International Journal of Advance Research in Science and Engineering
Volume No.06, Special Issue No.(01), Nov 2017
www.ijarse.com
IJARSE
ISSN: 2319-8354

Building a Framework for Developing MIS and E-learning Integration in Educational System

Abubakar Mohammed[1], Dr. Sanjeev Kumar[2], Dr. S.K. Das[3], Dr. S.P. Singh[4]

[1]*Assistant Lecturer, Department of Information Technology, Modibbo Adama University of Technology Yola, Nigeria, presently a Research Scholar in NIMS University Jaipur,(India)*

[2]*Associate Professor, Head of Department, Information Technology, NIMS University Jaipur, (Rajasthan) (India)*

[3]*Professor of Education, Dean Academics Affairs and Director Research, NIMS University Jaipur, (Rajasthan) (India)*

[4]*Head of Department, Computer Science Engineering, NIMS University Jaipur, (Rajasthan) (India)*

ABSTRACT

Software development methodology (SDM) is an integral part that cannot be separated from software development. Strict adherence, to SDM lead to successful implementation of software/system design. However, most software developers do not adhere to software development methodologies when building software applications. Educational institutions nowadays rely on software in most of their activities. Again, there is no clear SDM related to educational system. Therefore, this research tends to provide a framework (SDM) that will be adopted by software developers when building or implementing software solution to educational system such as information system or e-learning applications. The research will consist both survey and modeling approach. The survey will provide means of data collection from stakeholders while the modeling will make use of unified modeling language (UML) techniques. The research proposes two (2) frameworks (models) as presented in Fig. 1 and Fig. 2. The frameworks give the layout about general SDM and then drive the suitable and implementable SDM for educational system. The paper finally recommends that educational institutes should always engage services of expert on software engineering to look into software solution needed for their institutes. It also recommends that software developers should adhere to SDM whenever they are building/developing or implementing software solution.

***Keywords**: Framework, MIS, E-learning, Educational System, SDM*

I. INTRODUCTION

Software development methodology is the process of managing software development project or activities. It is also known as a framework or model that could be used by software developers to control the process of developing software or information system.

Information is a necessary resource produced by information systems and is a key to the management and decision-making in any organization. Information system can provide the most cost-effective resources to the organization if it is properly developed, managed, and used [4]. Information system is defined as set of people, procedures, and resources that collects, transforms, and disseminates information in an organization [5]. Information system also refers to a system that can include several integrated information technologies as well as organizational use and maintenance practices that collectively comprise a socio-technical phenomenon [6]. Most software used in educational system are usually information driven software that lies primarily on information system.

E-learning can be viewed as learning through electronic means. It involves acquisition of knowledge and skills using electronic technologies such as computer and internet [16]. E-learning enables you to learn anywhere and anytime irrespective of geographical locations. E-learning gives an opportunity to access and share learning materials in various formats such as word documents, PDF, PPT slideshows, audio and videos for demonstration, chat and messaging forums for interactions with instructors or other learners.

Therefore, an information system in the context of this research includes the technology, the people, processes and information. To develop a framework for EMIS as well as e-learning integration, there is need to know the basics about software development methodology and information system development.

Software development are usually done through software development methodologies. Although some developers do not strictly adhere or follow the process of software development methodologies, thus the development approach might work for small applications or projects but when the system grows, it may have difficulties in terms of new functionalities.

Software development methodologies that exists over the years include waterfall model, incremental, prototyping, spiral, and agile development. Waterfall is the first published software development process or model that was derived from more general system engineering process [1]. The model has a principle of plan-driven process that require planning and scheduling of all the process or activities before starting work on them. The model has five (5) sequential phases of requirements definition, system and software design, integration and system testing, operation and maintenance. The model requires that one phase has to be finished and approved before commencing the next phase. Incremental development model is based on the idea of developing and implementing an initial version of the software thereby exposing it to users' comment which in-turn will evolve to several versions until an adequate and satisfied system has been developed. Incremental method reflects the way problems are been solved. Each increment or version of the system incorporates some of the functionality that is needed by the customer. The model consists of specification, development, and validation activities which are enclosed together rather than separated, it also has a rapid feedback across the activities. The model has benefits of cost reduction in terms of accommodating changes to customer's requirements, deployment and delivery of the system is possible and rapidly done.

Prototyping methodology is an iterative form of experimentation with the purpose of obtaining information for the development process. It enables software developers to fully understand how easy or difficult it will be for

implementing some of the features of the system. This methodology can also give users a chance to comment on the usability and usefulness of the system.

Spiral model is an evolving model which combines the iterative nature of prototyping with characteristics of the waterfall methodology. The model is sometimes called risk-driven software model or process. This is based on the assumptions that changes occur as a result of project risks and includes explicit risk management activities to reduce these risks. Each loop in the spiral is split into sectors as objective setting, risk assessment and reduction, development and validation, and planning.

Agile development methodology is a plan-driven software process or model that support incremental development and delivery. The method is meant to adopt requirements changes, minimize cost of development and still produce reasonable quality software. Agile method is divided into scrum, dynamic systems development model (DSDM), rapid application development (RAD), extreme programming (XP), feature-driven development (FDD) and internet-speed development models.

On the other hand, Information System Development (ISD) is more than just a rational representation of reality. It makes provision for representing reality beyond the measurable, the visible and the world of reason. According to the functional approach (also called the traditional approach), ISD is a planned and rational activity carried out in a systematic, organized and precise manner [4][7][8][9]. The development is usually described according to phases in the development life cycle and has a strong technology focus. Though some scholars [10] have concur such an approach and assert that the traditional conception deals with an information system (IS) as if it existed in isolation from its human and organizational components and effects. It also placed excessive emphasis on the technological and accounting/financial aspects at the expense of the organizational and social aspects. Several scholars [11][12][13][14] have tried to explored alternative approaches in an attempt to accommodate social and cultural factors besides the technological in information systems development.

Other scholars [8] have viewed information system from linear design approach and refer to information system development life cycle (ISDLC) as structured methods that emerged during the 1980's and initially used in a linear model of the development process. Clear phases are identified with clear inputs and outputs from each phase. The idea was strongly advocated in information system development but scholars have agreed that ISDLC is usually treated as a rigid sequence of activities; as such they propose a flexible approach that is now the cornerstone in the management information systems (MIS) literature and a hallmark of every development effort. This implies that no MIS activity should be carried out without imposing strict ISDLC procedures, practices and methods on system developers [15].

However, the aforementioned software development methodologies were generally on software projects development irrespective of software specification or specialty. There's no clear methodology or specification as regards to developing software in educational systems. But some scholars have attempted to develop methodologies that will work in-line with educational system. Dubinsky and Hazzan [2] conducted research on model for teaching software development methodologies. The model is purely on how to teach students

software development methodologies and their usage. Granger and Malaga [3] also conducted research on applying a framework for software development methods into an information system curriculum. British and Colombia ministry of educations have developed a document titled "system development life cycle (SDLC) methodologies – BPP system of direction". The document stressed on the general software development methodologies without clear specification to educational system. The document is making emphasis about business process planning (BPP) as well as spelt out directions and positions of the ministry's projects.

Considering that previous researches do not provide a clear frameworks or software development methodologies adopted for developing the EMIS as well as the e-learning system, this research will therefore aim at provide a framework or software development methodology that will allow software developers to adopt for the development and implementation of information systems in education systems. This can be achieved with the following objectives:

i. To examine the current and general software development methodologies adopted for MIS and e-learning in higher education system in Nigeria and global level.

ii. To identify suitable software development methodology for MIS and e-learning in higher education system.

iii. To design the framework on integration of MIS and e-learning for higher education system.

II. METHODOLOGY

The research will combine both survey and modelling approach. The survey will create means of collecting data from the stake holders or respondents in educational systems. The data will be analyzed and use for building the software development methodology.

The design of the model will be presented using UML modelling techniques. It will depict the whole systems and gives clear indications towards developing and implementing information system in educational systems.

III.PROPOSITION AND IMPLEMENTATION OF THE FRAMEWORK

This section presents the proposed framework that can be used and implemented by software developers towards building systems related to educational system. The figures below depict the framework:

International Journal of Advance Research in Science and Engineering
Volume No.06, Special Issue No.(01), Nov 2017
www.ijarse.com
IJARSE
ISSN: 2319-8354

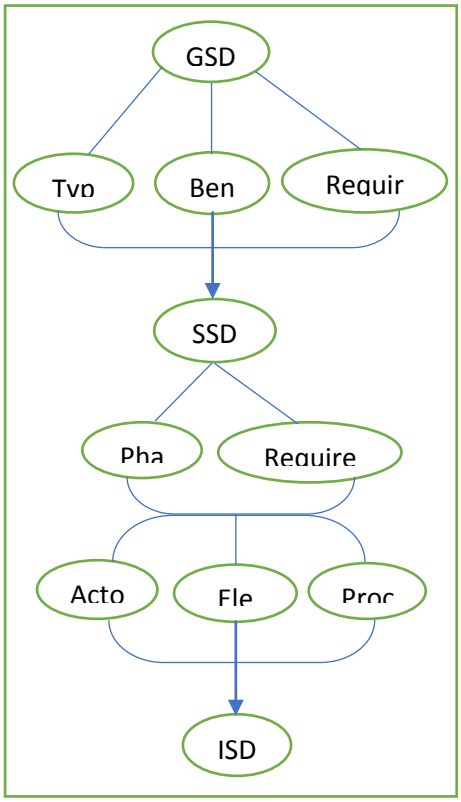
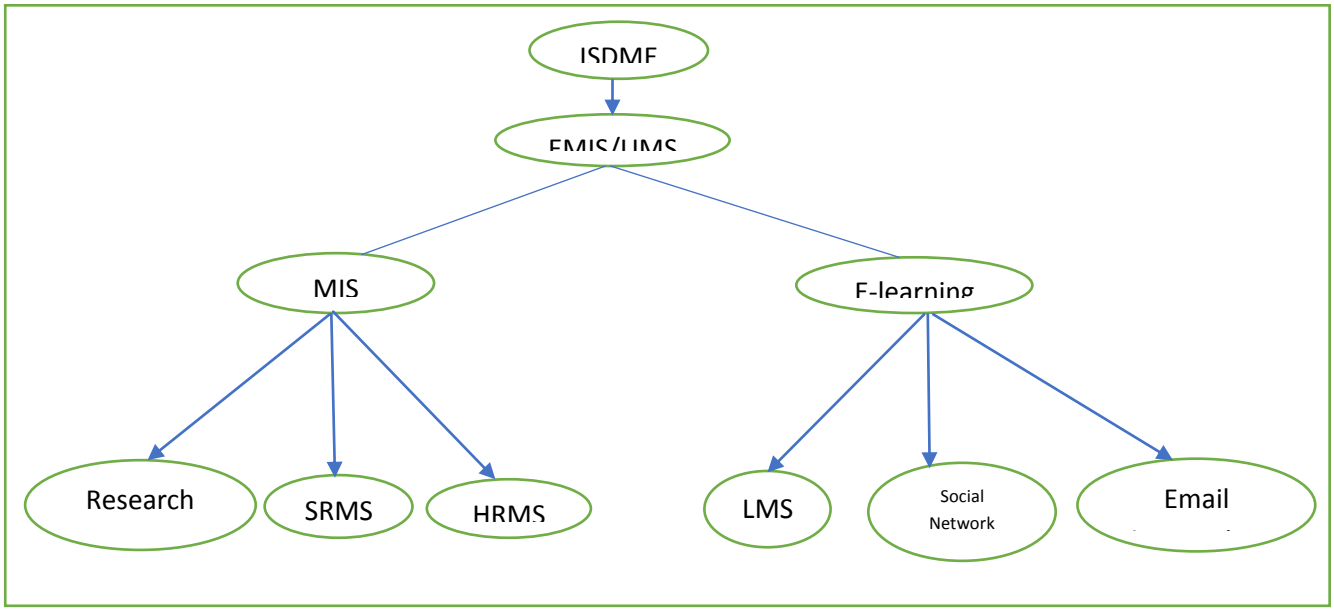


Figure 1: Proposed Framework to drive Suitable SDM for Education

The above figure describes how the propose framework will explore the general software development methodologies (GSDM) by looking at the various types of these methodologies, benefits derive from each and requirements attach to them. The research will then deduce and come up with a suitable software development methodology (SSDME) that will be adopted for educational systems.

The methodology will state the phases involves within the SSDME and requirements attach to each phase. It will also spelt-out actors involves at each phase, elements and processes required in the phase in order to accomplish the tasks involved. Finally, the framework will be adopted as implementable software development methodology for education (ISDME). The software developers will use the ISDME to implement or develop any system (software) related to educational system



When implementing ISDME in educational system, it will take the form of educational management information system (EMIS) or university management system (UMS). This has to do with either management information system (MIS) of e-learning platforms within the educational institutes. The MIS will consist of students record management system (SRMS), human resource management system (HRMS), and research related matters. The e-learning part will consist of learning management system (LMS), social network, and email interactions.

IV. CONCLUSION AND RECOMMENDATIONS

Educational institutes nowadays rely so much on software especially information systems for managing students and personnel records. In their quest to have such software, they tend to engage software developers to provide such services/applications to their institutes.

However, existing software development methodologies (SDM) does not provide specific methods for building system or software related to educational systems. This research will provide a framework (SDM) to be implemented in educational system.

The research also provides the following recommendations:

i. There is need to have SDM specifically for educational system.

ii. Educational institutes should engage the services of expert on software engineering to look into software solutions needed by the institute.

iii. Software developers should adhere to SDM whenever they are building/developing or implementing software solution.

REFERENCES

[1] I. Sommerville (2012) Software Engineering, PEARSON Publishers. Ninth Edition. In Royce, W.W. (1970) Managing the Development of Large Software Systems: Concepts and Techniques. IEEE WESTCON, Los Angeles CA: 1-9.

[2] Y. Dubinsky and O. Hazzan (2005) A Framework for Teaching Software Development Methods. Computer Science Education, vol.15 No. 4, pp275-296.

[3] M.J. Granger and R.A. Malaga (1994) Applying a Framework for Software Development Methods in an Information Systems Curriculum. Journal of Information Systems Education, pp148-154.

[4] Ahituv, N. and Neumann, S. (1986) *Principles of information systems for management*. Dubuque, Iowa: Wm. C. Brown Publishers.

[5] O'Brien, J.A. (1991) *Introduction to information systems in business management*. Boston, MA: Irwin.

[6] Henriksen, D.L. (2003) *Project web as Practice: On the relevance of radical localism for information systems development research. Ph.D. Dissertation, June 2003*. Roskilde University, Computer Science. Available from http:// www. ruc.dk/ upload/ application/ pdf/ b138e5ea/ DS96.pdf. Retrieved on 13th August, 2013.

[7] Bell, S. and Wood-Harper, T. (2003) *How to set up information systems: A non- specialist's guide to the multiview approach*. London: Earthscan Publications Ltd.

[8] Benynon-Davies, P. and Williams, M. (2003) The diffusion of information systems development methods. *Journal of Strategic Information System.**12***, 29–46.

[9] Fitzgerald, B. (1998) An empirical investigation into the adoption of systems development methodologies. *Information & Management*, ***34(98)***: 317-328.

[10] Serafeimidis, V. and Smithson, S. (2003) Information systems evaluation as an organizational institution – Experience from a case study. *Information Systems Journal,13*: 251-274.

[11] Hirschheim, R. and Klein, H.K. (1989) Four paradigms of information systems development. *Communications of The AC,**32(10)***: 1199-1216.

[12] Iivari, H. and Hirschheim, R. (1996) Analysing information systems development: A comparison and analysis of eight IS development approaches. *Information Systems*, ***21(7)***: 551-575.

[13] Avgerou, C. (2001) *The significance of context in information systems and organizational change. Information Systems Journal, 11 (1).* pp. 43-63. ISSN 1350-1917

[14] Checkland, P. (1999) *Soft systems methodology: A 30-year retrospective*. England: John Wiley & Sons Ltd.

[15] Ahituv, N. and Neumann, S. (1984) A flexible approach to information systems development. *MIS Quarterly*, **12(3)**, 69-78.

[16] Kahiigi, E.K., Ekenberg, L., Hansson, H., Tusubira, F.F. and Danielson, M. (2008) Exploring the e-Learning State of Art. Retrieved from www.ejel.org/issue/download.html?id**Art**icle=67