A GUIDE TO ESTABLISHING MANAGEMENT INFORMATION SYSTEM IN TERTIARY INSTITUTIONS IN NIGERIA

C.M. Wokocha

Department of Computer Science Federal College of Education (Technical), Omoku, Rivers State. Nigeria

E.I. Adebayo

Department of Computer Science Federal College of Education (Technical), Omoku, Rivers State,Nigeria

Abstract

Information is data that have been put into a meaningful and useful context and communicated to a recipient who uses it to make decisions. Information involves the communication and reception of intelligence or knowledge. It appraises and notifies surprises and stimulates, reduces uncertainty, reveals additional alternatives or helps eliminate irrelevant or poor ones, and influences individuals and stimulates them to action. An element of data may constitute information in a specific context; for example, when you want to contact your friend, his or her telephone number is a piece of information; otherwise, it is just one element of data in the telephone directory. To gain some insight into meeting the information needs of a tertiary institution, some understanding of the environment and the decision-making processes is necessary. This paper will focus on standard in establishing Management information systems in tertiary institution, so that information can be extracted from the operations systems so that, management can provide a stimulus for decision-making or information for decision-making.

Keywords: Management Information System (MIS), Tertiary Institutions, Education Management information System (EMIS)

Introduction

According to Cassidy (2005), Information is a critical resource in the operation and management of tertiary institutions. Timely availability of relevant information is vital for effective performance of managerial functions such as planning, organizing, leading and control. He further discuss that, an information system in tertiary institution is like the nervous system in the human body; it is the link that connects all the tertiary institution components e.g personnel, admission, exams and record, bursary, library, sickbay, student's affaire unit, security and management unit.

A. Babu, Singh and Sachdeva (2000) is of the view that, Information consists of data that have been processed and are meaningful to a user. A system is a set of components that operate together to achieve a common purpose. Thus a management information system collects, transmits, processes, and stores data on an institutions resources, programmes, and accomplishments. Orbach (2004) discuss that, the system makes possible the conversion of these data into management information for use by decision makers within the institution. According to Harsh (2000), A management information system, therefore, produces information that supports the staff, students and management functions of higher institution .

Management information system requirements

Education Management Information System (EMIS) (2006) is of the view that, for the implementation of the (EMIS) project in Nigeria tertiary institutions, a key component is to setup Information Technology (IT) infrastructure in all the higher institution. This paper therefore provide a set of guidelines, which can be followed for preparing the sites for the various server and computer rooms which will be setup in our tertiary institutions. These guidelines provide a generic framework for various aspects of Information Technology (IT) site preparation, specifically for setting up server rooms in a local area network enable environment (Ostheimer (2009)). These aspects include;

1. Site Selection

When site preparation requirements for a computer/server room are prepared, it is important to understand the infrastructure to be installed and the physical environment in which it will operate. The following information must be noted;

1. The computer room should be located away from the exterior walls of the building to avoid the heat gain from windows and exterior wall surfaces.

2. In case, exterior windows are unavoidable, windows that are double- or triple-glazed and shaded should be used to prevent direct sunlight from entering the computer room
3. The computer room should be maintained at a positive pressure relative to surrounding spaces.
4. There should be sufficient floor loading capability for computer equipment
5. A vapor barrier should be installed around the entire computer room envelope to restrain moisture migration. all pipes and cables that penetrate the envelope should be caulked and vapor sealed
6. Uniform room air distribution system should be maintained in the computer room
7. To have uniform air distribution in the computer/server room, adequate ceiling fans should be installed.
8. The computer room should be away from dangerous goods storage, mechanical shock, excessive vibrations and high fire and water risks areas.
9. To eliminate the effect of electromagnetic interference, the computer room should be located away from generator room, lift plant room, or in some cases, the radar or telecommunication control rooms.
10. There should be minimum access by general public and irrelevant personnel to the computer room. (Cisco Hand book (2009))

2. Fitting out Requirements

All materials to be used in the computer room should be non-combustible, self-extinguishing or fire retardant and have the properties of smooth surface finishing and non-dust shedding. Any pipes and ducts not serving the computer room should be removed.

i. **Walls/Partitions –** In the computer room, rigid floor-to-ceiling perimeter walls/partitions having 2-hour fireproof rating should be erected.

ii. **Internal Partitions -** Partitions inside computer room may be built to the headroom height. Consideration for ample air circulation has to be made. Half-glazed

partitions are recommended for partitions inside the computer room. Double-glassed partitions for noise reduction may be considered for printer area.

iii. Wall Finishing - Internal walls are to be finished smoothly with emulsion paint or vinyl wall papers. Finishing of light color can enhance the illumination of the computer room.

iv. Kerb - Concrete kerb of floor void height is required to be built along perimeter walls of the computer room and around the piping of air-conditioning equipment to prevent water penetration to and from the computer room.

v. Thermal Insulator - Thermal insulator is used on the structural floor and ceiling to prevent heat gain to computer room, especially when bottom discharged type air-conditioners are used.

vi. Raised Floor - Ostheimer (2009) recommended raised floor to be used in computer room. It provides the following advantages:

- acts as an air podium for conditioned air distribution
- provides spaces for cable running
- enables simple equipment installation and provides flexibility for equipment expansion.
- protects the interconnecting cables, plugs and power connectors
- eliminates hazardous cabling underfoot
- maintains a cleaner environment

vii. Floor Panel Fitting - Cable cutouts and adjustable air grilles are required on designated floor panels for cable connection of computer equipment and air delivery respectively.

viii. Ramp - To facilitate equipment transportation, a strong ramp with landing areas at both ends is recommended at the server/computer room. The ramp surface should be built with anti-static, non-combustible and non- slippery materials.

ix. False Ceiling - The requirement of finished headroom is different from one vendor to another. In general, the headroom should not be less than 2.4m. False ceiling provides tidiness and aesthetic effect to the computer room. It also serves as a plenum for lighting fixtures. The ceiling plate is preferred to be of easy remove and install type for the access of utilities in the ceiling void. Non-combustible and dust-free plates are required. If false ceiling is infeasible, the structural ceiling should be dustproof, waterproof and heat insulated.

x. Windows and Doors - All windows of the computer room are walled up to avoid direct sunlight and to provide better security and weather protection.

xi. Main Entrance Door - 5-foot wide double-leaf steel door having a 2-hour fireproof rating and secure bolted hinge is recommended. An air lock composed of 2 sets of outward opening and self-closing doors prevents the loss of conditioned air and reduces the influx of dust.

xii. Emergency Exit - The emergency exit requires an outward opening and self-closing steel door. It is also equipped with the same fireproof rating and secure bolted hinge as the main entrance.

xiii. Other Doors in the Computer Room - Double-leaf doors are preferred for ancillary machine room and printer room to ease printout movements.

xiv. Normal Lighting - Evenly distributed lighting is recommended for the computer room. It is necessary to align the distribution of lights with floor and equipment layouts to avoid shadowy areas caused by tall equipment, cabinets or racks. The lighting, sectional controlled by switches, should be able to switch off when they are not required.

xv. Floor Layout Inside Computer Room - A separate room should be provided for comfortable and silent working environment for computer and data entry operators.

xvi. Printer Room - Printers together with a small stationery store area should be in a separate room inside the computer room to reduce dust contamination and noise disturbances to other areas.

xvii. Technical Manpower Room – A room is required for IT personnel to perform on-site repairing work and to store spare parts of the equipment. It equips with work bench and storage cabinets and power points on the bench or any convenient point. If space is available, the engineer room may be located inside computer room.

xviii. Store Room - Store room, preferably on the same floor, provides storage area for computer stationery, consumable, reports and other accessories.

xix. Locker and Changing Room - Computer operators are not allowed to bring their personal belongings into the computer room. In addition, eating and drinking are prohibited in the computer room. It is therefore necessary to provide an accommodation outside the room.

3. Electrical Requirements

- **Power Source -** according to Ostheimer (2000) computer equipment require a "CLEAN" and dedicated power source in conjunction with the use of electrical noise protection device or power conditioner to prevent electrical noise disturbance. For maximum reliability, the independent feeder for the computer equipment must not be shared with other electrical devices. He further recommended the following power requirements;

- **Capacity** - Sufficient capacity is required for computer loads and future expansions of computer equipment. The capacity of an equipment is expressed in terms of KVA or KW, where KVA = Voltage x Current inAmpere 1000 KW = KVA x Power Factor of that equipment Always consult computer vendor(s) for the power factors of computer equipment

- **Voltage Standard** - The nominal voltage for a three-phase and single-phase power supply is 220V respectively. However, some equipment may require different voltage.

Detailed permissible tolerance of the voltage requirement can be referred to the hardware manuals or computer vendors.

- **Phase** - In most computer installations, a three-phase, four wire and five conductor power supply is provided to the computer equipment power panel. Such a supply consists of three phase wires, one neutral wire and one insulated equipment ground conductor.

4. Power Protection Device

Poor quality of power can seriously affect the performance and reliability of the computer system and may cause damage. Before selecting the power protection device, the load characteristics of the equipment, computer service requirements and reliability must be known.

5. Uninterruptible Power Supply (UPS)

It employs a means for charging a bank of batteries as a backup for the city mains during a short-term power interruption or to allow the computer system to be closed down. Its requirements depends on the computer power loads to be supported, the lead times to start up the backup emergency diesel generator or a tidy close down of the computer system. Using a UPS containing an isolation transformer and a harmonic reduction filter would be the best alternative possible because it may resolve all power line noise problems and provides a continuous power supply during power interruption.

6. Emergency Power Supply

A generator is to support the UPS in providing emergency power supply to the computer equipment in a prolonged power outage. The need of generator depends on the service requirements of the computer system. However, the generator should also be able to support other essential facilities and equipment such as the air-conditioning system, security and access control system and lighting.

7. Circuit Breaker

Besides the normal operating current, the circuit breaker of computer equipment handles the in-rush and surge current. Each computer equipment requires a separate

circuit and a circuit breaker. Circuit breaker and its related power point/socket should be properly labeled to identify the branch circuit it is controlling.

8. Air-Conditioning System

Computer equipment is operated in an environment of controlled temperature and relative humidity. The air-conditioning system in the computer room must be able to control the temperature and relative humidity within the specific ranges automatically and independently.

9. Fire Prevention

Site Prapration Guidelines for ICT Area/Room (2000), In order to minimise fire damages to computer equipment, the equipment and furniture used inside the computer room should, as far as possible, be made of non-combustible material or at least having minimal fire propagation or smoke generating properties.

10. Physical Security

Installation of Lock If the main entrance has 2 sets of door; the first set (outer) may be equipped with a cipher lock only. This lock is operated by entering a correct cipher number manually. The second (inner) set can be controlled by a cipher key lock.

11. Surveillance System

Closed Circuit Television System (CCTV) - CCTV is used to monitor the security as well as operating environment of the computer room. The monitor unit is capable of programmable switching for selection of pictures for a multi-camera CCTV system. The requirement of the CCTV system depends on the system security level and mode of operation of the computer system.

Systems design in mis

Williams (1983), The Data Base Management System (DBMS) application system demands designing of systems suitable to the application in project. The major steps involved in the system design of Management Information Systems (MIS) are the following:

i. **Input Design –** Input design is defined as the input requirement specification as per a format required. Input design begins long before the data arrives at the device.

Devices like; Keyboard , Mouse , scanner, biometric scanner, and digital video camera.

ii. **Output Design** – The design of the output is based on the requirement of the user – manager, customer etc. The output formats have to very friendly to the user. Therefore the designer has to ensure the appropriateness of the output format and using proper output device eg. Flat screen monitor, printers.

iii. **Data Storage -** Data storage is a method of operating a computer system having memory for storing and retrieving information concerning a subject, which comprises the Personnel, exams and record, library, bursary and student records. The storage design must suit the strength of the data coming into the memory eg. Primary and secondary memory.

iv. **Data Warehouse for Storage** - A data warehouse is a computer system designed for analyzing the historical data of an institution, such as student results, staff salaries, admission or other information from day-to-day operations. Normally, an institutions summarizes and copies information from its operational systems (such as human resources) to the data warehouse on a regular schedule, such as every night or every weekend; after that, management can perform complex queries and analysis on the information without slowing down the operational systems.

v. **Data Risk Management -** An effective risk management process according to S. Burner, Alice and Feringa (2002) is an important component of a successful information technology (IT) security program. The principal goal of an institution's risk management process should be to protect the *institutions and its ability to perform their mission*, not just its IT assets. Therefore, the risk management process should not be treated primarily as a technical function carried out by the IT experts who operate and manage the IT system, but as an essential management function of the institutions.

Networking system

Network is a system of interconnected computers, telephone, or other communications devices and data. According to Hutchinson and Sawyer (2000) it is the

tying together of so many communications and computer hardware devices in so many ways eg. Printers, clients / server, Close circuit TV camera (CCTV) and Fax machine.

Zheng and Ruan (2003) is of the view that, for automated information technology (IT) system to perform properly in MIS, Storage-area networks (SAN) is recommended for such project because SAN is a dedicated, high-performance network used to move data between server and storage resources. It also avoids any traffic conflict between clients and server. This network could be internal and external internet-like networks called intranet and extranet with a security program (firewall). Firewall blocks unauthorized traffic from entering the intranet and can also prevent unauthorized employees from accessing the files (Cisco Hand book (2009))

Conclusion

Historically, as familiarity with data processing increased, interest shifted to routine decision processes and gradually efforts where directed to the development of computerized Data Base Management Information System (DBMS) in all tertiary institution in Nigeria for decision processes, so that decision making, policy-analysis, formulating, planning, monitoring and management at all levels can be a reality. In this paper, a set of guidelines, which can be followed for preparing the sites for a generic framework for various aspects of site preparation, specifically for setting up data centre in a local area network in an enabled environment?

Recommendations:

Basically, Data Base Management Information System has come to form the major tools in Nigerian Educational sectors for management decision, so that sound decision can be reached in our tertiary institution. These recommendations are spotted out in establishing management Information system in Nigerian tertiary institutions.

1. **Development** – When the design and its methodology is approved, the system is developed using appropriate academic models. The development has to be in accordance to a given standard and the norms have to be strictly adhered to.

2. **Testing –** Exhaustive and thorough testing must be conducted to ascertain whether the system produces the right results. Testing data must be carefully prepared, results reviewed and corrections made in both hardware and application software. In some

instances, parts of the system may have to be redesigned. Testing an information system can be broken down into three types of activities; unit testing, system testing and acceptance testing.

3. Production

After the new system is installed and conversion is complete, the system is said to be in production. During this stage the system will be reviewed by both users and technical specialists to determine how well it has met its original objectives and to decide whether any revisions or modifications are necessary. In some instances, a formal post implementation audit document will be prepared. After the system has been finetuned, it will need to be maintained while it is in production to correct errors, meet requirements or improve processing efficiency.

4. **Maintenance**

Once a system is fully implemented and is being used in academic operations, the maintenance function begins. Maintenance is necessary for other failures and problems that arise during the operation of a system. End users and information systems personnel then perform a troubleshooting function to determine the causes of and solutions to such problems.

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