

The Development of Organizational Memory Information System in Academic Setting

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ABSTRACT

This study is concerned with proposing a suitable organizational memory framework for Faculty Memory Information System and the development of Faculty Memory Information System (FMIS) prototype for the Faculty of Computer Science & Information Technology, UM. The framework portrays interaction between components that support the institution memory and the information system components that support the effort to captures and preserves the institutional knowledge. Finally, based on the proposed framework, computational support is proposed to be web-based prototype to enable usage in intranet and Internet environment. A web-based environment would facilitate faculty members to utilize the prototype without limiting themselves to the physical presence at the faculty.

Keywords

Organizational memory information system, OMIS, Faculty memory information system.

1.0 INTRODUCTION

Management is increasingly aware that knowledge resources are essential to the development of their organizations. Nowadays many business executives understand that they need to keep, manage their organization's knowledge assets and bring the knowledge to share among their employees. The reaction to this issue, it has generated the term "organizational memory" which seems to be on the tips of everyone's tongues these days.

A knowledge organization uses knowledge effectively for its competitive advantage. These Knowledge organizations are the container for knowledge workers, in which they apply their knowledge and that make the knowledge become the key asset for the organization (Conklin, 2001). To avoid organization knowledge asset from being wasted for not being shared within their workers or being "forget", organization need to preserve

these knowledge assets. Organizational memory is viewed base on the concept that the knowledge and experience, which resides within the organization needs to be "preserved" and also "shared" among organizational members. The intention is to allow current and future projects to benefit from the experience of other projects, both current and previous, and allow for organizational competencies to be continually establish (Bannon & Kuutti, 1996).

Organizational Memory is also known as a method of preserving organization's knowledge asset base on the citation by Conklin, (2001) which state that 'Organizational memory extends and amplifies this asset [knowledge asset] by capturing, organizing, disseminating, and reusing the knowledge created by its employees'. Many approaches have been developed which claim to guide organization to use their common or shared memory in more efficient way. One of the approaches is realizing the organizational memory with the help of information system, which is thus resulting the term "organizational memory information system (OMIS)".

An organizational memory information system (OMIS) is define as 'a system that functions to provide a means by which knowledge from the past is brought to bear on present activities, thus resulting in increased levels of effectiveness for the organization' (Stein & Zwass, 1995). The OMIS captures knowledge of the organization in a computational form and make part of this knowledge available either by providing direct access through the system's repository or indirect access via links to external repositories.

This study is mainly focused on the development of Faculty Memory Information System based on the definition of OMIS given above. The outcome of the study will hopefully benefit the users of the system, which are the faculty's members and also provides understanding on how technology and tools that suitable

can be used to support the organization information processing to increase effectiveness in an organization.

2.0 PROBLEM STATEMENTS

One of the critical issues facing by many organizations (government, commercial, educational etc.) in the global networked economy today is how to capture knowledge in their organization. Moreover organization today also facing issues on how to store and retrieve and also reuse the organization past knowledge. Organizations today will not be able to sustain the level of growth and innovation required to maintain successful without addressing this issue. This is the main reason why organization must organize and preserve their knowledge assets.

In higher education, specifically here in the context of Faculty of Computer Science & Information Technology, UM, there are abundance of information and knowledge with regard to the faculty business such as teaching, research, consultation and other academic experiences to be shared among the faculty members. The problems that arise among the faculty's members are mainly in retrieving past document such as exam papers, notes and research finding reports. When it comes to rotation of job, the faculty's members also face difficulty to perform well with existing knowledge that they have as they need to retrieve manually past document of a particular portfolio to find information regarding his or her responsibility before being able to perform the job.

Traditionally these knowledge assets are captured in paper document and stored in files folders and if the faculty member wants to find such document they need to retrieve them manually through abundance of files stored in the meeting room which would cause time consuming and a lot of hassle. The rationale of this study is to solve problem faced by the faculty member in managing organizational knowledge asset at the faculty. This study also focus to overcome the difficulties faced by faculty member in order to find and retrieve past knowledge assets contained in the faculty that include storage files of lecture notes, reports of colloquiums, seminars, faculty meetings and past discussions of important events.

3.0 LITERATURE REVIEW

3.1 Knowledge in organization

Knowledge has become the most important and valuable asset in organization nowadays. Awad and Ghaziri (2004) define knowledge as 'understanding gained through experience or study'. In organizations, knowledge is embedded not only in documents or repositories but also in organizational routines,

processes, practices, and norms (Davenport and Prusak, 2000). By recognizing knowledge as a corporate asset and as the heart of organization, this has lead to the needs of managing, sharing and preserving the organizational knowledge so that it would not lost as the employee reach their retirement age or leave the organization. Thus had lead to the concept of organization memory where the goal is to extend and amplifies this corporate asset by capturing, organizing, disseminating and reusing the knowledge created by its employees (Conklin, 2001).

3.2 Organizational Memory Information systems (OMIS) Concept

The idea of Organizational Memory is that everything reside in an organizations contains some information or knowledge and consequently are comparable with a "memory" (Bannon & Kuutti, 1996). Walsh and Ungson (1991) define Organizational memory as 'stored information from an organization's history that can be brought to bear on present decisions'. Base on the definition given above, organizational memory (OM) is concerned with the ability to reuse an organization's experience or organizational knowledge embedded not only in formal documents, reports and manual but also in organizational routines, processes, practices and norms.

Many approaches have been developed which claim to guide organization to use their common or shared memory in more efficient way. One of the approaches is realizing the organizational memory with the help of information system, which is thus resulting the term "organizational memory information system". Organizational memory information system help in extending and amplifying organizational knowledge assets by capturing, organizing, disseminating and reusing the knowledge created by its employees (Conklin, 2000).

Stein and Zwass (1995) define OMIS as 'a system that functions to provide a means by which knowledge from the past is brought to bear on present activities, thus resulting in increased levels of effectiveness'. Base on Schwartz et al (2000) and the definition given by Stein and Zwass (1995), the organizational memory is concerned with capturing the knowledge of groups in organization while the associate information system makes part of the knowledge available either by providing direct access to repository of documents and experience reports in the organization or indirect access by providing links to external repositories or external sources. Our study will be based on the definition provided by Stein and Zwass (1995) as the foundation for the development of faculty memory information system.

3.3 OMIS Framework

Stein & Zwass (1995) presented a framework for OMIS in their research paper on "Actualizing organizational memory with information systems". The framework consists of two layers and these two layers can be either IT-based or non IT-based as shown as figure 1 below.

Integrative Subsystem	Adaptive Subsystem	Goal Attainment Subsystem	Pattern Maintenance Subsystem
Mnemonic Functions (knowledge acquisition, retention, maintenance, search and retrieval)			

Figure 1: Overview of the Framework for OMIS (Source: Stein & Zwass, 1995)

The first layer of OMIS consists of four subsystems, which are integrative, adaptive, goal attainment and pattern maintenance (Stein & Zwass, 1995). These subsystems derived from the organization effectiveness functions. The description of each effectiveness function quoted from Stein & Zwass (1995) is shown as table 1 below:

Table 1: OMIS effectiveness functions adapted from Jemex et al (1998), Quinn and Rohrbaugh (1983) and Bodart et al (1997).

Effectiveness Function	Description
Integration	The integrative sub-system sharing the knowledge through time and space. This sub-system also responsible in coordination and management of information across the organization.
Adaptation	The adaptive subsystem defining the limit of the organization's environment and the ability of the organization to adapt to changes in its environment.
Goal Attainment	The goal attainment subsystem identifies and evaluates the organizational objectives across time. This sub-system concerned on the ability of the organization to set goals and evaluate the degree of their fulfillment.
Pattern Maintenance	The pattern maintenance subsystem memorizes individual's work history and concerned with the ability of the organization to maintain the cohesion and the morale of the work force.

The second layer of the OMIS framework consists of five mnemonic functions, which are knowledge acquisition, retention, maintenance, search and retrieval

(Stein & Zwass, 1995). The mnemonic functions with description are presented as table 2 below:

Table 2: Layer 2 the Mnemonic functions of OMIS (Adapted from Scott, 1996).

Mnemonic functions	Description
Knowledge acquisition	The input process for an OMIS
Retention	Is influenced by communicability and consensus.
Maintenance	Depends on assimilation of new information with existing information and selective discarding of old information.
Search & retrieval	Non-biased, faster and more extensive searching and retrieval than manual systems.

4.0 THE FMIS FRAMEWORK

This section is directed to the development of framework for Faculty Memory Information System (FMIS) for the Faculty of Computer Science and Information Technology, University of Malaya. In particular, our framework focused on capturing knowledge while providing an integrated structure in which these models interact with activity that they support. The important of this framework is that it provides the mechanism that support knowledge acquisition, dissemination, retrieval and knowledge reuse for a faculty environment. The primary objective of Faculty Memory Information System framework is to facilitate information exchange within faculty members. FMIS also act as extending computer collaborative work (CSCW) to facilitate and enforce the knowledge sharing among workgroups since groups and group tasks are increasingly being viewed as the basic unit of formal faculty structure.

We approach the construction of the Faculty Memory Information System framework, based on design of OMIS identified by Stein and Zwass (1995), as the development of computational tool to support existing organizational processes. Their OMIS framework is based on an organizational effectiveness as one of the principal concerns and expressed on term of integrative, adaptive, goal attainment and pattern maintenance function. While in our framework of Faculty Memory Information System, we focus on the organizational effectiveness functions specifically tailored to the higher education institution. These sub-functions are expressed on term of human relations, open systems, rational goals and internal process.

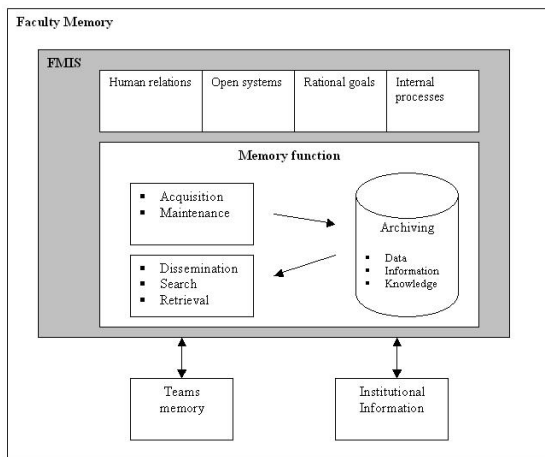


Figure 2: Proposed framework for FMIS

This framework structure Faculty Memory Information System in two parts, which is the Faculty Memory structure and FMIS structure. The Faculty Memory structure is referring to the ability of the faculty to remember and learn from it past. In the most general sense, faculty memory structure is concerned with being able to reuse the organizational knowledge assets. This framework identifies two major components of faculty memory structure that interact with the FMIS structure to support activities leading to faculty effectiveness. These components are team memory and institutional information. Team memory refers to the faculty members that are working together in their respective group, in which are the users of the system while the institutional information refers to type of information reside in the faculty that are available to be capture into the FMIS.

The FMIS structure is composed of two layers based on OMIS framework by Stein and Zwass (1995) and with modification to adapt with higher education needs. The first layer is the memory functions layer while the second layer is the faculty effectiveness functions layer. This framework is viewed from bottom up in which the resultant activity from memory functions layer (bottom layer) must be able to support each component in the faculty effectiveness functions (top layer) in order to increase the organizational effectiveness. The memory functions layer is composed of mnemonic functions and retention facility. While the faculty effectiveness functions layer is composed of human relations, open systems, rational goals and internal process. Components in the bottom layer, which is the memory functions is constructed and supported by a database application and information technology and this layer is responsible in supporting the success of the top layer of the FMIS structure.

In our memory function layer, we have added dissemination process to the mnemonic functions. Thus this framework suggests that the memory functions

layer must involved process of acquisition, creation, maintenance, dissemination, search and retrieval to be able to support key activities of knowledge sharing in a faculty. The retention structure in the memory layer acts as a static repository where all data, information and knowledge are stored, accumulated and preserved so that it can be retrieved later.

5.0 DEVELOPMENT METHODOLOGY

The development process of faculty memory information systems is base on the organizational memory development process by Te'eni and Weinberger (2000).

5.1 Problem identification and goal definition

In this area of study we have identify problem and goal definition base on the management perspective of the faculty. Briefly, in the context of faculty of computer science and information technology, university Malaya (FCSIT, UM) the faculty goal is oriented toward having knowledge in manage manner which involve augmenting, sharing and preserving organizational knowledge.

5.2 Knowledge acquisition

In this phase, we have identified that formal knowledge items such as a report of attended colloquium, or a working paper or a report of meeting minutes can be captured into computational form by either in word document form (*.doc) or portable document format (*.pdf) file, which is accessible, and preserve able in FMIS repositories. These knowledge items are presented as table 3 below.

Table 3: Knowledge items and FMIS role

Faculty's Knowledge	FMIS role
Research	As a repository of: <ul style="list-style-type: none"> • Research interest within institutional • Research result and funding organizations • Commercial opportunities for research results • Pre-populated proposal, budget and protocols • Proposal-routing policies and procedures. • Award notification • Contract and grant management policies and procedures • Technical and financial report templates and policies and procedures. • Overview of internal services, resources, and staff.
Curriculum development	As repository of: <ul style="list-style-type: none"> • Curriculum revision • Content modularized and arranged to facilitate interdisciplinary

	<p>curriculum design and development.</p> <ul style="list-style-type: none"> • Information related to teaching and learning • Information Faculty development opportunities • Information in each disciplinary area, updated materials, recent publications, applicable research • Guides for developing curriculum
Teaching	<p>As repository of:</p> <ul style="list-style-type: none"> • Module revision • Information related to module / subject • Teaching material including notes and assessments and Updated materials • Assessment techniques • Analyzed student evaluations updated each semester • Establishing effective teaching styles
Academic Experience	<p>As repository of:</p> <ul style="list-style-type: none"> • Report of faculty meeting • Report of colloquiums, seminar • Report of paper presentation • Pre-populated proposal, budget and protocol • Proposal-routing policies and procedures
Administrative services	<p>As repository of:</p> <ul style="list-style-type: none"> • Financial documents including reports, procedures and templates of budgeting and accounting. • Documents for human resources including reports, procedures and templates of training, scholarships, academic courses, academic timetable, student intake advertisement and exhibition.

5.3 Knowledge analysis and classification

Knowledge analysis is the organization and mapping of knowledge using formal structures such as classification scheme. In this phase the knowledge that was captured in an accessible form is then be classified into categories. Here in the context of FCSIT, the management team of the faculty is responsible in determining the knowledge classification.

Through this phase, we have conducted fact-finding technique in order to collect information on type and classification of knowledge available in the faculty. Base from the interview outcome, the knowledge that was captured in an accessible form is classified according to which departments they reside in the faculty. In FCSIT we have several departments, which are department of Artificial Intelligent, department of Information Science, department of Computer System & Technology, department of Software Engineering, Management office and Administrative office. These departments are considered as “group memories” in the faculty, and knowledge assets that reside in each group

must be well captured in order to support the faculty effectiveness. Within each academic group, knowledge assets are then categorized into those that related to research, meeting minutes, teaching material and curriculum development. The categorization of knowledge assets is depends on how it is structured and used in their respective groups.

Base on fact findings conducted, it can be seen clearly that there are abundance of information reside within the faculty but not in the manage manner in a way that the management can be assisted to search for a specific information, documents or information from past discussion which are valuable to the faculty. From the lecturer, management and administrative view it can be seen that they are interested to implement a proper organizational memory strategies in the organization, which deal with capturing and preserving organizational knowledge asset to improve the operation of the faculty in term of effectiveness and efficiency.

6.0 THE PROPOSED SYSTEM

The implementation of FMIS is base on several consideration bases on the framework proposed section 4.0 above. The consideration of implementation focuses on the top layer of the FMIS framework, which consists of human relations, open system, rational goal and internal process improvement. The first consideration is on human relations that we have decided that FMIS must provide online discussion functionality, this could encourage faculty members to participate in a particular discussion or knowledge sharing at any time and any place. This could provide openness way of human involvements in which improve the human relations in the faculty. Secondly, provide the FMIS prototype with link to external information sources available on the internet or to related resources at interest such as link to Quality Assurance Management Unit (QAMU) intranet or IRPA research program website. This second consideration is to align with the open system functions of the framework. The Third consideration is on the rational goal achievement, that we have decided that FMIS must provide repository of past document templates in a way that future similar tasks can be readily used the information to achieve current goals. This can be achieved by allowing user to reuse past document templates, for example the FMIS prototype records “meeting templates” of past meeting to help guide future similar meeting.

In implementing FMIS prototype, we also take into account several considerations on technical and non-technical aspect of FMIS. First, we decide that FMIS must be web enable system to allow user access at any time and anywhere. This is also to fulfill the non-functional requirement of portability feature. Secondly, the user must be able to seek and access the organizational knowledge asset captured in computational form. Lastly, the third consideration is on

ensuring the security, maintenance and consistent growth of the captured knowledge without losing their context.

To accomplish the first consideration, a web programming language is use in implementing FMIS. To realize the second issue, a keyword-base search in employed in implementing FMIS. The restrictions of user into group memory where several authorized faculty members are assigned into several groups and are responsible in augmenting knowledge in their group memory are done to realize the third consideration in the implementation of FMIS prototype.

6.1 Logical design of FMIS

The figure below shows the logical design of the Faculty Memory Information System (FMIS).

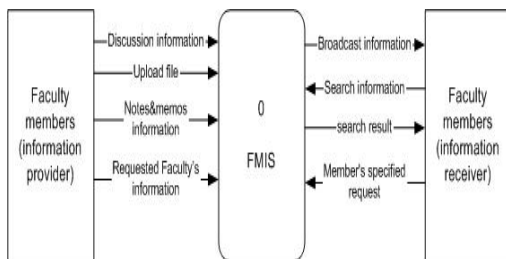


Figure 3: context diagram for faculty memory information system (FMIS)

6.2 Proposed Feature and Construction of the system

Construction turns the system design into a functional system where in this study the system to be construct is the faculty memory information system (FMIS). In order to construct groupware-base application for FMIS prototype we have referred to several open source groupware such as Tiger CRM¹, phprojekt², openxchange³ and sugar CRM⁴. FMIS is proposed to consist of 7 modules to facilitate the capturing, disseminating and sharing of knowledge within group memory. Each module contributes to Organizational Memory functions in supporting users to accumulate and preserve both formal and informal knowledge.

The discussion module play a role to assist capturing and managing informal knowledge such as group research discussion and online meeting discussion. The discussion module is provided to capture informal knowledge base on the reference on Marwick (2001),

which stated that online discussion as one of the knowledge management tools that can capture tacit The discussion module is aim to offer a virtual meeting or discussion for group memory members to capture knowledge asset and exchange ideas that eventually influence the value of such knowledge

File management module contributes to assist the capturing and managing of formal knowledge. The formal knowledge involved are meeting reports, white papers, plans and forms and others academic documents. This formal knowledge will be stored and managed in file management module. In file management module group members is able to share files that relevant and important for the whole group. On the file management page, all directories and files, which are stored in the database, are organized in a tree structure as figure below.

The notes/memos module facilitates users in capturing and sharing formal knowledge that needs to be published to respective group memory members. Summary module of FMIS as well contribute on knowledge dissemination strategy in which this module provide a page that summarize all the latest information coming in for each particular group memory. Figure 4 shows the summary page for FMIS. The InfoBase module which is stand for information base module contribute as a repositories of know how (FAQ) for the FMIS. The last main application scenario of FMIS is the function for knowledge search and retrieval within the system through keyword search mechanism.

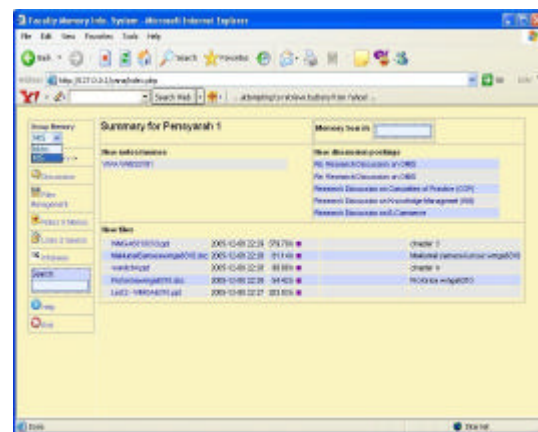


Figure 4: FMIS screenshot

¹ <http://www.vtiger.com/products/crm/demo/> (login: admin and password: admin)

² <http://www.phprojekt.com/demo/index.php> (login: english and password: english)

³ <http://mirror.open-xchange.org>

⁴ <http://www.sugarcrm.com/crm/demo/sugar-suite.html>

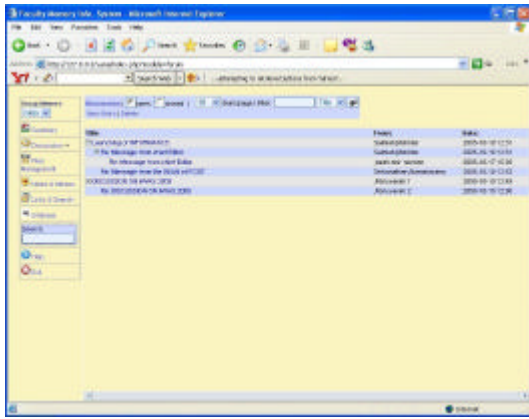


Figure 5: Discussion module for FMIS

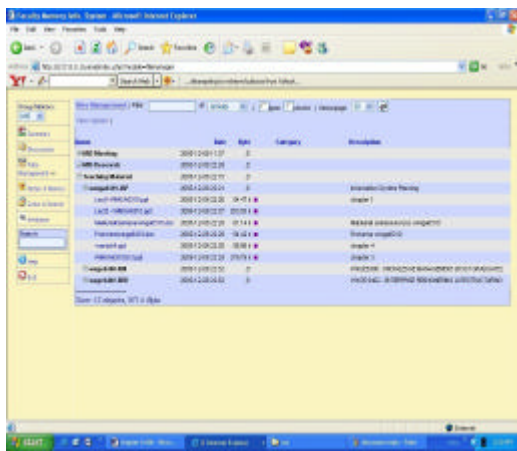


Figure 6: The file management module for FMIS

7.0 CONCLUSION

In today's technology, capturing knowledge, managing knowledge and leveraging on knowledge may give advantage to organizations to improve efficiency and gain competitive advantage. The education industry is not exception either as are these higher learning institutions are competing to gain advantage to be the best in their industry in providing the best education and to be an excellent centre of higher education and research. By that these higher education institution also have implemented strategies to increase effectiveness thus improve their competitiveness in education industry.

The goal of this work is to develop a framework and prototype for faculty memory information system. The framework meant to define the organizational memory information system implementation tailored to the environment of Faculty Computer Science and Information Technology, University Malaya (FCSIT, UM). Through study conducted, it can be clearly noted that the faculty members are looking forward to have organizational memory information system in the faculty. The introduction of FMIS prototype has help to

facilitate the faculty members in capturing, storing and disseminating knowledge in their specific respective field. The development of FMIS has also provides support for academic team activities in capturing, storing, updating and retrieval of knowledge within the faculty so that past knowledge can be brought to bear on present activities. However, the system would not have been success without full participations from the faculty members in augmenting the knowledge resides in the faculty. The success of the system also is all depends on how the faculty members will make use of FMIS in order to improve the level of effectiveness for the faculty.

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