the digital divide, and how to bridge it, have become topical issues in political, development, and technical fora. Resources have indeed been invested in the effort by governments, NGOs, bilateral and multilateral agencies as well as private sector enterprises. It has become evident in our countries that in most cases, the focus has been on technology and financial resources without fully addressing the other issues that will ensure effective and sustainable integration of ICT in enterprises. We have to learn from our past failures and identify best practices that will ensure success.

Makerere University, one of the oldest institutions of learning in sub-Saharan Africa, recently embarked on a major exercise of integrating ICT in all its operations. We say recently because all earlier efforts only led to a disjointed acquisition of technology.

The academic and administrative management of a student population of more than 20,000 as well as academic and administrative staff of more than 3,000 had otherwise become a shambles. The environment was not conducive to instruction within the new learning paradigms. The integration of ICT in all the functions of the institution was identified as a priority strategic objective if Makerere was to achieve its mission and fulfill its vision:

The Vision:

To be a center of academic excellence, providing world -class teaching, research and service relevant to sustainable development needs of society

The Mission:

Makerere University's mission is to provide quality teaching, carry out research and offer professional services to meet the challenging needs of society by utilising world wide and internally generated human resources, information and technology to enhance the University's leading position in Uganda and beyond

The project started during the early part 2000. This paper uses this ongoing exercise as a vehicle to demonstrate what should be a winning strategy in integrating ICT in enterprises in

Africa for both the private and public sectors. The fact that the problems discussed have been encountered in an academic community, a community where one would assume a reasonable level of ICT awareness, underscores their widespread nature. It is more than likely that the same problems will be encountered in other enterprises.

2. INTEGRATING ICT IN ENTERPRISES: THE CHALLENGES

Africa faces multi-faceted challenges in bridging the information divide and achieving the consequent human development. The normal focus of these challenges is often perceived as financial resources to buy computers and software, and to set up and operate international and internal connectivity on a sustainable basis. The challenges, in our experience at Makerere University, go far beyond this. If anything, financial resources are a secondary consideration. We consider the following critical issues that, if not properly handled, become barriers to success.

One, is the lack of real awareness about the benefits of ICT, and the implications if we do not integrate it in our functions. "ICT" and "digital divide" have joined the legion of political phraseology as "in" phrases. They are not really understood.

Two, is mindset, fear, and consequent unwillingness to face the changes from the highest decision making levels to the lowest operational levels. Enterprise resources therefore cannot be committed to joining the information and knowledge society.

Three, is the process: how does one go about it? Integrating ICT in private and public enterprises is a new area in most of our countries. We must develop local expertise to plan and manage the change.

Four, is lack of a clear perception of how ICT resources can be sustainably managed, the operational risks, and likely escalating costs of poor information resource management. Information resource management (IRM) is another area where local expertise needs to be developed if we are to contain costs while ensuring reliability and efficiency

3. CREATION OF AWARENESS AND OWNERSHIP

ICT must always be introduced in the context of an enterprise's strategic objectives. It is just one of various strategic approaches that contribute to the achievement of the enterprise goals. *The starting point* is therefore a clear understanding of the enterprise vision, mission, and strategic objectives.

Step two is the identification, by the users not ICT professionals, of the constraints and problems that an enterprise has in achieving its strategic objectives, and this should encompass ALL constraints and problems. The users really understand their processes and problems better than ICT professionals and only have to be guided in verbalising them.

Having identified constraints and problems, ICT is then introduced as an approach that might solve some of them, making the enterprise more efficient and productive. This *third step* has two stages:

- Putting ICT in context. It is important that users appreciate what ICT is, including its strengths, limitations, and risks. ICT must be put in the context of tools, with clear emphasis of using it only where it will improve performance.
- Looking at organisations that have integrated ICT in functions similar to those of the enterprises. This is learning from best practices, so that we do not re-invent the wheel.

The *fourth step* is a basic definition of functionality by the users. This must be a high level definition that should avoid direct reference to technology. It is a major part of the definition of the desired information architecture.

Finally, the users must develop timelines, and put in place users' project teams that will move the process forward. ICT professionals must be available at all stages to give information and, where really necessary, guidance. ICT professionals *MUST NOT* take over the process.

The approach in Makerere has been to run users workshop where users are also resource people. The sessions have been structured such that all participants give their input. It is our experience that having gone through this process, the majority of users get a better appreciation of ICT and its benefits, costs, limitations and risks. More importantly, the users feel that they own and control the process, as indeed they must if success is to be achieved within the shortest time.

Workshops have been conducted for policy makers including academic and administrative management, for each of the main support functions (Library, Academic Registrar's Department, Finance Department and Human Resource Department), and for the service units. Workshops for the academic side, organised at Faculty level are ongoing.

It is noteworthy that with the creation of ownership, all units, without exception, are now setting aside internal funds to put in place ICT resources.

4. ADDRESSING THE MINDSET

Addressing the mindset is probably the greatest challenge. ICT can and will change the way in which an enterprise functions. Implementation of ICT is not simply an introduction of new technology, but a complete re-thinking of how the enterprise's functions are achieved. Success only comes when people are able and willing to change their working habits and thinking processes.

Planning for the introduction of ICT in enterprises provides an opportunity for a complete re-evaluation of all the processes.

Users must revisit what they do on a day to day basis, identify the inputs to their functions, the processes through which they take the inputs, as well as the outputs. They must be willing to re-evaluate the processes and see how these can be modified to achieve the desired output more efficiently and with fewer resources: *Achieving more with less*. From the macro point of view, some processes, if redundant, should be eliminated. Users must be willing to change, to re-train, to acquire new skills compatible with the new environment.

The biggest worry of users invariably comes up as security of employment. The message must be driven home that the issue is not loss of jobs, but liberating human potential for

higher level functions. Yes, job losses are sometimes inevitable, and, if so, this must be faced squarely. The opportunities of higher production rather than reduced human resource should be thrown onto the scales.

At Makerere, considerable emphasis has been put on the issue of addressing mindset, again in workshop style sessions where people can raise their worries and formulate answers to them. There is complete acceptance that methods of work must change, particularly focusing on benefits to students. There is also increasing acceptance that some jobs will be eliminated. The likely loss of jobs is counterbalanced by the training opportunities that have been created as an integral part of the Makerere ICT Project. Those likely to lose their current jobs realise that they will have even better opportunities through retraining.

The mindset is gradually being overcome. Users are now the ones demanding change.

5. THE PROCESS

Like any other journey, the process of integrating ICT in any enterprise must be well planned if the journey is to be achieved in the shortest time and at the lowest cost.

The plan for the journey must specify:

- The starting point
- The destination
- The route
- The vehicle
- The timeline

5.1 Formulating the ICT Policy and Master Plan

Quantify the starting point

The starting point is where we are, and this must be fully quantified. We must fully define the enterprise in terms of its vision, mission, objectives, functions, resources (physical, financial, human resource, ICT resources and expertise, etc).

Know the destination

The destination is not an ICT issue because it is fully defined by the enterprise vision, mission and strategic objectives. If these are not well articulated, this is the logical starting point. ICT must be introduced as an aide to getting to the destination, otherwise it will have no defining boundaries, and technology would have been introduced for the sake of technology. This should never happen.

Identify the vehicle

The supposition here is that ICT has been identified as the most cost-effective vehicle, at this moment in time, to get the enterprise to its destination. This would have been decided within the higher context of the enterprise strategic plan.

Define the Route

The route and management of the journey are the issues that are captured in detail by the ICT Policy and Master Plan. These need to be defined by users, guided, where necessary, by ICT professionals. There are various critical components to the process of defining the route:

- ***Enterprise wide consultations***

Enterprise wide consultations are the first critical element of the process. Suitably combined with creating awareness and addressing the mindset, such consultations bring users on board. This necessarily means that the policy formulation and master planning process must take longer. It however ensures faster movement and quick adaptation once implementation starts. It ensures user-ownership and comparatively easy allocation of the necessary resources. In a university environment, it is important to remember that students constitute a major component of the users.

- ***Involvement of Policy Makers and Management***

Involvement of policy makers and top management is the second crucial element. ICT policy planning relates to long term planning and decision making on all substantial ICT initiatives of the enterprise. The success of the exercise is dependant on obtaining approval and support from top management, whose commitment will enable an enterprise to establish a cohesive link between its general objectives and the ICT policies. Top management commitment helps to ensure that ICT policy decisions are driven by real ICT needs and the desire to improve the performance of the enterprise. Top management must foster a climate in which innovation through ICT can develop. A long-term vision must originate from and be encouraged by the top management of the institution.

Direct and active participation from senior management (general and departmental) must be a continuing process because of the substantial impact on operational and managerial processes, and the substantial funds needed to develop and sustain the projected systems.

At Makerere University, the Policy and Master Plan formulation process has involved members of the highest policy body, the University Council, academic and administrative management, and students. Because of this participation, the priority of ICT is accepted at all levels, and Makerere will be committing close to shs 2 billion (\$1.2 million) in addition to donor funds per year to ICT implementation and management. About 60% of this will be from government and 40% from Makerere's internally generated funds.

Involvement of members of the University Council and top administration right from the beginning has also led to fast formal approval cycles.

- ***Learn from Best Practices (and failures)***

One advantage of starting late is the opportunity to learn from the successes and failures of other enterprises. We do not want to re-invent the wheel. We just want to fabricate it from materials that are responsive to our environment. Makerere has sent out delegations of users, ICT professionals, and top management to various universities in Africa, Europe, and America so that we can critically assess the performance of different strategies and

implementation paths. Such visits rely on well-structured instruments that guide the delegations in zeroing onto the issues of interest to Makerere.

- ***The process must be continuously iterative***

An ICT Policy and Master Plan is formulated to aid an enterprise in achieving its strategic objectives using ICT as a vehicle. It is formulated based on the existing environment and projections. Since these change with time, there must be in built dynamism in the ICT Policy and Master Plan. Continuous gap analysis will help in identifying the necessary adjustments, and sometimes, radical changes to the ICT Policy and Master Plan. The only constant should be the Vision of the Enterprise.

5.2 Critical Elements of the ICT Policy and Master Plan

The ICT Policy and Master Plan must, as a minimum, fully define the following:

- The anticipated ICT services that are considered of strategic relevance to the enterprise;
- The actions to be taken to implement these services;
- The principles of an enterprise-wide ICT infrastructure; and
- The major characteristics of the ICT management environment to assure sustainable, efficient, user-friendly and secure operations and deployment of all anticipated ICT services.

The major reasons for integral ICT policy planning are:

- *Rapidly changing technology.* As technology changes, planning becomes increasingly important in order to avoid incompatibility and inaccessibility.
- *ICT expertise scarcity.* The scarcity of adequately trained and experienced analysts, software engineers, systems and network managers, coupled with their long training cycles restrains ICT developments and requires that planning priorities be established.
- *Scarcity of other resources.* Limited availability of financial and managerial resources is the other reason for high level ICT planning. ICT is only one of many strategic investment opportunities for any enterprise, and the potential 'returns on investments' in it must be weighed against those of the alternatives.
- *Trends to integrated services, systems and databases.* A significant proportion of the application portfolio involves design/implementation of database centric services and systems that finally will be interrelated and accessed by different parts of the enterprise. A long-term view is critical in order to select appropriate database contents and technologies.

An ICT policy comprises *contents and functionality aspects, process aspects,* and the *resource aspects* of ICT.

Contents and functionality aspects reflect *what* ICT systems should do for the enterprise, which services they provide and/or data they contain. The process aspects describe *how*, *when* and *in which order* particular ICT services should be implemented. They describe the courses of actions to be undertaken in order to design/develop/implement the systems. They also describe how and by whom the development process should be organized, controlled and monitored (project management). The resource aspects realistically specify the various resources, *which are required for actual implementation, deployment and operational management* of ICT services and systems. Resource planning not only specifies *what* is needed but also *how* and *when* financial consequences can be funded.

5.3 Implementation

Any enterprise-wide ICT project is a major project, and it is prudent to break it down into distinctive sub-projects, each managed by a project team under the overall control of an implementation committee.

ICT Policy is the foundation for tactical (or project level) ICT management. While ICT policy determines ICT developments and management over the strategic time horizon (say five years), tactical ICT management concerns the planning and control of resources within the framework of the ICT Policy objectives. It involves breaking down the long-range objectives into shorter range, project level goals; determining the actual resources needed; setting up the specific project plans to reach those goals; ensuring that resources are brought in and used by the project as efficiently as possible.

The easier (not in absolute terms) sub-projects are those that relate to the establishment of the necessary infrastructure and the soft resources to manage it. These are followed by projects for the delivery of web-based services (email, internet and intranet access). Infrastructure and web-based services projects are best handled by ICT professionals within the agreed policy framework.

The harder projects are the information systems projects. There is normally a lot of temptation, once the ICT Policy and the Master Plan has been completed, for ICT professionals to take these over for quick implementation. This is a mistake. Long term sustainability, and dynamic adjustment as circumstances change, require that implementation should be managed by the users, with guidance from ICT professionals where necessary. The implementation phase is in itself a learning process. It gives the users a chance to examine in depth what they do and to define new systems. It strengthens continuing ownership of the process.

In Makerere, for example, project committees were set up for the major information systems. These are:

- The Library Information System
- The Academic Records Information System
- The Financial Information System
- The Human Resource Information System

It has been impressive to observe how fast the project committees consisting of users rather than ICT professionals get to grips with their statements of requirements for the systems

analysts. They have acquired in-depth understanding of their processes, and defined their desired system functionality.

A common mistake must be underlined here: many private sector and government enterprises have gone out and acquired hardware and software for information systems as the first step. This has been catastrophic. One should never buy a vehicle before knowing the tonnage it will carry. User awareness, user identification of the functional requirements, and a critical re-evaluation of processes are a must before calling for software and hardware solutions.

5.4 The Makerere ICT Policy – Summary Statement

The Makerere ICT Policy and Master Plan are embodied in a document available at <http://www.makerere.ac.ug/>. The policy statements are summarised below:

Policy Summary

- 5.4.1 It is the University Policy to assure availability of all anticipated ICT services/systems at any workplace in the university, and, for selected services, to locations outside the University through Common Network Services.
- 5.4.2 It is the University Policy to assure availability of User-level Data Communication Services such as Email, Access -to-Internet, Internet/Intranet Services.
- 5.4.3 It is the University Policy to promote office computing in all offices.
- 5.4.4 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)*.
- 5.4.5 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)*.
- 5.4.6 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)*.
- 5.4.7 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)*.
- 5.4.8 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.
- 5.4.9 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.

5.4.10 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.

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

6 INFORMATION RESOURCE MANAGEMENT

The implementation and maintenance of ICT demands a high level commitment, in terms of financial outlays and human resource deployment, from an enterprise. Furthermore, once implemented, ICT becomes critical to the functioning of an enterprise, so much so that its failure can lead to complete paralysis.

The high cost of ICT systems and services and the very high enterprise cost if they fail or become unreliable necessitate a coordinated method of managing, controlling, and maintaining the resources. This way, the cost to the enterprise can be optimised with respect to the required service levels. The function of managing, controlling and maintaining information resources systems is known as information resource management (IRM).

There are several approaches to IRM, each with its pros and cons. The approach adapted by Makerere in the centralised-decentralised approach. Hardware, software, and data sets are owned by the different user groups – for example the Academic Registrar's Dept, the Finance Dept, etc – but their management is centralised. This approach recognises ICT expertise scarcity. It permits a common pool of experts to be shared by several user groups, reducing the overhead for each group. It also releases the managers of different user groups from worries about the risks inherent in IRM. They are assured of an agreed level of availability, maintenance support, and functionality through service level agreements. They are however expected to pay for this service.

Another advantage of the centralised – decentralised approach is that it permits easy integration of information systems since they are under a single IRM unit that can establish standards and interoperability.

Information resource management must go hand in hand with issues of growth and financial sustainability of its ICT resources. Makerere University considers financial sustainability as a key element for which there is therefore provision at policy level.

Two other organs, especially in university type institutions, are recommended for ICT Policy management outside the professional IRM unit. The first is a policy level organ that should:

- Monitor and control the progress of all activities arising from the implementation of the ICT Policy;
- Monitor and control the progress of the development of the IRM unit;
- Allocate resources according to the agreed master plan;
- Budget for the cost of management, operations, maintenance and expansion;
- For university type institutions, recommend proposals for cost-recovery and cost sharing; and

- Determine /approve ICT Policy adjustments arising from technology trends or new visions and strategies.

The second is a user group consisting of representatives from user units that should provide a forum for the development and continuous review of the enterprise information architecture, ensuring that it conforms to the common vision of the end users. This organ should be the change driver, providing inputs for the policy organ and the IRM unit.

In Makerere, these organs are the Council ICT Committee (Policy organ) and the Architecture Working Group (User forum). The IRM unit is called The Directorate for ICT Support. The head of this unit reports to the Vice Chancellor, who is the chief executive of the university.

7 USER TRAINING

People are the most critical component of any information system or ICT based application. In countries like Uganda, the likelihood is very high that in any enterprise, the overwhelming majority of the potential ICT users lack the skills to work with hard and soft ICT tools. An ICT Policy and Master Plan should therefore include a component for training users.

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.

Organisational arrangements should be put in place to ensure that users are trained on a continuing basis.

One of Makerere's main subprojects is End User Training, whose short- and medium-term goals are aimed at creating, as rapidly as possible, a sizeable proportion of students and staff who 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, spreadsheets, databases) 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.

The medium term objective for academic staff is the learning of web authoring techniques and the use of self-paced interactive learning for students.

8 CONCLUSION

The paper has outlined a process for the successful integration of ICT in large enterprises. The process as presented is what Makerere has followed and continues to follow. We are pre-judging the final outcome based on preliminary results, which is possible, within reasonable confidence limits, for any good plan. We have highlighted the most critical challenges and how, from our experience, they should be addressed. We believe the methodology as outlined will contribute to the successful integration of ICT in large enterprises in Africa.

Acknowledgements

The support of the people of Sweden through Sida/SAREC and the people of Norway through NORAD for the process of developing an ICT Policy and Master Plan for Makerere University is gratefully acknowledge. The continuing support of Sida/SAREC, NORAD, USAID, and the Government of Uganda (including an African Development Bank loan) for the actual implementation of ICT services and information systems is also acknowledged.