Enhancing Quality of University Record's Management using Multi-Tier Integrated Management system

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Enhancing Quality of University Record's Management using Multi-Tier Integrated Management system.

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Abstract

Over the past decades many theories and practical views have been developed to see the improvement of quality assurance management in the different organizations. With focus on academia, a number of tools have been developed which include lecturer evaluation forms, staff appraisal forms and key performance indicators which all seek the improvement and establishment of quality within the institutions processes. However, in the current digital era, tertiary institutions have deployed a number of Electronic Management Information Systems (MIS) to help in the management of information. The only challenge is that most of the MIS are autonomous and store data/information separately. Therefore, this paper describes how academic institutions can integrate the autonomous management information systems hence easy management of all the university records in a single location. This greatly improves quality of record management as well as involving the different stake holders in the process.

1.0 Introduction

Records management started way back as early as paper records were being used and kept. However, before 1950s, most of the governments and Organizations/Institutions were operating without guidelines on how to manage both public and private records hence poor standards of records management. Starting from 1950s, many record management acts were put in place including but not limited to the Data protection act of 1998. All the acts and amendments were aimed at improving the quality and addressing the prevailing challenges in record management in different government and non-government Institutions [8].

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Traditional records management programs have been organized around File cabinets, physical record keeping systems and processes. But academic institutions must transition from the traditional paper-based model to a new model built around the management of electronic records to optimize the value of information by ensuring that it is easily accessible, complete, true, accurate, and fully usable by all stakeholder. Institutions are moving towards network approaches, coupled with the managerial agenda of corporate management, redefined the roles of various internal and external stakeholders in the management of records in higher education institutions [1].

Management Information System (MIS) is a systematic approach for organizing, planning and tracking documents in an institution [2]. These support the creation, use, and maintenance of electronic documents and information for the purpose of improving organization's work flow, quality, cash flow, fast task completion, cost reduction and information security. MIS are mostly implemented on a client- server architecture. This empower them to serve many clients simultaneously. In ISO 9000 standards [3], there has been an emphasis on documentation and records management. Many organizations started to consider these areas to be a focal point in the certification process. Additionally, [7], further demonstrated that companies which plan to implement a quality records management system that can be certified must also introduce systematic information and records management as part of the quality management system.

There has been an increase in the design and development of management information systems in developed countries, the development of effective and scalable systems has been difficult to achieve in developing countries. The review of record management systems designed for developed countries reveal a number of open challenges which include user context[3] and technology deviations. With focus on user context, this paper will discuss an approach which can be adopted to overcome this challenge. This paper demonstrates how the deployment of an integrated N-tier system can facilitate multiple users with different roles and use cases thus involving all users (Stakeholders) at all management levels as well as storing and managing records for easy retrieval/access at all time.

[3] User Context: The systems are designed for only expert/advanced users. Hence other users can't use the system.

1.1 Record management quality factors and Quality Assurance

1.1.1 Records management Quality Factors

A modern definition of quality derives from Juran's "fitness for intended use." This definition basically says that quality is "meeting or exceeding customer expectations". With reference to software development, the quality of records management can be assessed by a number of variables. These variables can be subdivided into seven main elements of effective records management including; Policies & Procedures, Records Storage & Conversion, Disposition, Disaster Prevention & Recovery, Records inventory &classification, Retention Scheduling, Vital Records [4]

1.1.2 Records management quality Assurance (RMQA)

RMQA is a systematic, planned set of actions necessary to provide adequate confidence that the record management process or the maintenance process of records conforms to established institutional requirements and managerial requirements of keeping the schedule and operating within the budgetary confines. The main intent of quality assurance is to minimize the cost of guaranteeing quality by a variety of activities performed throughout the development, manufacturing and management processes. Quality assurance (QA) in records management ensures that the program is supported by authorized policies, procedures and practices to ensure that official records will be capable of supporting and defending the actions of the institution, and for ongoing management of those records until they are no longer required. It regularly reviews performance through internal audits and feedback, to determine what is working well, and where improvements can be made. QA ensures records policy and procedure is understood and followed by all stake holders, at all levels of the institution, that there are documented procedures for undertaking internal audits, and also for dealing with problems and complaints.

1.3 Methodology

This study followed system development life cycle and user centered design concurrently in order to provide a record's management solution that would suit the institution and engage all stakeholders.

1.3.1 User centered design

In software engineering, most of the time systems are designed with a focus on business goals, fancy features, and the technological capabilities of hardware or software tools. All of these approaches to system design omit the most important part of the process, the end user[i].

User Centered Design (UCD) is the process of designing a tool, from the perspective of how it will be understood and used by the end user. Rather than requiring users to adapt their attitudes and behaviors in order to learn and use a system/tool [6].

User Context

Data was collected from different stakeholders who included the Dean of Students, officials in the Accounts Department, the Head of catering, the custodian, wardens for the males and female students, the guild officials (speaker, secretary, and information minister). Other departments consulted included the sports department, academics department and Counseling department. Due to limited resources, the researcher used a sample size and auto generated data using bootstrap resampling to represent the whole population in question in order to understand the user context.

Paper Prototyping

The study involved the end users at the initial stages to see if they could give their views about how they would want the interface of the system to look like for acceptability and usability. It was essential to incorporate direct feedback from end users into the design. It required zero coding effort and designs can go through a number of iterations in a short amount of time.

1.4 Findings

The system development life cycle and UCD resulted into a multi-tier integrated system. Multi-tier is a client–server architecture in which presentation, application processing, and data management functions are physically separated. This system was developed as a multi-tier reason being it's to serve many users hence handling millions of requests in a second. These requests cannot be serviced by only one server hence developing the application on multi layers/tiers such that one system can run on multiple servers concurrently hence enhancing scalability and efficiency.

Integrated system come from system integration which is defined in engineering as the process of bringing together the component sub-systems into one system that is able to deliver the overarching functionality. This was reached on because the system facilitated multiple

departments and stakeholders at all levels. Stakeholders included, students, Teaching staff, management administrators (Human resource, dean of students, Quality assurance, finance), suppliers, Stores, accommodation custodian, wardens and catering staff. Each of the stakeholders holds a module or sub-system of which if all the sub- systems in the University were developed under one integrated system, all institutional records within all departments of the university will be catered for centrally in that way avoiding data duplication, delays by some officials who absent themselves and easy access of information by the top administrators to help them make guided decisions

System Modules Integration

In software, a module is a part of a program. Programs are composed of one or more independently developed modules that are not combined until the program is linked. The developed current system has up to eight modules but this paper will discuss some of the most important and how they enhance quality of records management.

Finance Module: The finance module is one of the biggest and most important Module in the system. This is because it caters for almost every department in the institution. This module receives information from all other stakeholders and it processes the information for administrative module/senate. This module is linked to the bank (External Entity) which regularly updates the it with all transactions on the institution's account. Student is only registered after payment of at least half of the fees therefore one can only access the student module if is registered. The finance module can keep track and follow up students and parents who have not completed the fees with short messages and emails as reminders to complete the fees in a predefined time scope.

All finance records are stored and retrieved by only authorized individuals however other stakeholders can submit requests which are only approved by the finance personnel and responses are given back as feedback. Financial information similar to student's records are stored for relatively long time in the system. This module demonstrates an answer to records storage and conversion because it implements security constraints.

Student module:

With this Module, students are saved from the burden of making long lines to present bank slips as a proof of payment since the Banks connect with the University system and updates the financial module with all details of who has paid what amount and for what reason. The system then prepares and produces a registration card for each student, after which the student will pick the card from

the faculty in order to avoid congestion at the accounts department. The university will also reduce on the forgery of registration cards and meal cards since they are generated automatically with unique quick response (QR) codes. In addition, this module allows students to view their marks/results (both course work and final results) after being approved by the senate. This fulfills element Vital records. Since students are the main stake holders their data should be handled and managed carefully.

Administrative Module (Senate): This module is only accessed by the top management and it helps in decision making. It retrieves information from all other modules and then provides a summary of all the institution records. Summaries include Student performance, financial statements, staff performance, how the university has been admitting students and number of employees. After the senate has approved and made decision for the institution the information for that particular academic/financial year is achieve and backed up. This capability of the system also answer element disposition, since the system is programmed to backup information if it's not used in that current year. No information is lost since the institution might need to refer to some previous data, hence the system can retrieve all the past information stored in the system. This also answers questions in element Disaster Prevention & Recovery

The system was tested and validated. Unit testing was applied to test the system were each module was tested individually before integration. Automated tools like NetBeans were used and It was proved that the system was running with no bugs.

The validation was done through involving all stakeholders to confirm if the system was capturing providing the required information. From the analysis of stakeholder feedback, it showed that the system was 98.4 percent carrying out what was expected by the different stakeholders.

1.5 Conclusion

Quality assurance is one of the most important aspects in the development of higher education standards. But improving quality is not only about the lecture notes and teaching materials delivered to students but also involves management of institution records which are very vital in the smooth running of the institution. Therefore, implementation of an integrated Multi-Tier Electronic System which facilitates all stakeholders to contribute in the management of records by providing firsthand information hence enhancing the quality of records management in addition to the standards of higher education.

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[i]End User (Stakeholder) is the individual who uses the product after it has been fully developed and marketed