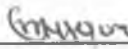# UNIVERSITY OF NAIROBI

SCHOOL OF COMPUTING AND INFORMATICS

KNOWLEDGE MANAGEMENT IN ORGANIZATIONS ; A PROTOTYPE

Submitted in partial fulfillment of the requirements of the Master of Science in Computer Science

DECLARATION

This project, as presented in this report, is my original work and has not been presented for any other University award.

Sign:_____   Date:_____

Emily Gakii Murerwa

P58/70843/2008

This project has been submitted as a partial fulfillment of the requirements for the Master of Science degree in Computer Science of the University of Nairobi with my approval as the University Supervisor.

Sign:_____   Date:_____

Dr. Elisha T. Opiyo Omulo

Project Supervisor

School of Computing and Informatics

University of Nairobi

ABSTRACT

Knowledge is an asset to any organization. Knowledge is described as information provided in context to produce an actionable understanding; it is what makes an organization take action or provides the ability to take action. Knowledge is classified as either tacit or explicit. Explicit knowledge is the documented information; presented in the form of books, documents, white papers, policy manuals, patents, processes and databases among others. Tactic knowledge is found in the minds of employees, experience of customers and memories of past vendors. While tacit knowledge is normally hard to code, explicit knowledge is easier to codify. Research has noted that capturing, storing and utilizing both tacit and explicit knowledge is critical to an organization's success in the fast changing market place. If knowledge is not managed, vast amounts of productivity will be lost recreating the wheel when personnel change or new projects are initiated. A knowledge management system prototype for managing explicit and tacit knowledge is presented in this research project. Supporting information was collected from books, magazine articles, Internet sites and my own experience. The results of this research can provide a guide to planning knowledge management initiatives.

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS

ICT	Information Communication Technology
IT	Information Tecnology
Email	Electronic Mail
AMREF	Africa Medical and Research Foundation
KVS	Kenya Veterinary Services
KMA	Knowledge Management Africa
KMA-K	Knowledge Management Africa – Kenya Chapter
ILRI	International Livestock Research Institute
LAN	Local Area Network
CoMem	Corporate Memory
XML	Extensible Markup Language
HTML	Hyper Text Markup Language
NXD	Native XML Database
KEPSNet	Knowledge Extraction Profiling and Sharing Network
MI Net	Military Intelligence Network
ICON	Intelligence Center Online Network
USAIC	United States Army Intelligence Center
MI	Military Intelligence
AICAT	Army Intelligence Comprehensive Analysis Tool
NCOA SRMS	Noncommissioned Officers Academy Student Registration and Management System
USAID	United States Agency for Internation Development
SECI	Socialization, Externalization, Combination and Internalization model
UNDP	United Nations Development Program
UNV	United Nations Volunteers
ISO	International Standards Organization

ISAM	Indexed Sequential Access Method
MYISAM	MySql Indexed Sequential Access Method
INNODB	Innobase Oy Database
URL	Uniform Resource Locator
AJAX	Asynchronous Javascript And XML
SPSS	Statistical Package for the Social Sciences

CHAPTER 1

INTRODUCTION

Concepts of knowledge and knowledge management are still not very familiar unlike data and information which are well understood. Yet data, information and knowledge are ultimately all vital to an organization. Data is defined as the raw facts and figures;facts, numbers or individual entities that lack context or purpose. By itself, data cannot make sense but must be changed or modified for its importance to be seen. The modification process is also known as processing. The processed data then becomes information. Information is that data which has been organized into a meaningful structure and it is understood and makes sense. Knowledge on the other hand is what enables the user of information to make a decision or to learn something from the information that has been presented. Knowledge is information with a personal context applied. Knowledge not only resides inside the heads of the people but also in documented formats. In many organizations, there exists databases full of data and information but it can only become knowledge when people use it. Collection of information is not a problem to majority organizations; the problem is in the deriving of benefits from the archives. Where knowledge management is not practised, there are piles of paper, documents and databases that no one visits and no one uses. Knowledge will enable take action based on information present. Figures 1 and 2 below pictorially presents the perceived differences between data, information and knowledge.

Figure 1 : Relationship between Data, Information and Knowledge

Data

Diagrams, Numbers, Text

Information

Logical, Meaningful Order

Make
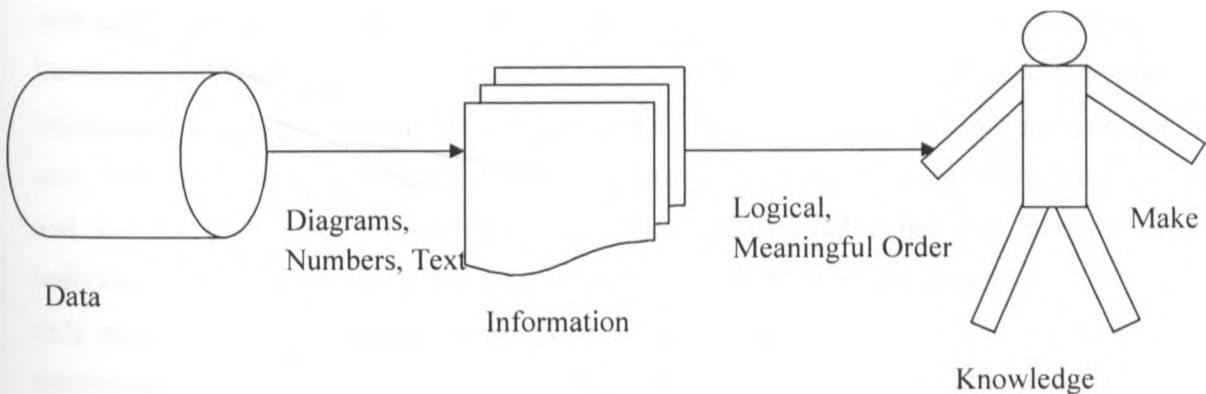
Knowledge

Figure 2 : The Heirachy of Knowledge

context
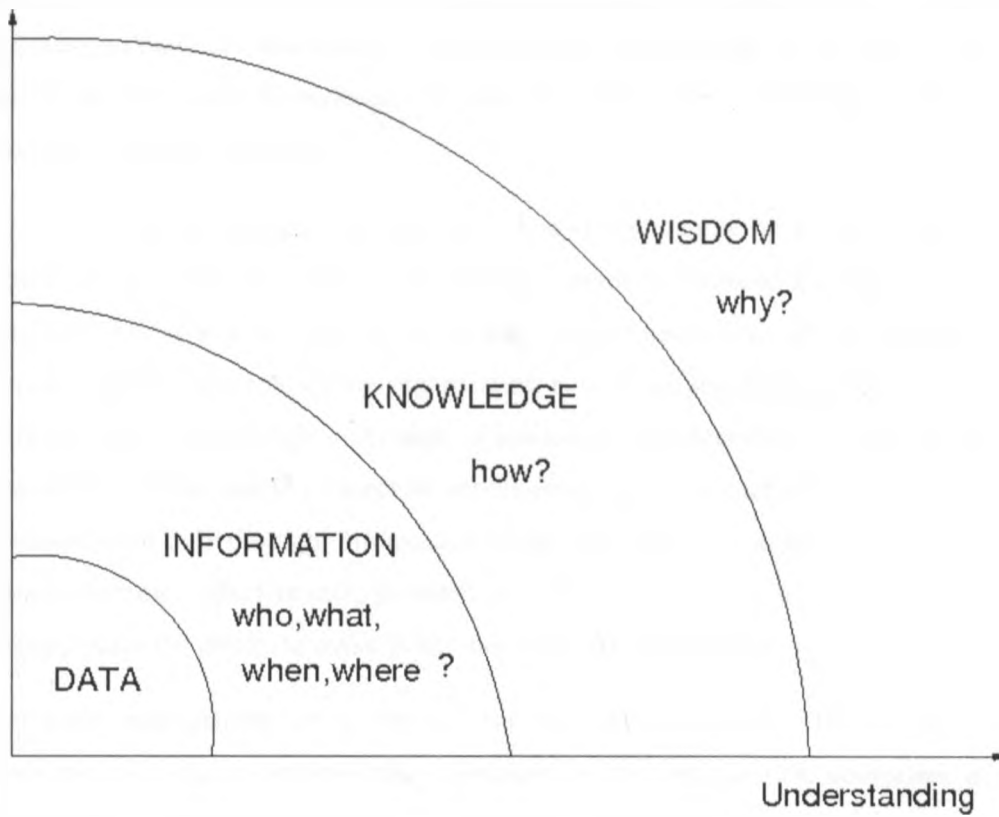
For knowledge management to be effectively done a clear understanding of what knowledge is and what it is not should be made.There are many definitions of knowledge and knowledge management depending on who is asked. It is hard to define knowledge because it means different things to different people and it still continues to evolve. Abdulla et al. (2008) defines knowledge as something that comes from information that has been processed using data and it includes experiences, values, insights and contextual information . According to Davenport and Prusak (1998), knowledge is a fluid mixture of experiences, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences, with knowledge originating and being applied in the minds of people. Alavi and Leidner (1999) defines knowledge as a justified personal belief that increases an individual's capacity to take action. Knowledge is information in use therefore knowledge only exists because information exists. Nonaka and Takeuchi (1995) identify two types of knowledge namely tacit and explicit knowledge. Tacit knowledge is internal to an individual and can be described as experiences, talent, intuitions or reflections. Explicit knowledge is

usually stored in mechanical or technological devices like documents or databases. It includes books, manuals, procedures, lists, websites and intranets. Hence knowledge found in an organization is either embodied in individuals as insights and experiences or in organizational processes and practices. Knowledge is an asset to an organization. But it only becomes power when it is expressed. Knowledge becomes an asset when something is done with the knowledge a people possesses.

Some argue that knowledge especially tacit knowledge cannot be managed because it is in peoples' heads'; that this kind of knowledge cannot be reduced to rules, procedures and formulas. While to a certain extent this is true, still tacit knowledge can be managed if it could be made explicit. The role of the organization is to avail and manage the environment that optimizes that knowledge. Through knowledge management, a knowledge centric organization will be able to connect its people (employees) to each other and deliver the right information and only the right information at the right time. An organization that does so will enhance learning, effectiveness, productivity and innovation in the organization which in return provides the ability to make better and more informed decision.

Knowledge management as a process for the optimizing the effective application of knowledge in order to achieve the objectives of the organization comprises a range of strategies and competencies that are used by an organization to identify, create, represent, distribute and enable the adoption of insights and experiences. It is a formal process that determines what information an organization has that can benefit others in the organization and therefore makes the information easily available for use by those who need it. According to Alavi & Leidner (2001), in a given organization, knowledge management refers to identifying and leveraging the collective knowledge within it in such a way to help the organization compete. Knowledge management involves the managing of intellectual capital of the organization, the so called corporate memory. It is a systematic goal oriented application of measures to steer and control the tangible and intangible knowledge assets of an organization in order to enable creation of new knowledge in the process generating value, innovation and improvements out of the process. In managing knowledge a set of practices are followed that maximizes the business value of knowledge by gathering, structuring and delivering it at critical points of customer interaction.

In many organizations, procedures are in place for management of data and knowledge. But awareness and implementation of knowledge management is not as widespread. One reason is that there exists a confusion between data, information and knowledge with people using these three interchangeably. Hence you find that when an organization has in place some aspect of information management the assumption is that knowledge management is being done as well. Marzanah, et al. (2010) in their research note that most knowledge management technologies in existence emerged from a document centric approaches i.e. most are in actual sense document management system lacking aspects of tacit knowledge management.

To manage knowledge an integrated approach of identifying, capturing, retrieving, sharing and evaluating an organization's information assets is taken (Gatner Group, 1998). These assets are inclusive of databases, documents, policies, procedures as well as the uncaptured tacit expertise and the experiences stored in individuals' head.

Knowledge management is not technology; it requires other enablers including people, processes and technology working together. Ability to share and archive an organization's knowledge resources can reduce any setbacks that might be caused by a turnover in the organization. Another organization's implementation of knowledge management can include a case where employees in the organization can collaborate with their colleagues to discuss ideas, suggestions, insights, lessons learned. Use of ICT technologies like videos and audio can also enable access to subject experts to seek their counsel concerning aspects. The real power of knowledge management occurs when employees utilize the shared information by putting it into action.

Due to its diversity of definition depending on varied fields, authorities in knowledge management recommend an approach where one adopts the knowledge management definition which best suits their objectives. The approach taken in this project is that of a software developer whose expertise is in knowledge management systems rather than in knowledge management in the wider sense of view hence interested in designing knowledge management software by coming up with something that would enable capture and systemize information and knowledge in an organization.

While information management is done by use of information management systems, knowledge management is done using knowledge management systems. An information management system works data to produce information while a knowledge management

system is an information management system with all the tools that are required to help turn information to knowledge. Through a knowledge management system, data is converted to information and then facilitates the conversion of information to knowledge.

Knowledge management system are ways of managing knowledge in organizations for supporting the creation, capture, storage and dissemination of information . A knowledge management system enables employees to have ready access to the organization's documented base of facts, sources of information, and solutions. Through a knowledge management tool, an organization is helped to communicate, collaborate, investigate, exchange and share knowledge. A knowledge management systems helps an organization to make better, more efficient and more effective decisions.

In summary knowledge is inherently about people and processes. While it is enabled by technology, knowledge is not exactly a technology-based concept. What information technology (IT) does is to provide the knowledge management tools that make it easier to bring people and processes together and to share knowledge for the optimization of an organization's objectives.

Problem Statement
Collecting data and information is not a problem to many organizations. We find widespread databases and piles of papers that are never read and archives that no one visits. The challenge is to gain value from these archives without necessarily information overloading.
Many organizations are also experiencing what is called the digital age which is characterized by widespread communication and sharing through access to websites, blogs, chats, emails and other internet connected applications which employees are exposed to. In digital age information sharing is the norm with little regard for hoarding and protection. Therefore it is of necessity that organizations provide a secure organizational environment for disseminating and sharing knowledge; failure to do so employees will no doubt result to unsecure methods of sharing like twitter, facebook and other social networks in order to collect information needed and respond through post to others requests.
In today's organizational setups it is rare to find employees who stay with the same organization from time of employment while young till they retire. Employees are more mobile now. Some retire, transfer, resign, move organizations and even die. When key

employees leave an organization, they leave with their know-how, experiences and best practices which is a loss to any organization.

These points identify organization's knowledge aspects of explicit and tacit forms. Complete knowledge compasses the two. Complete knowledge compasses explicit and tacit forms. While explicit knowledge is written down in different formats, tacit knowledge is the relevant information that resides in the head of an individual. It is the knowledge gained from experiences.There is hence a need for organizations to avail an environment that optimizes its knowledge – both in tacit (people form) and also in explicit forms (archives).

Okemwa (2006) observes that the concept of knowledge management is relatively new to many organizations and moreso those based in the sub-saharan region of Africa. He further states that many organizations based in the region do not as yet have formal organizational knowledge management programmes. He also notes that while knowledge management in a way is practiced yet it is not well understood by most organization. Likewise (Mosoti and Masheka, 2010) are of the view that creating and implementing knowledge management practices remains a challenge to many organizations.

Tacit knowledge is difficult to trace and capture. Due to this it is largely ignored in traditional knowledge management systems. Irick (2007) ephasizes that the interplay of tacit and explicit knowledge is a critical factor in an organization's knowledge management. Effective knowledge management will require not only managing the easy to understand and capture explicit knowledge, but also the hard to explain, difficult to trace and difficult to capture tacit knowledge. Most emerging knowledge management technlogies are from a document-centric hence a limitation exists to the management of tacit knowledge Marzana, et al. (2010); Pena-Mora *et al*. (2000); Mulder & Whitely (2007); Van der Spek & Spijkervet (1997).

This research project presents a prototype system that provides an environment to optimize an organization's knowledge by providing a knowledge management tool to help organizations manage both explicit and tacit knowledge for the purpose of effective knowledge management in organizations. The tool helps organizations to identify, capture / create, represent, distribute and enable the adoption of knowledge for better decision making.

Objectives

1. Develop a knowledge management system to manage both tacit and explicit knowledge

2. Test the developed system in a production environment

3. Deploy the system

CHAPTER 2

LITERATURE REVIEW

Knowledge management involves the process of creating knowledge repositories coupled with improving the access and sharing of the knowledge; communicating the knowledge through collaborations; enhancing the knowledge environment and also managing it as an asset to the organization. Research has shown that many organizations are realizing the unequaled value of knowledge. Organizations are displaying a willingness to manage knowledge. Many have in a way implemented some aspects of knowledge management though not in satisfactory measures. This section highlights some of these views and implementations in place.

The African Medical and Research Foundation (Amref) is an organization that is embracing knowledge and has shown a commitment to knowledge management (Mutethia, 2005). It's initiatives include holding a number of knowledge management workshops with an aim to evaluate and discuss knowledge management initiatives. In the year 2003, a knowledge management workshop was held in Delf Netherlands. In the year 2004, Amref organized and held an institutional knowledge management workshop in Nairobi Kenya with participants drawn from the water and sanitation programme, Human Resources Management, Information Technology, Technical Support Office and Senior Management. The goal of this workshop was to brainstorm on ways to improve documentation and sharing of knowledge by identifying who requires knowledge and how knowledge is shared, channels through which knowledge can be shared, obstacles to effective knowledge and information sharing and also share experiences and lessons with management at all levels. The workshop also discussed on the need to develop preliminary plans to integrate knowledge management into the Amref programme activities through such ways as identifying openings for knowledge management in organizations, mobilizing workforce in an endeavour to create a common understanding of knowledge management, identification and forming of core groups of knowledge management champions, training of knowledge management contacts and champions, sharing experiences with organizational management, documenting lessons and experiences and also conducting of knowledge management scans in organizations.

Ogara, Jalang'o & Othieno (2010) researched on knowledge management and institutional framework at the Kenya Veterinary Services (KVS). The researchers found out that

knowledge management is a vital ingredient in the delivery of veterinary services in Kenya as exemplified by the KVS. They highlight the growth at the department of veterinary services and the subsequent vast generation of knowledge and information from the growth. The department has been managing both its tacit and explicit knowledge though there have been gaps identified. The researchers further identify how the gaps can be addressed. They recommend knowledge management at the department of veterinary services for the strengthening of flow information within the department and with other related organizations and institutions , the creating of an enabling environment to allow staff to share knowledge and their experiences, staff to be trained on knowledge management and also come up with innovative strategies aimed at acquisitions and adoption of knowledge.

Mosoti & Masheka (2010) examine how knowledge management practices are carried out and their contribution to the development in Kenya and Africa. The research involved 16 nonprofit organizations constituting 23 percent and 53 profit organizations representing 77 percent of the totals. The respondents were all based in Nairobi. The findings of this research are as summarized below:

i)   Most of the organizations have no idea of knowledge creation and management within their organizations

ii)   Though capturing and transforming knowledge is an important technology, however most organizations do not use it

iii) Monetary incentives to knowledge management are rare in most organizations

iv)   Most of the organizations are not regularly updating databases of good work practices, lessons learned or listing of experts.

v)   To most organizations, knowledge management is just a routine and not a management tool

vi)   Some organizations fails to utilize knowledge capturing systems

vii) In most organizations workers share knowledge or information in their different project teams

viii) Organizations in Nairobi feel the need to use knowledge management practices for collecting and using new ideas, improve sharing or transferring of knowledge, increase efficiency hence improve the organization's performance, train personnel, increase acceptance of innovations, improve worker retention, identify and/or protect strategic

knowledge present in the organization, ease collaborative work of projects teams that are physically separated and also for promoting sharing or transferring knowledge .

ix)   Most of the organizations value both vertical and horizontal sharing of knowledge

They note that although much literature exists on knowledge management no one has undertaken a research on knowledge management practices in organizations in Nairobi Kenya. They also note that knowledge management practices even though practiced are not well understood by most organizations. These organizations face the challenge of how to create and implement knowledge management practices. According to the researchers, it can be deduced that the picture portrayed by small organizations in Nairobi limitations on knowledge management, may be an indicator that the implementation of knowledge management practices in the wider organizations is largely ignored. The recommendation is that organizations should capture knowledge in both tacit and explicit forms providing facilities for knowledge management.

The Knowledge Management Africa is an initiative positively looking at knowledge management. Knowledge Management Africa is an electronic network that exists to promote the use of Africa's collective knowledge as a key development resource and establish knowledge management platforms in order to create access to existing networks and also avail facilitation of the sharing and utilization of knowledge across all sectors. Knowledge Management Africa organizes conferences in different countries in Africa in order to boost the implementation of knowledge management in Africa. The Knowledge Management Africa process in Kenya (KMA-K) is spearheaded by the Ministry of Planning, National Development and Vision 2030 and particularly by the Sectoral Planning Directorate. The KMA-K is at the moment in the process of seeking the institutionalizing of the KMA-Kenya Institutional Framework in an effort to enhance and implement KMA nationally. The framework seeks to form a strategic framework upon which institutions and governance structures for the implementation of knowledge management in Kenya. This will be done by creating knowledge focal points in institutions, establish knowledge management frameworks in both public and private institutions, establish knowledge sharing platforms, develop human capital and physical infrastructures for the implementation of knowledge management and also establish ICT platforms to support knowledge management as an organizational asset.

These are just but a few examples of what organizations are doing in relation to knowledge management. We can say that a hunger, an interest in knowledge management is quite visible. Challenge is that how to do knowledge management still sounds foreign to many. Structures for doing so are lacking. That is why in many organization knowledge management just remains a buzzword with little on the ground to actually actualize the concept. Structures therefore need to be put in place for effective knowledge management which will be beneficial to these organizations.

Still, knowledge management is not completely new to organizations. There exists its management in one form or the other. There are present identified attempts at knowledge management. The section that follows examines some of these researched approaches of knowledge management in place.

The International Livestock Research Institute (ILRI) has a knowledge management platform that includes a collaboration environment for collaborating within the organization and with its partners, information centers where staff share what they know through journal and monographs, training and learning center and internet cafes accessible both to ILRI staff and to the authorized public. Okemwa (2006) notes that the knowledge management initiative at ILRI has not exhaustively been able to capture the largely tacit knowledge comprising the ethno-veterinary knowledge in the sub - saharan Africa region which would greatly improve its services by utilization of traditional human husbandry practices and indigenous medicinal plants. He also observes that ILRI's implementation of knowledge management also lacks standards, techniques and methods for audit knowledge. It is noted that this is a problem that exists not only at ILRI but also in many other organizations. He recommends that seeing that ILRI's knowledge implementation is limited, more sources of knowledge need be identified and tools defined.

A knowledge management system is presented by Saroch & Barmash (2007). The system's goal is the management of knowledge found in proposals. It helps organizations easily find past proposals to help in future proposal writing. The system is anchored on the organization's document management and collaboration. It does tacit knowledge sharing through similar grouped communities of practice via discussion boards, talk platforms and online chats. This system lacks a way of tapping into and codifying the expertise and experiences of the workers.

Corporate Memory also known as CoMem is a prototype knowledge management system for the managing of engineering designers' internal and external knowledge Frutcher & Demian (2002). CoMem groups the sets of project memories into a corporate memory and then supports external knowledge reuse from this memory through three modules. The overview module supports the designer to find reusable items by enabling a view of the entire corporate memory at a glance while providing filtering tools to help the designer focus by adding emphasis to certain items. The project explorer module enables the designer to explore the item's project context by displaying the project and discipline that the item belongs to, related components, disciplines and projects. The evolution history explorer module enables the designer explore how an item selected from the overview evolved and its history. Generally CoMem knowledge management prototype system through its three modules of overview, project context explorer and evolution history explorer supports the three processes of internal knowledge reuse namely find, explore evolutionary history and explore the project context. CoMem in this way is a knowledge management system intended to support effective knowledge reuse through faster searches and provision of contextual information. CoMem is primarily developed for use by architecture, engineering and construction firms. Tacit aspect of knowledge management is lacking in CoMem.

Gopalakrishna et al. (2004) propose a knowledge management system prototype for handling XML format documents. The system provides a framework to facilitate the creation, capturing, organization, and sharing of knowledge for various knowledge domains in the form of Extensible Markup Language (XML) format. It recommends managing knowledge as XML documents rather than the more common HTML forms. A three tier approach of client tier, application server tier and data server tier is used. Knowledge in form of xml documents is store in an NXD data-server, the application server tier ensures the stored knowledge / data is protected from direct access by the clients while the client tier is responsible for the presentation of the data / knowledge to the users. This system is targeted at management of explicit knowledge i.e. document management. A successful knowledge management system should manage both explicit and tacit knowledge.

NewsMate is a mobile knowledge management system designed for Journalists. It is a protype application for supporting knowledge sharing and expertise location in both office and field

locations. It is mostly geared on connecting journalists for knowledge sharing. Document management aspect is not substantial.

Knowledge Extract, Profiling and Sharing Network (KEPSNet) is a knowledge management framework to support the management of tacit knowledge comprising competencies and experiences in a project group (Marzanah et al., 2010). KEPSNet captures tacit knowledge through concept maps. Users interact with the system through a provided user interface menu. KEPSNet allows for knowledge retain through knowledge capture, knowledge retrieve through compare and profiling and knowledge reuse through knowledge recommendations and networking. KEPSNet is a great framework for the management of tacit knowledge but fails as a knowledge management tool as it does not encompass entire knowledge management of both tacit and explicit knowledge.

The Military Intelligence Network (MI Net) is a knowledge managemet site that is used by the military community to easily publish, manage, organize and discuss a wide range of content through one website. It applies the concept of social networking to knowledge management acting like the military's professional forum. Users share what they know and find what is needed by having subject matter experts answer their questions timely. Users quickly share ideas, lessons learned which is actually transfer of knowledge. Responses given to request range from simple textual replies to tools like standard operation procedures, powerpoint presentations or other documents. MI Net as a knowledge management system operates on the concept that the 'people factor' needs to be coupled with the 'technology factor' for effective impact of knowledge on people. As a knowledge management platform MI Net is effective in that it embodies the concept of providing the right knowledge to the right people at the right time through asynchronous collaboration of the novices and the experts.The challenge of MI Net is to have an instant connection between the person in need of the information and the subject matter. Unless this is pre arranged then it can pose a challenge.

ICON (Intelligence Center Online Network) is a knowledge management system developed and belonging to USAIC (US Army Intelligence Center). ICON was developed with a goal to provide a single point of entry for Military Intelligence soldiers to request, share, and locate information relevant to the accomplishment of their specific information-centric missions. It is knowledge management tool that enables intelligence soldiers all over the world to

communicate, collaborate and investigate. ICON provides its users with a standardized suite of mission – specific web services and tools to enable the exchange and sharing of knowledge across the USAIC and Millitary Intelligence (MI) community. ICON is made up of application specific knowledge tools which includes:

a) ICON Outer Main Page (pre-login) – A tool that contains information for public view. This information is initially approved and targeted at diseminating information to those without official logins including the general public.

b) ICON Inner Main Page (post-login) – restricted area only accessed by authenticated users. Information contained here is that of general interest to the USAIC and MI community

c) ICON Shout Box – This tool allows authenticated users to partake of open discussion between them. They do this through posting questions and comments.

d) ICON Websites – ICON provides links to websited of its related missions and also to those of organizations of interest. Maintainance of the websites is done by the respective organization not by ICON

e) ICON Document Management System – A structured and controlled document repository for the Military Intelligence community.

f) ICON Virtual FootLocker – A structured and controlled course document repository for the Military Intelligence community. The tool makes available soft copies of course document packages and avails them to students currently attending Military Intelligence courses at USAIC.

g) ICON Workgroups – A document collaboration tool. The tool provides a closed environment for small groups to collaborate on working documents. If it is a folder it is only availed to users who have explictly been granted access for it. A powerful in that it enables collaboration worldwide as long as there exists an authentication account and access to the internet

h) Army Intelligence Comprehensive Analysis Tool (AICAT) – the tool provides a repository to store, maintain, query and report on intelligence, surveillance and recoinnaissance requirements and related doctrine, organization, training, material,

leadership, personnel, facilities and information. Users browse the web application to review current and projected MI force structures and create comprehensive trainig task lists. The tool stores the information in documents and is availed to all authenticated users.

i) Fort Huachuca Interactive Locator – A tool to assist personnel visiting Fort Huachuca training location in locating key building and streets.

j) Conference and Seminar websites – A tool to provide information for the MI conferences and seminars. Details captured include about the worksh op, online registration, maps and directions, speakers, agenda, lodging and are information, conference documents, and also a way for contact.

k) USAIC Conference Administration System – A tool that assists conference action officers use to control the conferences

l) Lessons Learned and Lessons Learned Integration – Both make up the lessons learned system. Included in the system are observations, insights and lessons learned interfaces.

m) Noncommissioned Officers Academy Student Registration and Management System (NCOA SRMS) – helps with cadre student registration and tracking throughout student attendance at the academy. Includes ways of managing student data and cadre instruction tools

n) Quality Assurance Office Survey System – The tool provides an administration interface that allows quality assurance office personnel to construct pre-course, post-course, ad-hoc and leader surveys in order to allow assess the effectiveness of USAIC course instruction and quality of life.

o) Significant Activities Reporting System – A set of web applications that allow USAIC action officers to continually update the status of ongoing key issues and short term adhoc issues that affect USAIC leadership. Level one allows action officers create and update existing key issues and significant activities and publish them for review by other directorates. Level two allows directorate administrators select and compile published key issues. Level three takes the reports of multiple directorates and

consolidates them into a high level report suitable for posting to the commander and for dissemination.

p) Training Requirements and Analysis System Tracker – The tool allows USAIC leadership to automate the process of review and approval of course administrative data, program of instructions and integrated training plan.

q) USAID Commander's Dashboard – A tool with three areas which include USAIC SIGACTS which archives reports for review and analysis, dashboard charts and graphs to provide real time statitistics for the key web applications, and key issue tracking to allow commanders to review ongoing issues and their current status. Through the tool, commanders are provided with up to the minute access to key decision making data.

r) USAIC Tasking System – A tool to allow G3 personnel to create, disseminate, track and close requests for personnel and equipment support. Organizations using the tool can also respond to taskings

s) USAIC Master Activities Calendar – A web based calendar that allows organizational administrators to create and publish events targeted for public distribution.

ICON is a robust knowledge management system hence providig many features for managing of both explicit and tacit knowledge. But ICON is also quite complex for an organization starting out in knowledge management and those interested in it. The many features might put an organization off. There is the non admirable aspect of information overload if so many features are incorporated. This research adopts the ICON framework but streamlines it to a level simple enough for implementation in an organization.

Research shows that majority existing knowledge management technologies have emerged from a document centered approaches. This relates more to the management of explicit knowledge. Basically it stems from the confusion between information and knowledge and hence the temptation to equate information management to knowledge management. If the document centric approach is followed then in reality only explicit knowledge management will be done. And yet knowledge management incorporates both the management of explicit as well as tacit knowledges. As Pena-Mora *et al.* (2000) states, there exists the limitation to the management of tacit knowledge. A limitation also exists in taking into account the

interactions, interests, skills, intuitions, motivations and competencies in an organization or a group setting. Mulder & Whitely (2007), Van der Spek & Spijkervet (1997) also note that not much has been said about conceptualizing individual competencies within knowledge management. An effective solution that advantages the organization needs to incorporate tacit and explicit knowledges and avail tools to manage them effectively. This is what is presented in this research.

Implementing a knowledge management system is a process. It should not be done hamparzadly but rather stepwise. The process should follow specific steps and activities. This can be done by utilizing already existing knowledge management models or from scratch. There are various models of knowledge management including the famous life cycle model of knowledge management which has been customized by various researchers. A discussion of these models follows:

Table 1 : Knowledge Management Life Cycle Models

Model	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Nissen	Capture	Organize	Formalize	Distribute	Apply
Depress and Chauvel	Create	Map / Bundle	Store	Share / Transfer	Reuse
Gatner Group	Create	Organize	Capture	Access	Use
Davenport and Prusak	Generate		Codify	Transfer	
Amalgamated	Create	Organize	Formalize	Distribute	Apply

The five modes all begin with either a create or a generate phase with only Nissen begining with a capture phase. In phase two the practice is the organizing, bundling or maping of the knowledge but Davenport and Prusak's model passes this step. Phase three defines how knowledge is made formal or explicit while phase four deals with the sharing and distributing of knowledge in the enterprise. Phase five presents the application, use or reuse of knowledge for problem solving and decision making in the organization. The Amalgamated Life Cycle Model of knowledge management Nissen (2002); Oxendine & Nissen (2001) integrates the

key concepts from the other four models. This model making reference to current knowledge management systems and practices is presented in the table that follows.

Table 2 : The Amalgamated Life Cycle Model of knowledge management

Create	Organize	Formalize	Distribute	Apply	Evolve
• Data Mining • Artificial Intelligence • Research and development • Benchmarki ng • Business intelligence	• Knowledg e Maps • Semantic networks • Grape vines	• Data Warehous es • Reports	• FAQs • Best practices • Lessons learned • Knowledge brokers • Yellow pages • Web publications • Document searches • Email • Meetings • Teleconferences • ListServers	• BP R	

The SECI model of knowledge management

This model was developed by Nonaka and Takeuchi for knowledge management. The model proposes management of both explicit and tacit knowledge with both knowledges interacting continously in a spiral manner leading to creation of new knowledge. It builds on the premises that the creation of knowledge is a continuous process of dynamic interactions between tacit and explicit knowledge.

Figure 3 : The SECI Model of Knowledge Management

The SECI model (Nonaka and Takeuchi)
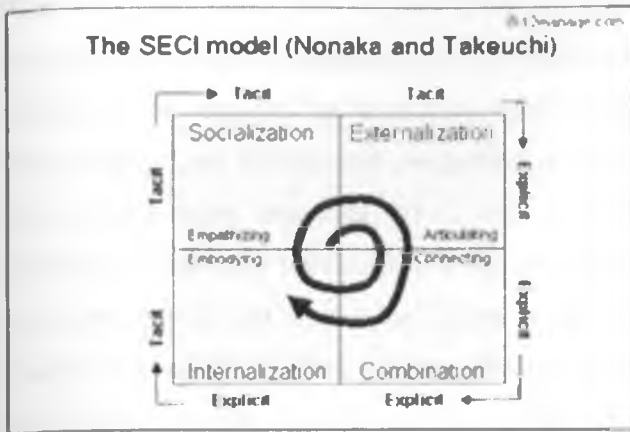
The model proposes that managing knowledge is possible through the four modes of knowledge interaction i.e. Socialization (tacit-to-tacit), Externalization (tacit-to-explicit), Combination (explicit-to-explicit) and Internalization (explicit-to-tacit). The four modes interact in the spiral of knowledge creation. The spiral becomes larger in scale as it moves up through organizational levels, and can trigger new spirals of knowledge creation. The Socialization pillar provides a platform to share tacit knowledge through face-to-face communication or shared experience. This is done through informal social intercourse and teaching by practical examples. The Externalization pillar is for converting tacit knowledge to explicit knowledge through concepts and models. Combination pillar involves compiling externalized explicit knowledge to broader entities and concept systems. When knowledge is in explicit form it can be combined with the knowledge that has been filed earlier. In this phase knowledge is also analyzed and organized. The Internalization pillar incorporates understanding explicit knowledge. It happens when explicit knowledge transforms to tacit and becomes a part of individual's basic information. The cycle continues in the spiral of knowledge back to socialization when tacit knowledge is shared silently. Through this the amount of knowledge grows. The SECI model has the advantages of dynamic nature of knowledge and the knowledge creation process. It provides a relevant framework for the management of an organization's knowledge. But SECI model has the disadvantage that it is based on a study of Japanese organizations which heavily bias on tacit knowledge as the culture is that most employees are often with the organizations for life. This is not ideal for most other organizations.

Hierachical Spiral Model of knowledge management

The hierachical model (Sun & Gao, 2006) is a hybrid model borrowing from Sun's waterfall model of knowledge management and Nonaka's spiral model of knowledge management. The major process stages of the heirachical spiral model are extracted from the waterfall model. The processes are divided and categorized to five main processes and eleven sub-processes from a hierarchical viewpoint, which form a spiral within three main processes. The model provides the guidance between the different phases of knowledge management activities. The main process of the heirachical spiral model include knowledge selection, knowledge creation, knowledge sharing and knowledge preservation and retention. Knowledge selection identifies knowledge needs by understanding and select useful knowledge from the existing repository. Knowledge creation supports generation and creation of knowledge. Knowledge sharing is regarded as the core process of knowledge management and is performed by distribution and utilization of the knowledge that has been selected or generated from the organisation and acquired outside. When sharing knowledge, new knowledge is often created by combining the shared knowledge and existing knowledge (Davenport & Prusak, 2000). Knowledge preservation aims at retention of knowledge assets. The new valuable knowledge has to be stored from time to come. This has to be accomplished by efficient storage media to access knowledge, to prevent valuable expertise from disappearing. Knowledge needs to be updated frequently because the knowledge becomes obsolete rapidly in the knowledge society. The hierachical spiral model is extensive with five main processes and eleven subprocesses. This is advantageous in that the model provides for a detailed and thorough depth of knowledge management implementation. The limitation is that it may demand for a long period on the implementation as the process is followed.

This research developed a system prototype that is computer based and takes into consideration the management of both tacit and explicit knowledge. The research made reference to the KEPSNet and the ICON knowledge management system looked at earlier. KEPSNet as a knowledge management tool captures tacit knowledge through concept maps. The presented protype adopts the capture and management of tacit knowledge as advocated by KEPSNet. ICON knowledge management system is a robust knowledge management system with admirable features for both tacit and explicit knowledge management. Hence by combining ideas from KEPSNet and ICON the presented system is able to manage both tacit and explicit knowledge. The system references Nissen's knowledge management life cycle

model. The Nissen methodology of knowledge management proposes adapting to the phases of knowledge capture, knowledge organize, formalize, distribute and apply. Among the life cycle models, the first phase is either create, generate or capture. Nissen's is the only model whose initial phase is capture existing knowledge. It is important to start a knowledge management cycle with identifying and capture knowledge that is already available because it is a fact that any organization already has in existence varied knowledge. The rest of the phases of the Nissen model are also systematic and admirable for a system development. Reference is also made to Snyder and Wilson (1998) proposal of knowledge management which suggest a more or less same approach as Nissen's. The process follows stages of knowledge capturing, organizing, applying, recording, sharing, evaluating and finally improving the know-how.

The system developed presents a knowledge management platform that identifies, captures, stores, avails and maintains an organization's knowledge. The system has as its input explicit and tacit knowledge which the system then manages. This knowledge is output to the employees of the organization who then use it to make decisions and take action. The goal of this system is to enable employees to have ready access to the organization's documented base of facts, sources of information, and solutions by connecting an organization's people (employees) to each other and delivering the right information and only the right information at the right time. The conceptual framework for the system is shown below:

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Figure 4 : The Conceptual Framework
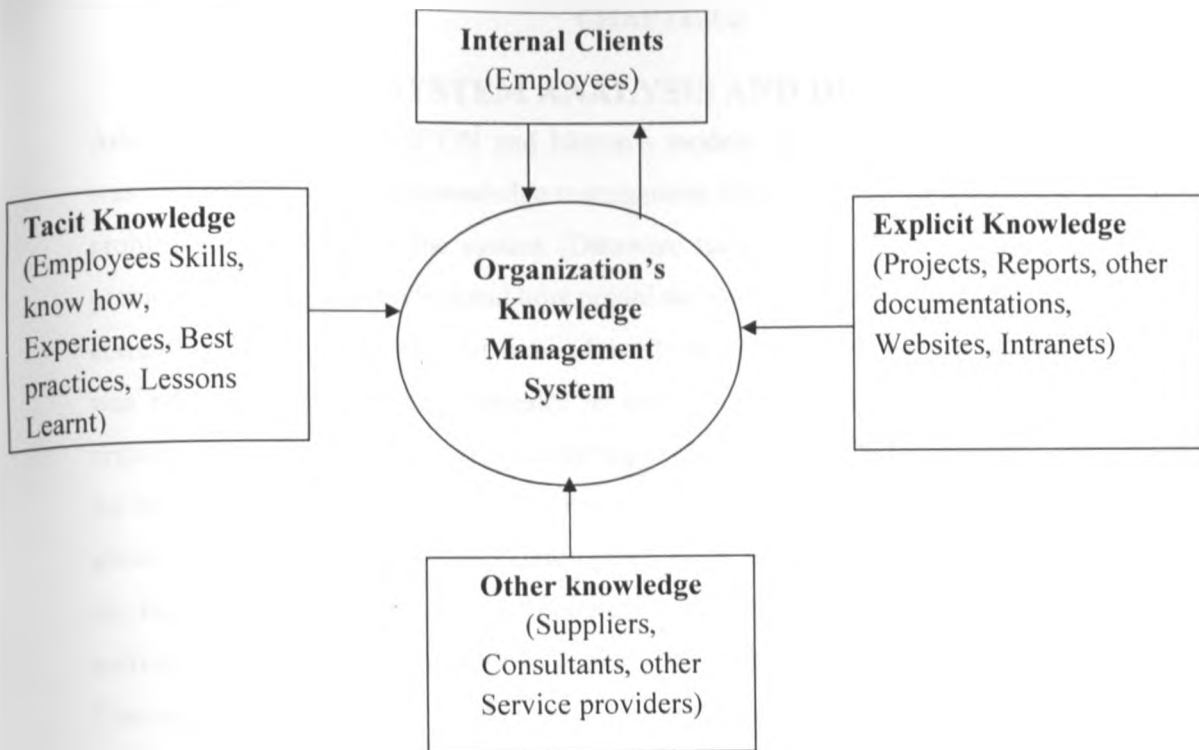
The knowledge management system manages tacit and explicit knowledge. It has its main user as the employees of the organization who are authenticated and authorized to access and utilize the resources availed by the system.

CHAPTER 3

SYSTEM ANALYSIS AND DESIGN

Adapting to KEPHSNet, ICON and Nissen's models, this section outlines how the project was carried out. Effective knowledge management systems focus on identifying the business problem to be solved by the system (Dataware technologies,1998). To define the business problem, we sought to understand how organizations view knowledge management, how it is currently done and proposals for how a knowledge management system should be like. This was done by sending a questionnaire to select organizations and to select people in the organizations. The Simple random sampling method was applied to selecting the population for the sampling. Simple random sampling unlike systematic sampling and stratified sampling allows for all samples of the population to be given equal probability in the process without any bias. This method was vital as it allowed to get views from any organization and from any individual in the organization without a bias. The intention was to enrich the research process. The responses from the questionnaires are analyzed and given in the appendix section of this report. These responses point out that organizations are not completely familiar with knowledge and knowledge management yet are desiring to reap benefits of such implementations which gave an emphasis on why knowledge management systems are necessary in organizations. Former research also guided the development of the prototype system including those by Mosoti & Masheka (2010) on state of knowledge management in organizations and Mutethia (2005) on knowledge management in Amref Kenya as summarized in the literature review section above. Reading documentation on current practices on knowledge management in organizations also formed a solid base for specifications definitions.

Saroch & Barmash (2007) states that one key factor for the success of a knowledge-management system is to plan it around a critical real-world issue. The system will be a success if future users can frame for themselves the goals and objectives of the system. Borrowing this noble idea the project focused on a particular organization assuming a representation of majority organizations. Due to time constraints, the project focused on one department of an organization for demonstration and testing purposes. This also models from Saroch and Barmash's adopting of the Business Development Development in their organization as the initial test bed for their proposed knowledge management prototype.

Likewise we chose the Information Communication Technologies (ICT) Department of a government ministry for this project.

The section that follows show how the system was modeled.

Knowledge capture

As per Nissen's life cycle model of knowledge management, for knowledge to be managed it should be identified or audited and then be captured for storage. Snyder & Wilson (1998) refer to knowledge capture as knowledge harvesting. They state that the process of knowledge harvesting starts by enabling experts to verbalize their tacit knowledge thereby making it explicit. The project process followed was identification of the knowledge, elicit the knowledge and then capture the knowledge. This process also called knowledge audit identifies sources of knowledge required to solve the business problem the knowledge management system is being built to address. Identification of the knowledge in the department was done through an interview session with the case study department. Sample Interview questions and an analysis of the response given are displayed in the Appendix Section. The department's documentations were also reviewed. From the questions and documentations, the following knowledge sources were identified.

Table 3 : Knowledge Identification

ICT Department Knowledge Status	
Number of Personnel at the ICT Department at any one time	i) Head of ICT Department - 1 ii) Government employed ICT Officers – 3 iii) United Nations Volunteers (ICT Specialists) – 2 iv) Interns (ICT) – 2 v) Secretary – 1 vi) Support Staff – 2 Total Number = 11
Officers with specified Expertise	i) Database –3

	ii) Programming – 3
	iii) Servers and Network Administration – 1
	iv) Help desk – 7
	v) Web Development – 3
Officers' Status	i) Permanent – The Head of ICT, the Government employed ICT Officers, the Secretary and the Support staffs are all public service employees and are permanent. These are 6 personnel in the department.
	ii) Contract – The United Nation Volunteers (UNVs) who are ICT Specialists and Experts are recruited by UNDP and forwarded to the Government Organization to build capacity in the department. They have a four year non renewable contract. When the UNVs' four year term expires, the UNV has to leave. A new set of UNVs are recruited for replacement. Some of the most crucial skills in the department are held by the UNVs. Total number of UNVs at any one time is 2.
	iii) Interns – The department has at any one time two students on an apprenticeship programme. The students have a contract of up to three months

Documents in the Department		
	i)	ISO Procedures
	ii)	ICT Technical Specifications
	iii)	Procurement Technical Evaluation Reports
	iv)	System Manuals
	v)	User Manuals
	vi)	Reports
	vii)	Books
	viii)	Magazines
	ix)	The Organization monthly bulletin
	x)	Periodicals
How do personnel in the department collaborate / share?	i)	Through email
	ii)	Through phone
	iii)	Through social network sites (facebook, twitter, MySpace)
	iv)	Informal chats e.g. like those done during tea breaks
	v)	During meetings
	vi)	The help desk register
Website and Applications	i)	The Organization website
	ii)	An Intranet
	iii)	Stand alone systems

It was found out that one of the critical activities of the department is the administration of the organization's network and the servers. In this department only one employee possess the expertise required to man both the organization's network and its servers. This employee happened to be a UNV on a contract. Thus such a skill is rare in the organization. The expert knowledge of this employee needed to be tapped.

Knowledge organization

Nissen stage 2 is knowledge organization. After knowledge is identified it needs to be organized. Explicit knowledge at the department is found in documentations and in limited shared network folders. Tacit knowledge at the department was found to be in the personnel. Perceived tacit and explicit knowledge is organized as shown below:

Table 4 : Knowledge Organized

Explicit knowledge	ISO Procedures, ICT Technical Specifications, Procurement Technical Evaluation Reports, System Manuals, User Manuals, Reports, Books, Magazines, The Organization monthly bulletin, Periodicals
Tacit Knowledge	Personnel - Includes government employees, UNVs and interns
Other knowledge	Suppliers, consultants
Existing ways of knowledge management in the department	Help desk register , The Ministry website, intranet, meetings, email, lotus sametime chat, facebook, twitter, yahoo messenger, google talk, phone talks, informal chats

Knowledge Formalization

Knowledge is represented in the prototype system as follows:

Explicit knowledge

This was found to mostly exist in document formats. A document management approach is chosen for this knowledge. A Document Management System is a repository that is used to store, organize and track documents. It provides storage, metadata, security, indexing and retrieval of documents. Document management systems are a must in knowledge management. They are key enablers in the process of knowledge management. As knowledge management is involved in the gathering, storing and sharing of the right information to the right people at the right time, then document management system ensures that the information

is available. Past scenarios are where users stored their documents and information in a decentralized manner each on their machines. Challenge here is that it is hard to enforce security as numerous copies of documents are all over, backup is difficult and these documents might also be unavailable to the greater organization. Documents which can be directly provided in soft copy are uploaded to the system while those in hard copy have first to be scanned independently then uploaded. The prototype system provides the following functionality for this module:

- ✓ Upload document

- ✓ Search for document

- ✓ Browse / read document

- ✓ Download document

Documents are uploaded to a central place accessible to the wider organization. Centralizing the documents could be done in either of two ways. One way is saving the file uploads into a public directory on the server where they can be accessed by all. This method provides a faster storage and retrieval of files as compared to the same in database uploads. But to limit access to the files being uploaded, uploading them to a database can be effected. This is possible using the blob, medium blob or long blob data types. Uploading to a database also has some other advantages including easing on backups as the files are backed up when the database is backed up, full text search operations can be performed against columns that contain fixed or variable-length character including Unicode data and also against formatted text-based data contained within image fields like Microsoft Word or Microsoft Excel documents, better utilizes data consolidation and eliminates filename collisions which means there is no need to worry about multiple files having the same name, since the files are now identified by their record IDs rather than filenames. Albeit uploading to database is slower and access is also slower when compared to utilizing a file system approach.

The database approach has been utilized. The documents are kept in a database. The database engine utilized is MYISAM. There are many database engines that could be used including ISAM, MYISAM, InnoDB or HEAP database engines. ISAM database engine is optimized for queries more than for updates. For this reason it performs read operations very fast being less taxing on memory and storage devices. But ISAM is not fault tolerant meaning if a disk

crashes it will not be possible to recover the data. MYISAM database engine is MySql's extension of ISAM. MYISAM provides indexing and other vast functionalities. By use of a table-locking mechanism, MYISAM provides multiple simultaneous reads and writes. MYISAM also does support Full Text features for advanced quering. The HEAP database engine allows for temporary files that reside only in memory. For this reason it is faster than both ISAM and MYISAM. But HEAP tables are temporary and must be deleted after you have finished working with them. InnoDB database engine include transactional and foreign key support but are much slower than the rest. InnoDB also does not support Full Text functionality. MYISAM is chosen because Natural Language is utilized in the queries. Natural Language querying in MySql uses FullText searches which MYISAM supports on Blob and Text datatypes. InnoDB does not support FullText searching. The documents are kept in a mysql database which captures details like Name of document, Type of document, Size of document and Contents of the document as a blob type. Also considered as explicit knowledge are details about projects, suppliers and consultants. Supplier and consultants details were kept as searchable databases.

Projects' Database

All projects done at the organizations have their details captured in a database. A search reveals which projects have been or are being done by a particular section of the organization. Details captured regarding projects include Project Title, Project Details, Department, Date when started, Date project completed, Employee in charge of project and addditional details on the project that might be of interest to the organization.

Suppliers Database

A yearly undertaking of a pre-qualification exercise where suppliers to supply goods for that year are selected is normally carried out. The organization procures ICT equipment from pre-qualified suppliers. Quotations and tenders are floated to pre-defined suppliers who successfully went through the supplier pre-qualification process for the item to be procured. Therefore all suppliers of ICT equipment are known. The organization has been keeping a manual record of the list of suppliers.When an item is to be procured, the predefined are alerted to the same via letters. After selection of successful supplier is made the successful ones are notified of the success while the unsuccessful ones are also notified of the failure. The system provides a searchable automated record of the suppliers to easily provide a way of

knowing and contacting the them. The provided email details are automated to enable directly send an email to the supplier. Details captured are Business Name, Physical Address, Phone Number, Mobile Phone, Contact Person, Email Address as well as a brief explanation of the nature of the business

Consultants

Organizations sometimes outsource some of their activities to enable concentrate on core business. A directory of consultants contain details that will make it easier to contact consultants when a need arises. The prototype system advocates for this as a way of managing knowledge by capturing the details such as Name of a consultant , Nature of the business , Email Address, Phone Number and the Contact Person.

Experts' Map

The department does keep a list of the personnel but the details were found to be sketchy. Details kept as found were:

Table 5 : Employee Details

Name of Officer	Personal Number

For effective knowledge management more details need to be captured and managed. The prototype system provides a detailed expert map as a database that collects and keeps details of the knowledge workers in the Organization. Details kept include   First Name, Middle Name, Last Name, Department, Highest Education Level, Date Employed, Expertise (Area of Specialization / Area of Expertise), Category (If permanent, casual, consultant, volunteer etc), Email Address, Telephone Extension and Other skills possed by knowledge worker.

Through the details provided by this database, authorized users are able to easily access and know who possess what skills in the Organization. The email field provides a link to access the Organization's email client and send and email to the expert. Contacts details provided like office telephone extension and the mobile phone number enable to contact the expert faster if a need arises.

Tacit Knowledge

Tacit knowledge is found in the minds of people. Although not as easy to capture and manage as explicit knowledge, researchers have explored ways of doing this. Methods include communities of practice, concept maps, expert system. This project captures tacit knowledge through capture and managing of lessons learnt, a help desk system, best practices and also a discussion forums which captures a post and stores it.

Help Desk

The department maintains a manual register of help desk problems encountered and how they have been solved. The help desk operates as shown below:

Figure 5 : Help Desk
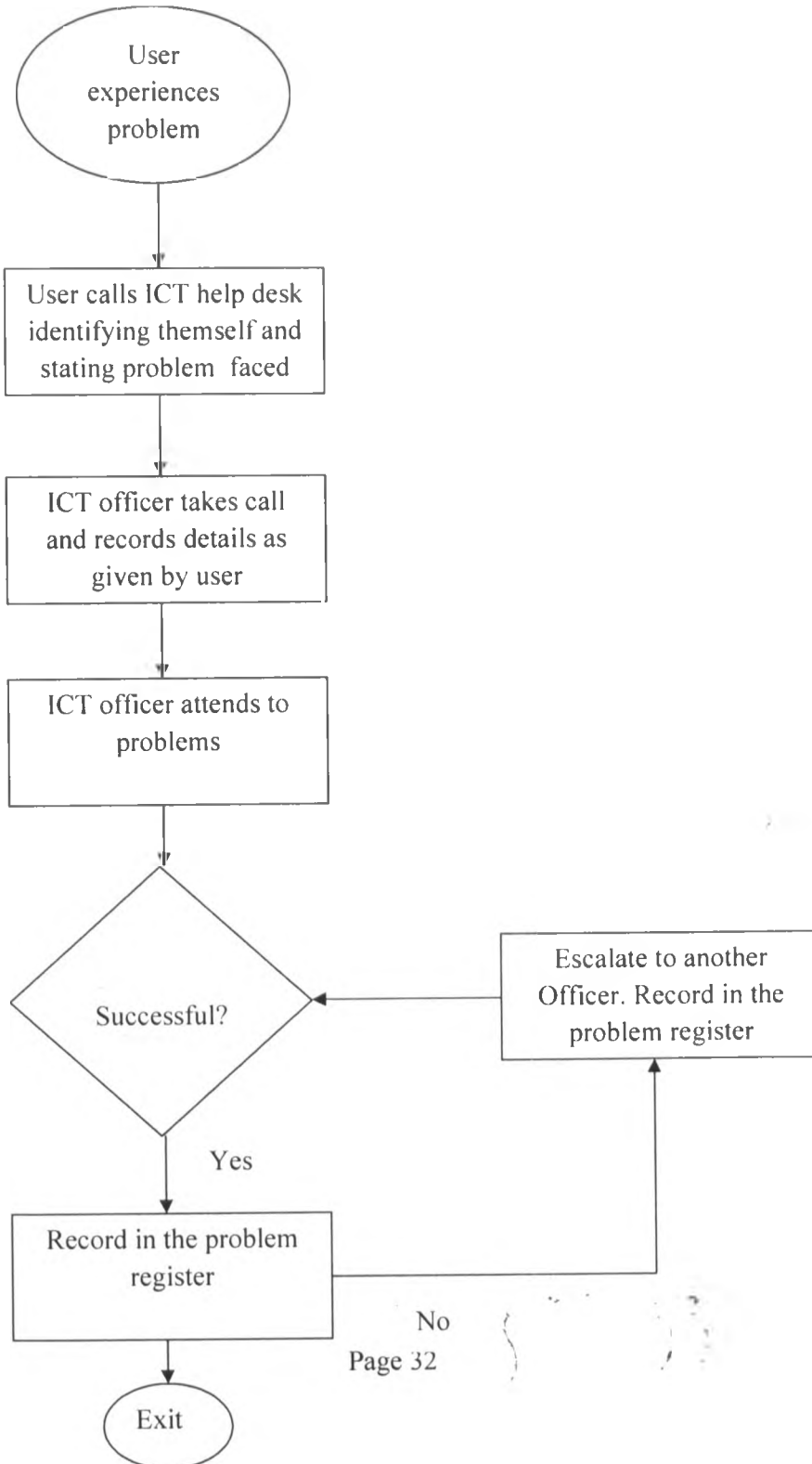
The current problem register is manual. Samples of records kept in the current setup are presented in the appendix section. The prototype system presents a web application to help capture these details. The system can be mined later on to identify problems encountered and how they were solved which can prevent a reinvention of the wheel and also cause the problems to be sorted faster.

Lessons Learnt from Trainings and Events

A lesson learnt is an experience that the organization should retain for future reference. Lessons Learned are validated working knowledge derived from success or failure, that when reused, can significantly impact an organization's process (Secchi 1999). Lessons learnt processes refer to an organization's effort to managing Lessons Learned. Weber et al, 2000; Weber et al., 2001 describe the five Lessons learned processes including collect, verify, store, disseminate, and reuse ; this basically is what knowledge management is about. Lessons learned systems are motivated by the need to preserve an organizational knowledge by converting individual knowledge into organizational knowledge so that, when experts leave the organization, other employees may benefit from the captured lessons learned to solve problems that may closely or exactly match to the similar or different contexts. Such a system is presented by Shariff et al. (2005).

In this prototype system, lessons learnt range from valuable outcomes and techniques that can be repeated or an undesirable outcome that can be avoided to prevent a recurrence basically what worked well and what did not work. The system captures lessons learnt using two tools. One of them is the help desk register. Employees in the organization call the ICT department when in need of an ICT support. The ICT officer assigned responsibility attends to the problem and records what transpired. In case a novice employee is faced with a daunting help desk request he can search the past help desk attended to issues for enlightment. The second approach is that of employees encouraged to record key lessons from events like trainings and own experiences. These lessons can be searched and reviewed by the rest of the peers. Natural language searching is also utilized in these two approaches. When a training whether internal or External is done, the trainees are required to summarize key points from the event and note them as lessons learnt. In future these can be availed for reference. The details captured include Event_ID, Event_Date, Event_Title, Event_Details, Lessons_Learnt, and Submitted_By.

Best Practices

Employees can record a best practice which is broadcast to others by searching by topic. Name of the author, Topic and the best practice as Details are captured and managed.

Posts to a Discussion Forum

The system provides a discussion forum on which employees can post either a question, insight or other observation. Others are then able to either reply an answer or any other message. These posts are kept in a database for posterity.

Collaborative Environment

This is done through the discussion forum and a chat interface. Employees' posts and replies to posts of concern.

Approach

The project uses a computer web based system approach for knowledge management to manage both explicit and tacit knowledges of an organization. A web based system was chosen because it is easy to deploy to users; it is not platform dependent and also more manageable as the system is once installed on the server then always availed to clients, reduce s costs as regarding support and maintenance and also better security for the live data. The system is set up such that users are given only a url to access it.

Tacit knowledge management using an expert / decision support system is also considered. Expert systems are considered one of the well known techniques for knowledge management (Nadia, 2008) ; Vostrovosky (2006); Malhotra (2001). Implementation of the tacit knowledge management aspect was hence done through an expert system implementation (Glen Cooper and Marie Burlinson, 1989) guided the process.

System Design

Figure 6 : The Knowledge Management System Modules


```
                    ┌─────────────────────────┐
                    │ User Authentication and │
                    │      Authorization      │
                    └─────────────────────────┘
```

(Tacit Knowledge)

- Expert's Map

- Expert's tacit knowledge as tips and techniques / lessons learnt / standard operating procedures / best practices

(Explicit Knowledge)

- Help Desk Register

- Projects Database

- Suppliers

- Consultants

- Electronic Documents (Books, Magazines, Periodicals, Bulletins, Procedures etc)

(Collaboration)

- Organizational website

- Organization internal web applications

- Related websites

- Collaboration tools

Database Design

Database Name: db_kms

Tbl_users

PK	User_ID
	Username Password
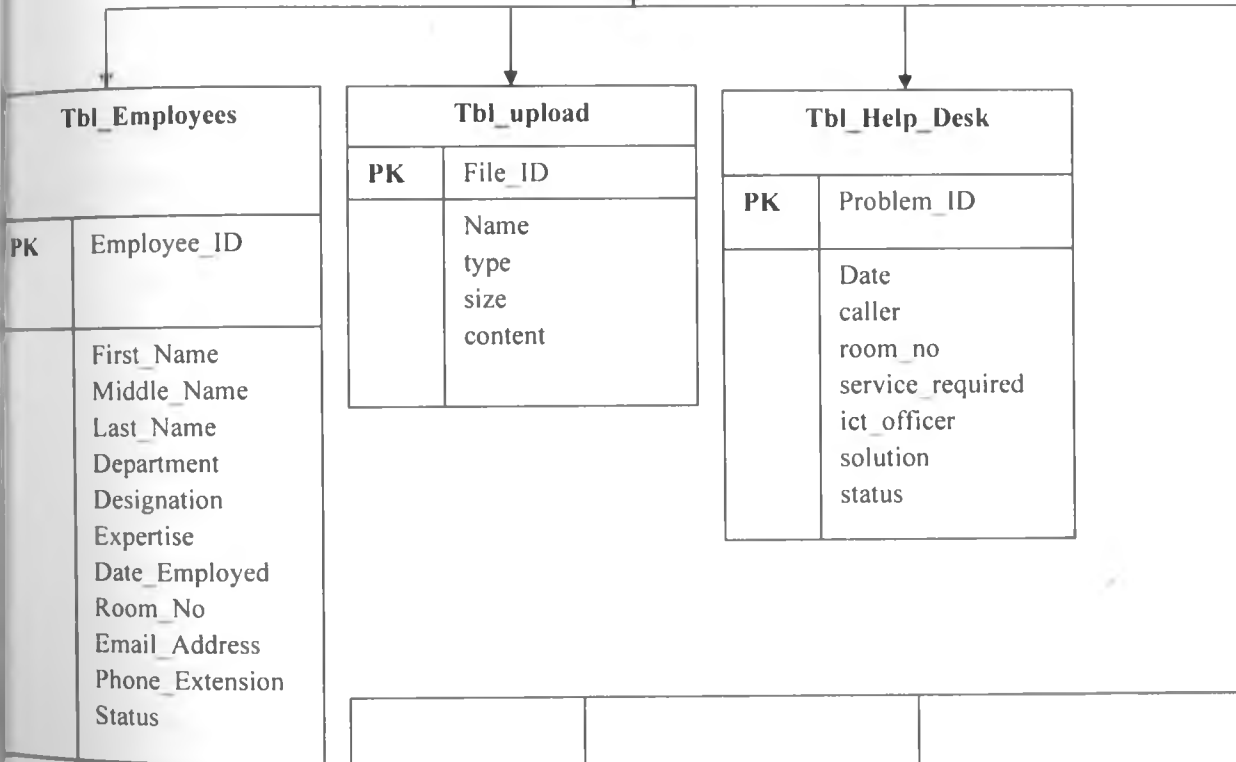
Tbl_Employees

PK	Employee_ID
	First_Name Middle_Name Last_Name Department Designation Expertise Date_Employed Room_No Email_Address Phone_Extension Status

Tbl_upload

PK	File_ID
	Name type size content

Tbl_Help_Desk

PK	Problem_ID
	Date caller room_no service_required ict_officer solution status

Tbl_Projects

PK	Project_ID
	Project_title Project_details department date_started date_completed project_in_charges other_details

Tbl_Consultants

PK	Consultant_ID
	Consultant_name Business_nature Email_address Phone_number Contact_perso

Tbl_Best_Practices

P	ID
	Author Post Details

Tbl_Lessons_Learnt

PK	Event_ID
	Event_Date Event_title Event_details Lessons_Learnt Submitted_By

Figure 7 : Database Design

CHAPTER 4

IMPLEMENTATION

Implementation Overview

This phase deals with the actualization of the prototype system. The prototype system is implemented as a web based database driven system. The codes are presented in APPENDIX 5.

Implementation Tools

The Programming Language

The major language used for the implementation is PHP. PHP a scripting language was chosen due to its ability to create dynamic web pages very fast. As the system is web based, users can access it from a web link as long as they have an internet connection. PHP is also freely available as an open source software an attribute which makes it admirable for use in many organizations as it cuts the financial cost. PHP modules are easily integrated with the Apache web server. Ajax (Asynchronous Javascript And Xml) and Javascript are also used to offer extended functionality to PHP. SPSS Analysis software and Microsoft Excel 2007 have been used for analysing the questionairres.

The Database Management Software

Being a web application, the system sits on a database. The chosen Database Management Software is Mysql because it is a fast multi threaded and multi user robust database management system. Using Mysql ensures that all the system information can be managed from a single database file with seperate tables.Mysql is chosen also because of its ease of compatibility with PHP and its availability as an open source software. Mysql as a Database Management Software also enables creating of robust databases. For ease of graphical user interface based administration of the databases, PHPMyadmin is also utilized.

The Web Server

The web application needs to run on a web server in order to be able to be availed throughout the Organization. The chosen web server was Apache. The above used tools i.e. PHP, Mysql, PHPMyadmin and Apache being all open source software are easily downloaded from the internet either seperately or as packages WAMP (Windows, Apache, Mysql and PHP), LAMP

(Linux, Apache, Mysql and PHP) or XAMP (Apache distribution for Linux, Windows, Mac OS X and Solaris).

The GUI

The GUI is developed using Macromedia Dreamweaver, a professional HTML editor widely used for designing, coding and developing of web pages, web sited and web applications. Dreamweaver beautifully incorporates with php, mysql and apahce to enable create dynamic database inclusive web applications.

CHAPTER 5

TESTING

This section highlights how the system was tested. The system can be accessed by using either the link http://10.101.2.45/kms/login.php or http://localhost/kms.php . These links point to the test server where the application is currently uploaded

System testing is aimed at evaluating the system to determine if it meets the required results. Software testing methods are broadly classified into two categories. These are the white box also known as the structural testing and black box testing also known as functional testing. White box testing concentrates on the procedural details of the system. It looks at the code and the procedural design and among other things determines if all possible paths within a function, test all logical expressions and also execute all loops within a program. The system developer through white box testing gives assurance that all independent paths within a system module have been exercised at least once. He also guarentees that an examination of all logical decisions on their true and false sides have been done, that all loops are executed at least once and a test of their operation at the limits has been done. The developer through white box testing also guarantees that the internal data structures are valid. White box testing is best done in teams but also can be done through the white box desk-test where the system developer performs the white box testing alone at his desk.

Black box or functional testing concentrates on the overall functionality of the system. It tests the system's behaviour against its specifications without making any references to the system's internal structures. Source code is not needed. The test just requires that certain inputs are given to the system and the functionality observed by observing the output. Black box testing sub categorisizes into function testing, system testing, performance testing, stress testing and user testing. Function testing is the first black box test done and it is aimed at evaluating the system's behaviour from the user's point of view. Function testing evaluates the design and the coded product to determine if there is a match. This is done in a stepwise function. System testing focuses on the whole application and its environment. It aims at demonstrating the discrepancies of the system from its requirements and documentation. The testing is done in the environment for which the system was designed. Performance testing goals at showing that the application is not able to fulfill its tasks in the amount of time it is supposed to. Through stress testing it is demonstrated that the system is not able to handle

huge amounts of data even though the system was developed for this especially for real time systems. Stress testing can either be done by subjecting the system to heavy volumes of data for a long period of time or with a high volume of data over a short span of time.

User testing is considered a mixture of all other types of black testing. The test involves a typical user getting the whole system including all documentations to work at it alone. User testing main goal is to prove that the system is suited for the user's requirements. User testing is what leads to either users accepting or rejecting the syste. Lack of user acceptance inhibits the effective implementation of information systems Davis(1993); Gould, Boeis and Lewis (1991) ; Nickerson (1981). The knowledge management system was developed to enable employees improve their performance on the job. But if users reject the system, then no such improvements can be experienced. The user acceptance test is important to know whether the system users will adopt the system developed or not.

Testing the system applies the Unified theory of Acceptance and use of Technology (UTAUT) to evaluate how users evaluate and consequently adopt to information systems. UTAUT is a technology acceptance model that aims to explain user intentions to an information systems and subsequent behaviour while using it.

Figure 8 : UTIT
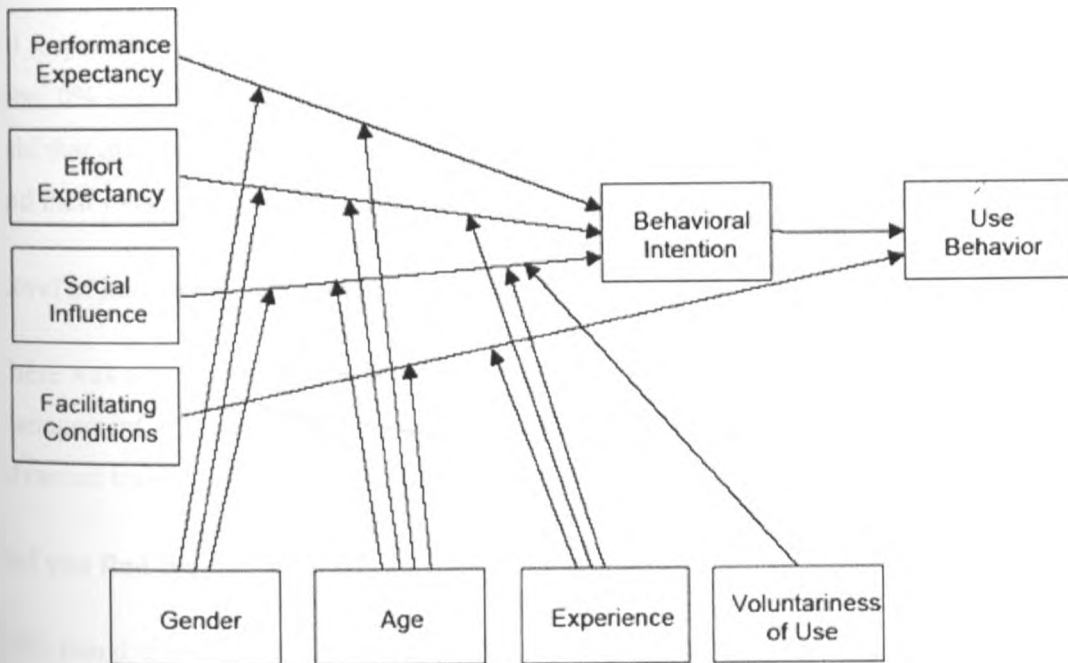
According to UTIT the four pillars that determine how well a user adopts to the system are performance expectancy, effort expectancy, social influence and the facilitating conditions. Others include the age, gender and experience as factors to adoption of technology. UTIT in application is demonstrated by Venkatesh and Davis (2003); H.Wang and S.Wang(2010); Curtis et al. (2010) in the testing of computer based systems. In this paper, UTIT is used in developing a user testing questionnaire that users respond to as a test for the system. The system was developed for an ICT department.

Testing was done by having the ICT Officers in the department access the usability. A user logins to check if the system is configured for security by allowing authentication during login. After the users tested the system they filled a questionnaire to assess the suitability. The screen shots for the tests are captured in the Appendix section. A questionnaire for user acceptance testing is also presented in the Appendix. A discussion of the results from the testing phase follows:

10 respondents were given the questionnaire and all of them returned it. Their responses are as follows.

Is the interest in knowledge management related to the job?

10 responded which is 100% response. 75% said that knowledge management ties with their jobs, 0% said that knowledge management in no ways relates to their job while 25% people said that they don't know whether there exists a relationship between knowledge management and their jobs.

Level of knowledge on knowledge management

There was a 100% response as all respondents responded. 35% have no training in knowledge management, 65% have at least a basic knowledge on knowledge management while 0% have advanced training on knowledge management.

Did you find the user interface of the system friendly?

55% found it user friedly while 45% did not find it user friendly. Among the suggestions given for improvement are have a forgotten passwords link, better arrangement of the

interface, more advanced searches including other fields and a prelogin interface educating users on what the system is all about.

Did you find any issues while accessing the aplication

30% did find an issue while accessing the application while while 70% were confortable while accessing the application.

Did the system break in between the usage?

0% did experience the system breaking while using it while 100% did not experience a system break while using it.

How would you rate the whole system in terms of access and ease of use?

60% found the system moderately easy while 40% found it easy. No one found the system either very easy, difficult or very difficult; all represented as 0%.

Was the system exhaustive?

70% found the application comprehensive to aspects of knowledge management while 30% found the system not comprehensive or exhaustive enough neeeding expansion.

Does the knowledge management system reduce the time spent looking for information compared to what was there before?

85% of the interviews said that the developed knowledge management system has been found to reduce time spent looking for information in the organizatin while 15% of the population says this has not reduce time spent.

Comparative time taken with or without the prototype system

Time taken to search for a contact experts (in Minutes)
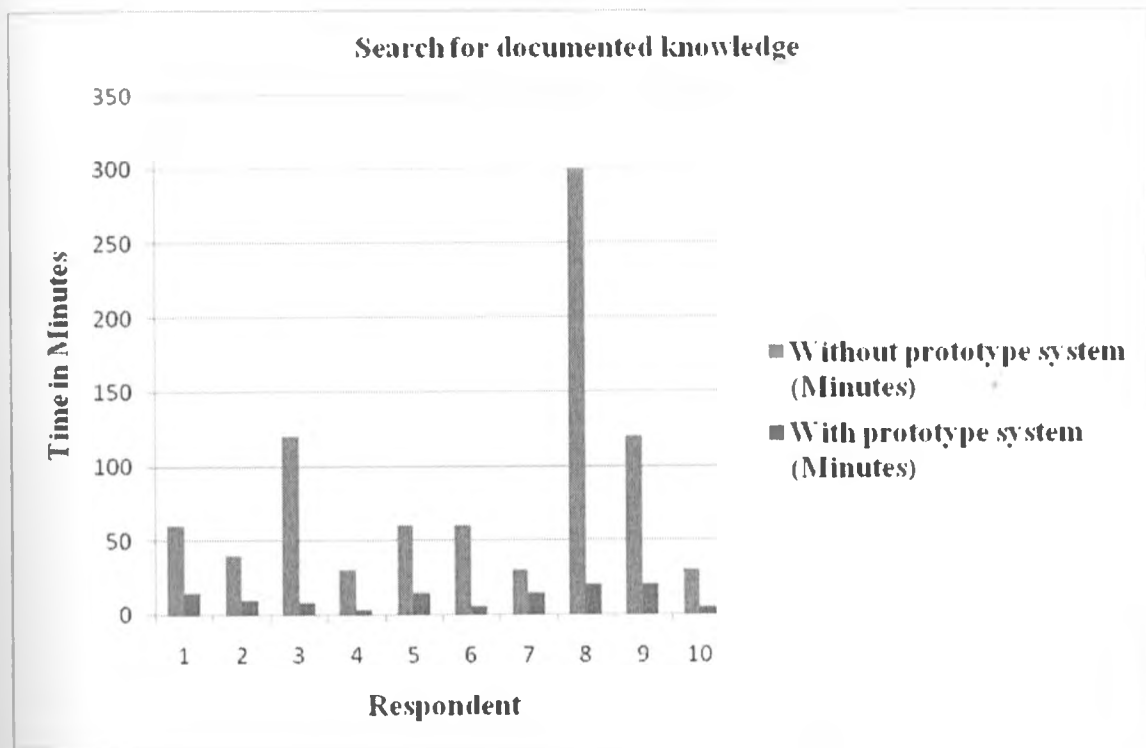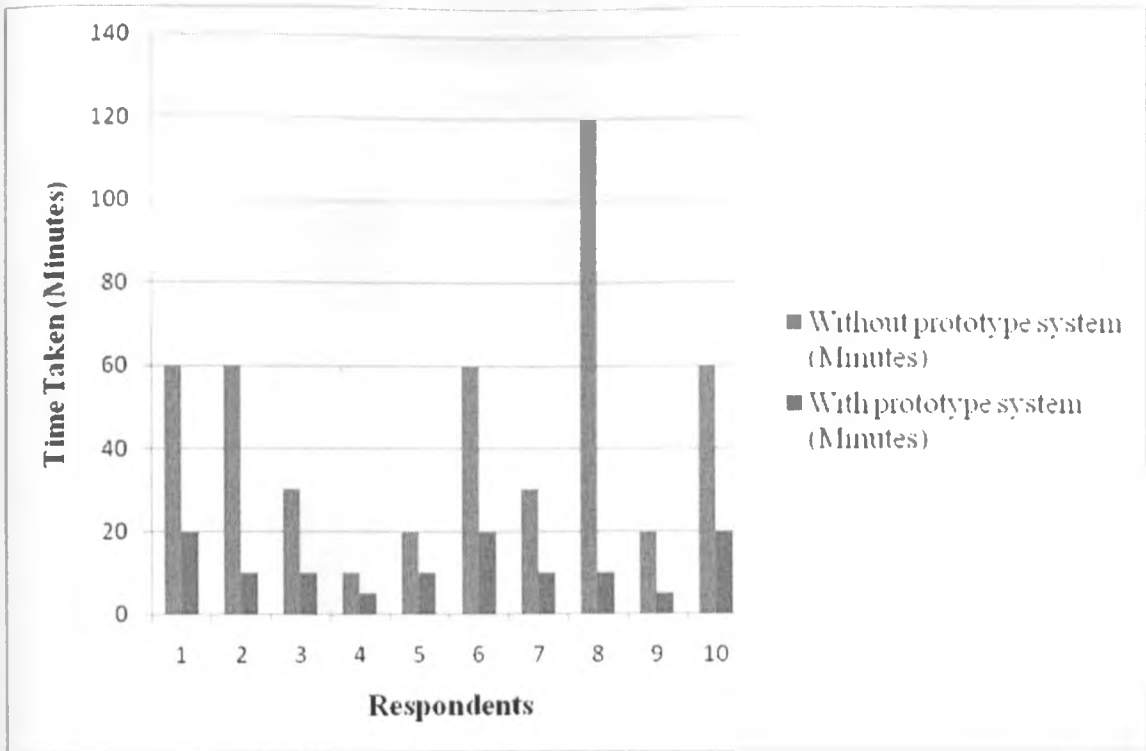
Search for documented knowledge

Experience significant improvement in the speed of searching for knowledge compared to the old system?

Reduce knowledge search time

A bar chart titled "Reduce knowledge search time". The y-axis is labeled "Percentage" ranging from 0% to 120% in 20% increments. The x-axis is labeled "Reduced time on knowledge search?" with categories "Yes", "No", and "Don't Know". The "Yes" bar reaches 100%.
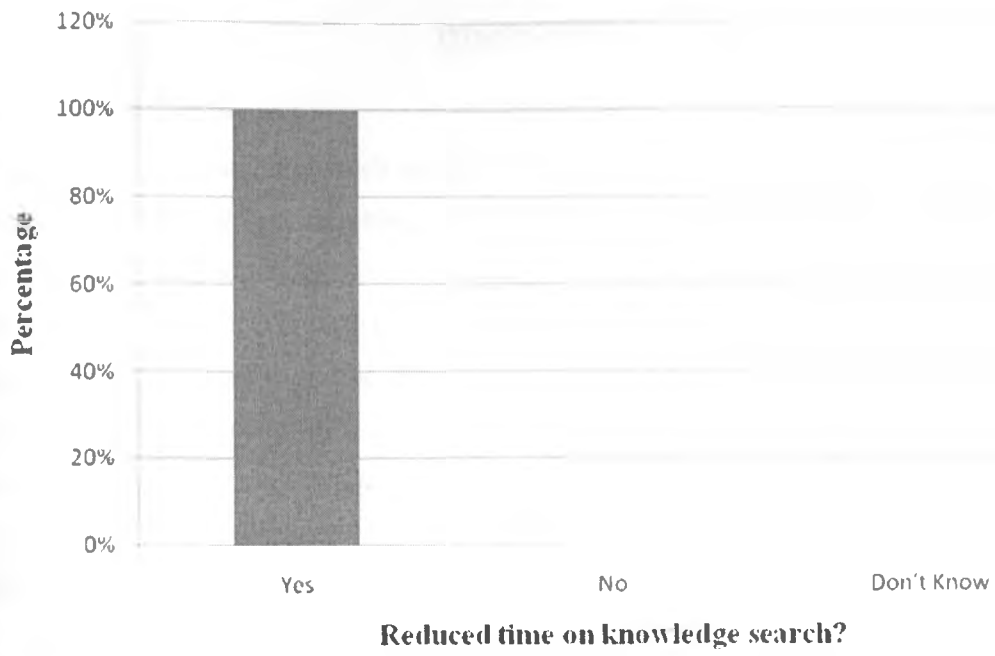
CHAPTER 6

DISCUSSION

Limitations of the project

Natural language searching which is applied for the advanced querying of the records in the database utilizes Full Text searching aspect of Mysql. To apply FullText normal and FullText Boolean searching, the record tables had to be changed from the InnoDB data engine to the MYISAM data engine. MYISAM does not support foreign keys. Application of this very vital constraint could therefore not be done where Natural language querying is defined. Also as organizations are as different as there are many of different kinds with different and varied ways of carrying out their processing. The assumption made is that organizations will fall a similar setup and pattern as the test organization the prototype is based on. In reality differences will arise hence customization might need to be done.

A fully applicable knowledge management is robust involving lots of strategies and practices. To develop such a system for full maximation requires a lot of time. Time allotted for this academic project was bound. There is so much that could be done. However taking into factor that this is a prototype system, it can be redesigned, remodeled, extended, customized and grow to the bounds the customers may require for their individual organizations. With time availed, the system can grow.

Expert systems are a tool that can be applied to knowledge management. However some organizations' structures and ways of operations are in such a way that it is not viable to utilize expert systems.

Recommendations for future work

The study recognizes that there is a lot to be done in the area of knowledge management. Being a system prototype, the system is open for expansion, modification and growth till a full sufficient system is achieved. Below are areas which the researcher feels can be studied further to enrich knowledge management initiatives in Organizations.

Knowledge management strategies can either "pull" or "push" information to their users. The best admired approach is pull. Software agents come in handy for such an implementation. Agents are software components which have properties that are helpful in performing of routine tasks which are normally carried out by human users. As a knowledge management

system comprises various knowledge sources, agents come in handy in the searching over the multiple knowledge sources. Searching agents in particular can help conduct a search operation over large knowledge repositories while still maintaining good efficiency. Filtering agents when used in knowledge management can decide which knowledge is relevant to the user and that which is not therefore rank the search results accordingly for the user they represent. Advertising agents monitor the knowledge base for updates and notify the users about it. Other agents that are essential in knowledge management include user and profiling agents. Agent technology therefore if used in knowledge management offers a richer knowledge experience to an organization.

Data mining also called data or knowledge discovery from databases is a process that involves analyzing data from different perspectives in order to summarize it into useful information. Data mining as a tool can help knowledge management facilities to discover, organize, check and analyze knowledge. Data mining enables a knowledge management solution become proactive which enables knowledge management to offer better quality knowledge which in turn adds more value to the knowledge.

Text mining is involved with extracting unstructured and undetected knowledge which is hidden in collections of unstructured text documents using technology. Through text mining relationships in a text collection are uncovered and this enables discover new knowledge. Text mining is recommended as a research area in organizational knowledge management.

Though knowledge management recommends real time knowledge sharing like online communications using chat messages, there is likelihood that this could be abused with an organization's workforce spending much time online chatting over personal unofficial rather than official work related issues. Sensitizing organizations on work ethics is a practice this study recommends.

An in-depth study and application of Expert Systems as a tool for an organizational knowledge management tool is also recommended as a research area.

CHAPTER 6

CONCLUSIONS

The research study was able to identify the three levels necessary for the management of knowledge in an organization. These are knowledge existing in peoples' heads, documented information and knowledge that comes from people collaborating. A system prototype system has been developed to manage this.

Explicit knowledge management in the prototype system is achieved through document management, managing projects, suppliers and consultants. Through a centralized document management environment, users submit documents to a central place where they are accessible to authenticated users of the organization. The tool allows for uploads, search, view and download documents. After documents are uploaded only an administrator can be able to remove them completely. The submitter of the document is defined, hence at any time we can tell who has uploaded what and when. Explicit knowledge is also captured as details about suppliers, contractors and organizational projects. Users can search for these records easily.

Tacit knowledge is important in an organization. The system defines what is called an experts' are. An expert map which in real case is an employee database is maintained. Important aspects of the employee database is the room no, the phone number, the email account and the field of expertise. When users search by employee expertise all those with such are displayed. Using the email link, the user clicks and an email client opens up with the email address of the expert already input; the user does not have to go looking for the email address, time is saved by this feature. An email can therefore be sent to the expert for assistance. The phone number facility is important as the employee in need can place a call to the expert. The room number helps an employee know where another's office location hence a walk in for problem solving is possible. A discussion forum tool is also provided for tacit knowledge management. Authorized system users submit a topic and a message of discussion. Others respond by posting replies. Posts made to the forum can only be removed by the administrator. The discussion forum cannot only be used for shouting out requests for assistance but can also be used as a platform for posting tips, best practices, insights, procedures which can be viewed later. A best practice and lessons learnt interfaces are also

provided for. Another aspect through which tacit knowledge is managed is through real time chatting. A chat tool is provided by the prototype system.

As the nature of knowledge is so dynamic, the system prototype is bound to change. Currently availed features can be expanded and customized for more functionality. Additional tools can also be implemented to make if fully serve different dimensions of need.

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APPENDIX

APPENDIX 1: Knowledge Management Awareness and Practices

EMILY GAKII MURERWA,
P.O. BOX 3,
NAIROBI 00100.

Dear Respondent,

RE: MSC. COMPUTER SCIENCE RESEARCH PROJECT

I am a Master of Science Computer Science student at the University of Nairobi.

In fulfillment of the course, I am conducting an academic research on Knowledge Management in Organizations. The research aims at developing a prototype system to aid Organizations in managing knowledge.

I would be grateful if you would accept the request to be one of the respondents who will assist in collecting of relevant information related to the objective of the research. The information you will give will be purposely for the research study and will be treated with the utmost confidentiality. I do appreciate your assistance.

Thank you.

Emily Gakii Murerwa

Researcher

Questionnaire

Assessment of Knowledge Management Awareness and Practices in Organizations

Department: _____

Designation: _____

Please put a tick (√) in the appropriate number or give the necessary details in the spaces provided.

1. What do you understand by the term
    knowledge?_____
    _____
    _____
    _____
    _____
    _____
    _____
    _____
    _____

2. In your own opinion, is knowledge management important in an Organization?
    a) Yes
    b) No
    c) If a) or b), do explain
        _____
        _____
        _____
        _____

3. Does your Organization recognize Knowledge as part of its asset base?
    a) Yes

b) No
c) Don't Know

4. What does your Organization think of Knowledge Management?
   a) Never heard of it
   b) Being done but has a different name
   c) A passing fad
   d) Something beneficial to the Organization

5. What do you think of stored knowledge at your Organization?
   a) Trivial, part of formalities and not of much use
   b) Important, relevant but not updated regularly
   c) Important, relevant and latest

6. How much time does it take an employee at your Organization to get the relevant knowledge when needed?
   a) A few minutes
   b) A few hours
   c) A few weeks
   d) A few days
   e) Unable to trace

7. Which of the following does your Organization have?
   a) A written Knowledge Management policy / strategy
   b) Culture and value system to promote knowledge sharing
   c) Partnerships and alliances aimed at acquiring knowledge
   d) Policies and / or programs intended to improve worker retention

8. How does your Organization reward knowledge sharing?
   a) With Monetary incentives
   b) With non monetary incentives
   c) If (b) Specify _____

9. How does senior management view Knowledge Management in your Organization?
   a) Very important and offers full support
   b) Very important but hardly supports it
   c) As a waste and hardly bothers
   d) Initially supportive but has now lost interest

10. Does your Organization create and support 'Communities of Practice'
    a) Yes
    b) No
    c) Not Sure

11. Your Organization:
    a) Captures and uses knowledge obtained from its employees, clients, suppliers among others

b) Encourages more experienced employees to transfer their knowledge to new or less experienced employees
c) Offers trainings to keep employees skills current
d) Provides formal training related to Knowledge Management
e) Provides informal trainings related to Knowledge Management

12. Workers at your Organization share information or knowledge by:
   a) Regular update of a database of good practices, listing of experts and lessons learnt
   b) Facilitating collaborative work practices
   c) Preparing of written documentations of lessons learnt, training manuals, publication articles, system and user manuals

13. Which technologies has your Organization implemented?
   a) Internet
   b) Intranet
   c) Extranet
   d) Data Warehouses
   e) Groupware
   f) Decision Support Systems
   g) Data Management System
   h) Knowledge Management System
   i) Any other ---- Specify_____

14. Which group(s) is currently responsible for the Knowledge Management practices at your Organization?
   a) ICT
   b) Library
   c) Knowledge Management Unit
   d) Human Resources Unit
   e) Other ------ Specify_____

15. Do the current knowledge management practices in your Organization have a dedicated budget?
   a) Yes
   b) No
   c) Don't Know

16. Does your Organization measure the effectiveness of the Knowledge Management practices?
   a) Yes
   b) No
   c) If a) above, specify _____

17. What factor(s) would motivate your Organization to implement or increase knowledge management practices?

a) Help protect the Organization from loss of knowledge due to workers departures
b) Difficulty in capturing employees / consultants undocumented knowledge
c) Use of Knowledge Management practices and tools by other Organizations.
d) Promote sharing of knowledge among employees
e) Better decision making
f) Faster response to key business issues
g) Improve quality and delivery
h) Improve customer focus
i) Help integrate knowledge within your organization
j) Others....... Specify_____

18. Which of the methods below does your Organization use for training?
a) Formal mentoring practices like apprenticeships
b) Paid for tuition for work related courses
c) Reimbursing of tuition for successfully completed work related courses
d) Encouraging of experienced employees to transfer their knowledge to less experienced employees
e) Formal training in regards to knowledge management
f) Other..... Specify _____

19. In your own view through which methods do you feel Knowledge Management should be implemented in an Organization?

_____
_____
_____
_____
_____
_____
_____

20. Is use of technology essential in Knowledge Management?
a) Yes
b) No
c) Don't Know

Explain   your
response_____
_____
_____
_____

Thank you for your response

APPENDIX 2: Questionnaire Analysis Report

Department

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	RPD	3	14.3	14.3	14.3
	ICT	2	9.5	9.5	23.8
	Admin	5	23.8	23.8	47.6
	HRMU	1	4.8	4.8	52.4
	State functions	1	4.8	4.8	57.1
	Accounts	1	4.8	4.8	61.9
	MDGs	3	14.3	14.3	76.2
	Internal Audit	1	4.8	4.8	81.0
	ISTI	1	4.8	4.8	85.7
	Macro	1	4.8	4.8	90.5
	Registry	1	4.8	4.8	95.2
	Library	1	4.8	4.8	100.0
	Total	21	100.0	100.0	

Designation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Economist	3	14.3	14.3	14.3
	ICT Officers	2	9.5	9.5	23.8
	HMU Officer	2	9.5	9.5	33.3
	PA	1	4.8	4.8	38.1
	Secretary	3	14.3	14.3	52.4
	Project Officers	1	4.8	4.8	57.1
	Programme Officer	3	14.3	14.3	71.4
	Administrator	3	14.3	14.3	85.7
	Auditor	1	4.8	4.8	90.5
	Clerk	1	4.8	4.8	95.2
	Librarian	1	4.8	4.8	100.0
	Total	21	100.0	100.0	

What do you understand by the word knowledge?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Practical understanding of something	9	42.9	42.9	42.9
	Useful information to a certain group	1	4.8	4.8	47.6
	Range of strategies	1	4.8	4.8	52.4

		Frequency	Percent	Valid Percent	Cumulative Percent
	Skills acquired and accumulate over time	10	47.6	47.6	100.0
	Total	21	100.0	100.0	

Is knowledge management important in an organization?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	95.2	95.2	95.2
	No	1	4.8	4.8	100.0
	Total	21	100.0	100.0	

		Cases	Col Response %
Why is knowledge management inportant?	Improves performance	11	61.1%
	Gives a competitive advantage	18	100.0%
	Ensures sharing of lessons learned	18	100.0%
	Affords room for continous improvement	12	66.7%

Does your organization recognize knowledge as part of its asset base?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	90.5	90.5	90.5
	No	2	9.5	9.5	100.0
	Total	21	100.0	100.0	

What does your organization think of knowledge management?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A passing fad	1	4.8	4.8	4.8
	Something beneficial to the organization	20	95.2	95.2	100.0
	Total	21	100.0	100.0	

What do you think of stored knowledge in your organization?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Important, relevant but not updated regularly	12	57.1	57.1	57.1
	Important, relevant and	9	42.9	42.9	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	latest				
	Total	21	100.0	100.0	

How much time does it take an employee in your organization to get the relevant information when needed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A few minutes	1	4.8	4 8	4.8
	Few hours	7	33.3	33.3	38 1
	A few days	4	19 0	19.0	57.1
	Unable to trace	9	42.9	42.9	100.0
	Total	21	100.0	100.0	

		Cases	Col Response %
Which of the following does your organization have?	Culture and value system to promote knowledge sharing	8	40.0%
	Partnerships and alliances aimed at acquiring knowledge	3	15.0%
	Policies and/or programs intended to improve worker retention	10	50.0%

		Count	Col %
How does your organization reward knowledge sharing?	With monetary incentives	1	5.6%
	With none-monetary incentives	10	55.6%
	No rewards	7	38.9%

		Count	Col %
How does senior management view Knowledge Management in your organization?	Very important and offer full support	15	71.4%
	Very improtant but hardly supports it	5	23.8%
	Innitialy supportive but has now los interest	1	4.8%

		Count	Col %
Does your organization create and support " Communities of Practice"?	Not sure	21	100.0%

		Cases	Col Response %
Your organization:	Captures and uses knowledge obtained from all corners	1	5.0%
	Encourages more experienced employees to transfer knowledge	9	45.0%
	Offers training to keep employees skills current	19	95.0%

		Count	Col %
Workers at your organization share information or knowledge by:	Facilitate collaborative work practices	1	5.3%
	Preparation of written documentation of lessons learned	18	94.7%

		Cases	Col Response %
Which technology has your organization implemented?	Internet	21	100.0%
	Intranet	9	42.9%
	Groupware	1	4.8%
	Decision support system	1	4.8%
	Data management system	6	28 6%

		Cases	Col Response %
Which group is currently responsible for the knowledge management	ICT	8	40.0%
	Library	11	55.0%
	HRMU Unit	10	50.0%

Notes

		Count	Col %
Does your organization measure the effectiveness of the knowldege management practices?	Yes	8	38.1%
	No	13	61.9%

		Count	Col %
Do the current knowledge management practices in your organization have a dedicated budget?	Yes	1	4.8%
	No	9	42.9%
	Not sure	11	52 4%

		Cases	Col Response %
What factors would motivate your organization to implement KM	Protecting the organization from loss of knowledge from departure	12	57.1%
	Difficulty to capture undocumented knowledge	9	42.9%
	Use of the practices and tools by other organizations	12	57.1%
	promote sharing of knowledge among employees	8	38.1%
	Better decision making	2	9.5%

		Cases	Col Response %
Which of the methods does your organization use for training?	Formal mentoring practices like partnerships	2	10.0%
	Paid for tuition for work related courses	12	60.0%
	Reimbursing of tuition for successfully completed courses	12	60.0%
	Encouraging transfer of knowledge from experienced workers	7	35.0%

		Cases	Col Response %
Through which method can KM be implemented in the organization?	Regular training/workshops and with a dedicated budget	21	116.7%
	Team work	16	88.9%
	Rewarding for new knowledge	12	66.7%
	Sponsoring Exchange programmes	1	5.6%

		Count	Col %
Is use of technology essential in knowledge management?	Yes	20	100.0%

		Cases	Col Response %
Use of technology is essential in KM because	Important in retrieval, processing and storage of data	10	52.6%
	Fast, reliable and efficient	17	89 5%
	Reduces overal operations cost	9	47 4%

APPENDIX 3: Knowledge Audit

1. How many employees are there in the department?
2. What is their expertise?
3. Which are permanent, casual, interns, consultants?
4. How do the experts collaborate?
5. What kind of documents do you have in the unit?
6. Does the Organization have a website? Web applications? Any application specific to the department?

From answers given above the following was deduced:

ICT Department Knowledge Status		
Documents in the Department	i) ii) iii) iv) v) vi) vii) viii)	ISO Procedures System Manuals User Manuals Reports Books Magazines The Organization monthly bulletin Periodicals
Number of Personnel at the ICT Department at any one time	vii) viii) ix) x) xi) xii)	Head of ICT Department - 1 Government employed ICT Officers – 3 United Nations Volunteers (ICT Specialists) – 2 Interns (ICT) – 2 Secretary – 1 Support Staff – 1 Total Number = 10
Officers with specified Expertise	vi) vii) viii) ix) x)	Database –3 Programming – 3 Servers and Network Administration – 1 Help desk – 7 Web Development – 3
Officers' Status	iv)	Permanent – The Head of ICT, the Government employed ICT Officers, the Secretary and the Support staffs are all public service employees and are permanent. These are 6 personnel

		in the department.
	v)	Contract – The United Nation Volunteers (UNVs) who are ICT Specialists and Experts are recruited by UNDP and forwarded to the Government Organization to build capacity in the department. They have a four year non renewable contract. When the UNVs' four year term expires, the UNV has to leave. A new set of UNVs are recruited for replacement. Some of the most crucial skills in the department are held by the UNVs. Total number of UNVs at any one time is 2.
	vi)	Interns – The department has at any one time two students on an apprenticeship programme. The students have a contract of up to three months
How do personnel in the department collaborate / share?	vii) viii) ix) x) xi) xii)	Through email Through organization's chat facility (Lotus Sametime) Through phone Through social network sites (facebook, twitter, MySpace) Informal chats e.g. like those done during tea breaks During meetings
Website and Applications	iv) v) vi)	The Organization website An Intranet Stand alone systems

APPENDIX 4: Help Desk Register (Manual)

Date	User/caller	Dept No	Issue Raised / Service required	ICT officer responsible	Stand of the job / Allocating	Solved / Closed
21/06/2021	Maggie Namba		Equipment setup & configuration	Emily	accomplished	closed
21/06/2021	modem review	Eze	Computer effects & troubleshooting Legal lab	Emily	here	done
21/06/2021	hardbridge		help	Emily	box	closed
22/06/2021	Mr Nyamwa	730	Printer Connection	Bernard	Bone	closed
21/06/2021	Mr Ntongo	720	help - configuration Printer	Emily	box	closed
22/06/2021	Peggy Begum		Internet configuration setting configuration	Emily	one	closed
22/06/2021			Connection installation usage	Emily	done	done
22/06/2021	Lucy		laptop review client configuration	Emily	one	done
23/06/2021	Daniel		help install ...	Bernard	Network domain down	working on it
23/06/2021			repairing			... on it
23/06/2021			might review	Emily	here	...
		30	internet usage	Emily	box	do
23/06/2021			internet help ...	Emily	...	done

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Date	Name	No.	Issue	Technician	Status		
7/5/2012	Shasha	813	Computer & mobile set up	Ken	Done	N/A	Yes
21/5/2012	Minister	1034	Connections & mobile set	Sean	Done	N/A	Yes
20/5/2012	Minister	10	Computer & Printer connections & network configuration	Sean	Done	N/A	Yes
22/5/2012	Abduch	208	Flash configuration	Sean	Done	N/A	Yes
22/11/2011	Mc maan		Document entry	Emily	Oke	Oke	Yes
23/05/2012	T5129	Referas office	Graphic configuration	Elsie	Solving	N/A	Solving
23/05/2012	PC	1034	Printer & mobile connection	Sean	Solved	N/A	Solved
23/5/2012	Faddi	944	Printer issues	Sean	Solved	N/A	Solved
23/5/2012	PS		Internet connection & safety care	Ken	Solved	N/P	Solved
24/5/2012	Band	552	Hardware set up & company	Ken	Solved	N/A	Solved
24/5/2012	Yubb	730	Com safety management	Ken	Solved	N/A	Solved
29/5/2012	Varuna Offar		Website Video Flash Player	Ken	Solved	N/A	Solved

```php
echo   "<center>You   need   to   fill   in   a   <b>Username</b>   and   a
<b>Password</b>!</center>";

}else{ $res = mysql_query("SELECT * FROM `tbl_users` WHERE `username` =
'".$username."'");

$num = mysql_num_rows($res);

if($num == 0){

echo "<center>The <b>Username</b> you supplied does not exist!</center>";

}else{

$res = mysql_query("SELECT * FROM `tbl_users` WHERE `username` =
'".$username."' AND `password` = '".$password."'");

$num = mysql_num_rows($res);

if($num == 0){

echo "<center>The <b>Password</b> you supplied does not match the one for that
username!</center>";

}else{

$row = mysql_fetch_assoc($res);

$_SESSION['uid'] = $row['id'];

echo "<center>You have successfully logged in!</center>";

$time = date('U')+50;

mysql_query("UPDATE `users` SET `online` = '".$time."' WHERE `id` =
'".$_SESSION['uid']."'");

        echo 'welcome';

echo $username;

header('Location: kms.php'); }}}     }

?>

<form action="Login.php" method="post">

<div id="border">

<table cellpadding="2" cellspacing="0" border="0" align="center">
```

```html
            <tr>    <td    colspan="2"    align="center"><b>Knowledge    Management
System<br><br>Login to access it</b></td></tr>

            <tr><td colspan="2"> </td></tr>

      <tr>    <td>Username: <font color="#FF0000">*</font></td>

      <td><input type="text" name="username" /> Type your Employment Number as
username</td>          </tr>

      <tr>    <td>Password: <font color="#FF0000">*</font></td>

      <td><input type="password" name="password" /> Type your First Name as the
Password</td>

      </tr>

            <tr>   <td colspan="2" align="center"> </td></tr>

      <tr>    <td colspan="2" align="center"><input type="submit" name="submit" value="
Login    " /></td>

      </tr>

      <tr>    <td    align="center"    colspan="2"><a    href="register_user.php">New
User?</a></td>

      </tr>   </table></div>

      </form>

      </body>

      </html>

       <?php

      ob_end_flush();

      ?>

</body>

</html>
```

Search for Expert

```php
<?php
```

```php
include "menu.php";

?>

<table align="center" width="70%">

<form action="Employees.php" method="post">

<tr>

<td align="center" colspan="2">

<B>Employees Database</B>

</td></tr>

<tr><td><b>Search    For    an    Expert    :    </b></td><td>    <input    type="text"
name="term"> <i>Search by Area of Specialization</i></td></tr>

<tr><td colspan="2" align="center"><input type="submit" name="submit" value="Search for
an Expert"></td></tr>

</form></table>

<?php

include "connect.php"; //mysql db connection here

print "<link rel='stylesheet' href='style.css' type='text/css'>";

if(isset($_POST['submit']))

{

$term=$_POST['term'];

$sql=mysql_query("select * from tbl_Employees where Expertise like '%$term%'");

echo "Employees in  ";

echo $term;

echo '<br>';

echo '<br>';

echo "<table border='1'>

<tr>

<th align=left>First Name</th>
```

```php
<th align=left>Middle Name</th>

<th align=left>Last Name</th>

<th align=left>Department</th>

<th align=left>Date Employed</th>

<th align=left>Expertise</th>

<th align=left>Designation</th>

<th align=left>Room Number</th>

<th align=left>Email Address</th>

<th align=left>Phone Extension</th>

<th align=left>Status</th></tr>";


while ($row=mysql_fetch_array($sql))
{
echo "<tr>";
echo "<td>" .$row['First_Name'] . "</td>";
echo "<td>" .$row['Midde_Name'] . "</td>";
echo "<td>" .$row['Last_Name'] . "</td>";
echo "<td>" .$row['Department'] . "</td>";
echo "<td>" .$row['Date_Employeed'] . "</td>";
echo "<td>" .$row['Expertise'] . "</td>";
echo "<td>" .$row['Designation'] . "</td>";
echo "<td>" .$row['Room_No'] . "</td>";
echo "<td><a href=\"mailto:" . $row['Email_Address'] . "\">" . $row['Email_Address'] . "</a></td>";
echo "<td>" .$row['Phone_Extension'] . "</td>";
echo "<td>" .$row['Status'] . "</td>";
echo "</tr>";
```

```php
}

echo "</table";

}?>
```

Help Desk Record

```php
<?php

include "connect.php";

if(isset($_POST['submit']))

{

$sql="INSERT INTO `tbl_help_desk` (Date, caller, room_no, service_required, ict_officer,
solution,                              status)                              VALUES
('$_POST[date]','$_POST[caller_name]','$_POST[room_no]','$_POST[service_required]','$_P
OST[ict_officer]','$_POST[solution]','$_POST[status]')";

if (!mysql_query($sql))

  {

  die('Error: ' . mysql_error());

  }

echo "1 record added";

}

?>
```

Search past help desk records

```html
<a href="Help_Desk.php">Home</a>

<table align="center" width="70%">

<form action="Search_help_desk_prob.php"method="post">

<tr> <td align="center" colspan="2"><B>Help Desk Previous Incidents</B>

</td></tr>

<tr><td><b>Search   a   previous   incident   :   </b></td><td>   <input   type="text"
name="term"> <i>Search by topic area; type a word(s) of the topic</i></td>

</tr>
```

```php
<tr><td colspan="2" align="center"><input type="submit" name="submit" value="Search
Past Help Desk Problems"></td></tr>

</form>

</table>

<br><br>

<?php

include "connect.php";

if(isset($_POST['submit']))

{

$term=$_POST['term'];

//$sql=mysql_query("select * from tbl_Employees where Expertise like '%$term%'");

$sql=mysql_query("select  *  from  tbl_help_desk  where  match(service_required,solution)
against ('%$term%')");

echo "<table border='1' align='center'>

<tr>

<th align=left>Problem Number</th>

<th align=left>Date of Call</th>

<th align=left>Caller</th>

<th align=left>Room Number</th>

<th align=left>Service Required</th>

<th align=left>ICT Officer</th>

<th align=left>Solution</th>

<th align=left>Status</th>

</tr>";

while ($row=mysql_fetch_array($sql))

{

echo "<tr>";
```

```php
echo "<td>" .$row['problem_id'] . "</td>";

echo "<td>" .$row['Date'] . "</td>";

echo "<td>" .$row['caller'] . "</td>";

echo "<td>" .$row['room_no'] . "</td>";

echo "<td>" .$row['service_required'] . "</td>";

echo "<td>" .$row['ict_officer'] . "</td>";

echo "<td>" .$row['solution'] . "</td>";

echo "<td>" .$row['status'] . "</td>";

echo "</tr>";

}

echo "</table>";

}?>
```

Lessons learnt recorded
```html
<form action="Lessons_learnt_record.php" method="post">

<table align="center" width="60%">

<tr><td colspan="2" align="center"><b>Record Lessons Learnt</b></td></tr>

<tr><td colspan="2"> </td></tr>


<tr><td colspan="2"> </td></tr>

<tr><td>Date of Event</td><td><input type="text" name="date">   (YYYY-MM-DD)</td></tr>

<tr><td>Title of Event</td><td> <input type="text" name="event_title"></td></tr>

<tr><td>Event Details</td><td> <textarea name="event_details"></textarea></td></tr>

<tr><td>Lesson Learnt</td><td> <textarea name="lesson_learnt"></textarea></td></tr>

<tr><td>Submitted By</td><td> <input type="text" name="submitted_by"></td></tr>

<tr><td colspan="2" align="center"><input type="submit" value="Record Lesson Learnt" name="submit"></td></tr>
```

```php
</table>

</form>

</table>

<?php

mysql_connect("localhost","root") or die(mysql_error());

mysql_select_db("db_kms") or die ("Could not connect to database");

if(isset($_POST['submit']))

{

$sql="INSERT   INTO   `tbl_lessons_learnt`   (Event_Date,   Event_Title,   Event_Details,
Lessons_Learnt, Submitted_By)

VALUES

('$_POST[date]','$_POST[event_title]','$_POST[event_details]','$_POST[lesson_learnt]','$_P
OST[submitted_by]')";

if (!mysql_query($sql))

 {

 die('Error: ' . mysql_error());

 }

echo "1 record added";

}

?>

<br>

<?php

"<div align=center>

include "Home.php";

"</div>";

?>
```

Lessons learnt search

```html
<table align="center" width="70%">

<form action="Lessons_learnt_search.php"method="post">

<tr>

<td align="center" colspan="2">

<B>Lessons Learnt</B> </td>

</tr>

<tr>

<td><b>Search    a    lesson    posted    :    </b></td><td>    <input    type="text"
name="term"> <i>Please type in your search keyword</i></td> </tr>

<tr> <td>Type by Topic<br> E.g. networks, print </td></tr>

<tr><td colspan="2" align="center"><input type="submit" name="submit" value="Search
Lessons Database"></td></tr>

</form></table><br><br>


<?php

mysql_connect("localhost","root") or die(mysql_error());

mysql_select_db("db_kms") or die ("Could not connect to database");

if(isset($_POST['submit']))

{


$term=$_POST['term'];

$sql=mysql_query("select        *        from        tbl_lessons_learnt        where
match(Event_Details,Lessons_Learnt) against ('%$term%')");

echo "<table border='1' align='center'>

<tr>

<th align=left>Date</th>

<th align=left>Event Title</th>
```

```php
<th align=left>Event Details</th>

<th align=left>Lesson Learnt</th>

<th align=left>Submitted By</th>

</tr>";

while ($row=mysql_fetch_array($sql))

{

echo "<tr>";

echo "<td>" .$row['Event_Date'] . "</td>";

echo "<td>" .$row['Event_Title'] . "</td>";

echo "<td>" .$row['Event_Details'] . "</td>";

echo "<td>" .$row['Lessons_Learnt'] . "</td>";

echo "<td>" .$row['Submitted_By'] . "</td>";

echo "</tr>";

}

echo "</table";

}?>
```

Upload a document

```html
<form method="post" enctype="multipart/form-data">

<table width="350" border="0" cellpadding="1" cellspacing="1" class="box" align="center">

<tr><td colspan="2" align="center"><b>Document Management System</b></td></tr>

<tr><td colspan="2">  </td></tr>

<tr><td colspan="2">Browse for a Document to upload. Ensure the file name does not have spaces between them</td></tr>

<tr><td colspan="2">  </td></tr>

<tr> <td width="246"><input type="hidden" name="MAX_FILE_SIZE" value="2000000">

<input name="userfile" type="file" id="userfile"> </td>
```

```php
<td width="80"><input name="upload" type="submit" class="box" id="upload" value="
Upload "></td></tr>

<tr><td colspan="2">  </td></tr>

</table></form>

<?php
if(isset($_POST['upload']) && $_FILES['userfile']['size'] > 0)

{

$fileName = $_FILES['userfile']['name'];

$tmpName  = $_FILES['userfile']['tmp_name'];

$fileSize = $_FILES['userfile']['size'];

$fileType = $_FILES['userfile']['type'];

$fp      = fopen($tmpName, 'r');

$content = fread($fp, filesize($tmpName));

$content = addslashes($content);

fclose($fp);


if(!get_magic_quotes_gpc())

{

   $fileName = addslashes($fileName);

}
include 'connect.php';

$query = "INSERT INTO uploads (name, size, type, content ) ".

"VALUES ('$fileName', '$fileSize', '$fileType', '$content')";

mysql_query($query) or die('Error, query failed');

echo "<br>File $fileName uploaded<br>";

echo "<br><br>";

print "To upload another file <a href=upload.php>Click Here</a>";
```

```php
} ?>
```

Download a document

```php
<?php

mysql_connect("localhost","root") or die(mysql_error());

mysql_select_db("db_kms") or die ("Could not connect to database");

$term=$_POST['term'];

//$query="select id,name from uploads where match(name) against ('$term')";

$query="select id,name from uploads where match(name) against ('$term') OR match(name)
against ('%$term') OR match(name) against ('$term%')";

        //$query = "SELECT id, name FROM tbl_upload";

        $result = mysql_query($query) or die('Error, query failed');

        if(mysql_num_rows($result) == 0)

        {

                echo "Database is empty ";

                }

        else

        {

        while(list($id, $name) = mysql_fetch_array($result))

        {

        ?>

        <?php

        echo $id;

        ?>

        <a href="Download.php?id=<?php echo $id;?>"><?php echo $name; ?></a> <br>

<?php

}

}
```

```php
?>

<?php

mysql_connect("localhost","root") or die(mysql_error());

mysql_select_db("db_kms") or die ("Could not connect to database");

        if(isset($_GET['id'])) {

        // if id is set then get the file with the id from database

        $id    = $_GET['id'];

        $query = "SELECT name, type, size, content " . "FROM uploads WHERE id = '$id'";

        $result = mysql_query($query) or die('Error, query failed');

        list($name, $type, $size, $content) =  mysql_fetch_array($result);

        header("Content-length: $size");

        header("Content-type: $type");

        header("Content-Disposition: attachment; filename=$name");

        echo $content;

        exit;

        }

        ?>
```

Discussion forums

```php
<?php

include "menu.php";

?>

<?php

include "connect.php"; //mysql db connection here

print "<link rel='stylesheet' href='style.css' type='text/css'>";

print "<A href='post.php'>New Topic</a><br>";

print "<table class='maintable'>";
```

```php
print "<tr class='headline'><td width=50%>Topic of Discussion</td><td width=20%>Posted
By</td><td>Replies</td><td>Time of Last Reply</td></tr>";

$getthreads="SELECT * from forumtutorial_posts where parentid='0' order by lastrepliedto
DESC";

$getthreads2=mysql_query($getthreads) or die("Could not get threads");

while($getthreads3=mysql_fetch_array($getthreads2))

{

 $getthreads3[title]=strip_tags($getthreads3[title]);

 $getthreads3[author]=strip_tags($getthreads3[author]);

 print                              "<tr                             class='mainrow'><td><A
href='message.php?id=$getthreads3[postid]'>$getthreads3[title]</a></td><td>$getthreads3[a
uthor]</td><td>$getthreads3[numreplies]</td><td>$getthreads3[showtime]<br>Last post by
<b>$getthreads3[lastposter]</b></td></tr>";
}

print "</table>";

?>

<?php

include "connect.php"; //mysql db connection here

$id=$_GET['id'];

print "<link rel='stylesheet' href='style.css' type='text/css'>";

print "<A href='Discussion_forums.php'>Back to main forum</a>-<A href='post.php'>New
Topic</a>-<A href='reply.php?id=$id'>Reply<br>";

print "<table class='maintable'>";

print "<tr class='headline'><td width=20%>Author</td><td width=80%>Post</td></tr>";

$gettopic="SELECT * from forumtutorial_posts where postid='$id'";

$gettopic2=mysql_query($gettopic) or die("Could not get topic");

$gettopic3=mysql_fetch_array($gettopic2);

print "<tr class='mainrow'><td valign='top'>$gettopic3[author]</td><td vakign='top'>Last
replied to at $gettopic3[showtime]<br><hr>";
```

```php
$message=strip_tags($gettopic3['post']);

$message=nl2br($message);

print "$message<hr><br>";

print "</td></tr>";

$getreplies="Select * from forumtutorial_posts where parentid='$id' order by postid desc";
//getting replies

$getreplies2=mysql_query($getreplies) or die("Could not get replies");

while($getreplies3=mysql_fetch_array($getreplies2))

{        print    "<tr    class='mainrow'><td    valign='top'>$getreplies3[author]</td><td
vakign='top'>Last replied to at $getreplies3[showtime]<br><hr>";

  $message=strip_tags($getreplies3['post']);

  $message=nl2br($message);

  print "$message<hr><br>";

  print "</td></tr>";

}
print "</table>"; ?>
```

Reply a post

```php
<?php

include "connect.php"; //connection string

print "<link rel='stylesheet' href='style.css' type='text/css'>";

print "<table class='maintables'>";

print "<tr class='headline'><td>Reply</td></tr>";

print "<tr class='maintables'><td>";

if(isset($_POST['submit']))

{

  $name=$_POST['name'];

  $yourpost=$_POST['yourpost'];
```

```php
$subject=$_POST['subject'];

$id=$_POST['id'];

if(strlen($name)<1)

{    print "You did not type in a name."; //no name entered

}

else if(strlen($yourpost)<1)

{    print "You did not type in a post."; //no post entered

}

else  {    $thedate=date("U"); //get unix timestamp    $displaytime=date("F j, Y, g:i a");

   $subject=strip_tags($subject);

   $name=strip_tags($name);

   $yourpost=strip_tags($yourpost);

   $insertpost="INSERT                                                           INTO
forumtutorial_posts(author,title,post,showtime,realtime,lastposter,parentid)
values('$name','$subject','$yourpost','$displaytime','$thedate','$name','$id')";

   mysql_query($insertpost) or die("Could not insert post"); //insert post

   $updatepost="Update          forumtutorial_posts          set          numreplies=numreplies+'1',
lastposter='$name',showtime='$displaytime', lastrepliedto='$thedate' where postid='$id'";

   mysql_query($updatepost) or die("Could not update post");

   print "Message posted, go back to <A href='message.php?id=$id'>Message</a>.";  }

}else{

  $id=$_GET['id'];

  print "<form action='reply.php' method='post'>";

  print "<input type='hidden' name='id' value='$id'>";

  print "Your name:<br>";

  print "<input type='text' name='name' size='20'><br>";

  print "Your message:<br>";

  print "<textarea name='yourpost' rows='5' cols='40'></textarea><br>";
```

```php
    print "<input type='submit' name='submit' value='submit'></form>";}
print "</td></tr></table>";?>
```

Chat

```php
        <?php
         $_SESSION['username'] = "";
        ?>
        <html>
        <head>
        <meta />
        <title>KMS Chat Environment</title>
        <script type="text/javascript">
         function getPage(page, id) {
          var xmlhttp=false;
          try {


            xmlhttp = new ActiveXObject('Msxml2.XMLHTTP');
          } catch (e) {
           try {


            xmlhttp = new ActiveXObject('Microsoft.XMLHTTP');
           } catch (E) {
            xmlhttp = false;
           }
          }


          if (!xmlhttp && typeof XMLHttpRequest!='undefined') {
```

```
    xmlhttp = new XMLHttpRequest();

  }

  var file = page;

  xmlhttp.open('GET', file, true);

  xmlhttp.onreadystatechange=function() {

    if (xmlhttp.readyState==4) {

     var content = xmlhttp.responseText;

     if( content ) {

      document.getElementById(id).innerHTML = content;

} } }

  xmlhttp.send(null)

  return;

  }

  function chat() {

   var user    = document.getElementById('user').value;

   var message = document.getElementById('message').value;

   getPage("chat.content.php?user=" + user + "&message=" + message,"screen");

  document.getElementById('message').value = "";

  }

  function getMessage() {

  getPage("chat.content.php","screen");

  }

 </script></head>

 <style type="text/css">

 body {

  font:12px arial;
```

```css
}


#panel {
  border:1px solid #cccccc;
  height:430px;
  width:462px;
  padding:5px;
}
#title {
  margin-bottom:5px;
}


#screen {
  width:460px;
  height:300px;
  border:1px solid #cccccc;
  margin-bottom:5px;
  overflow-x:hidden;
  overflow-y:auto;
}

#input {
  float:left;
  margin-right:5px;
}
```

```css
#send {
  float:left;
}


#user {
  border:1px solid #cccccc;
  width:150px;
}


#message {
  height:80px;
  width:345px;
  border:1px solid #cccccc;
}


#post {
  height:50px;
  width:100px;
}
</style>
<body>
<script type="text/javascript">
process = setInterval("getMessage()", 1000);
</script>
<div id="panel">
  <div id="title">
```

```html
<span>Username: </span>

<span><input type="text" name="user" id="user" maxlength="15"></span>

</div>

<div id="screen"></div>

<div>

<div id="input">

<textarea name="message" id="message"></textarea>

</div>

<div id="send">

<input type="button" name="post" id="post" maxlength="500" value="Post"
onClick="javascript:chat();" />

</div>

<div id="main"><a href="chat_logout.php">Logout</a></div>

</div>

</div>

</body>

</html>
```
```php
<?php session_start();

mysql_connect("localhost","root","") or die(mysql_error());

mysql_select_db("db_kms") or die(mysql_error());

if(isset($_GET['user']) && isset($_GET['message'])) {

  if(trim($_GET['user']) != "" && trim($_GET['message']) != "") {

    $message = strip_tags(mysql_real_escape_string(trim($_GET['message'])));

    $user    = strip_tags(mysql_real_escape_string(trim($_GET['user'])));

 $_SESSION['username'] = $user;

    $s = "INSERT INTO tbl_chat_message(username,message,posted) VALUES
('$user', '$message',NOW())";

    $q = mysql_query($s) or die(mysql_error());
```

```php
        }

        }

            $s = "SELECT username,message,posted FROM tbl_chat_message WHERE
(DAY(posted) = DAY(CURDATE()) AND MONTH(posted) = MONTH(CURDATE())
AND YEAR(posted) = YEAR(CURDATE())) ORDER BY posted DESC";

        $q = mysql_query($s) or die(mysql_error());

        ?>

        <?php while($r = mysql_fetch_array($q)) {

            if($r['username'] == $_SESSION['username']) $user_bg = '#2C50A2'; else $user_bg
= '#FF3333';

        ?>

            <div style="color:<?php echo $user_bg; ?>">

                <?php echo "<b>" . $r['username'] . " says:</b> " . date('g:i:s a',
strtotime($r['posted'])); ?>

                </div>

            <div style="padding-left:5px; padding-bottom:15px;"

                ><?php echo $r['message']; ?></div>

        <?php }

        session_destroy();

        ?>

<?php
    session_start();

    session_unset();

    session_destroy();

    session_write_close();

    setcookie(session_name(),'',0,'/');

    session_regenerate_id(true);

?>
```
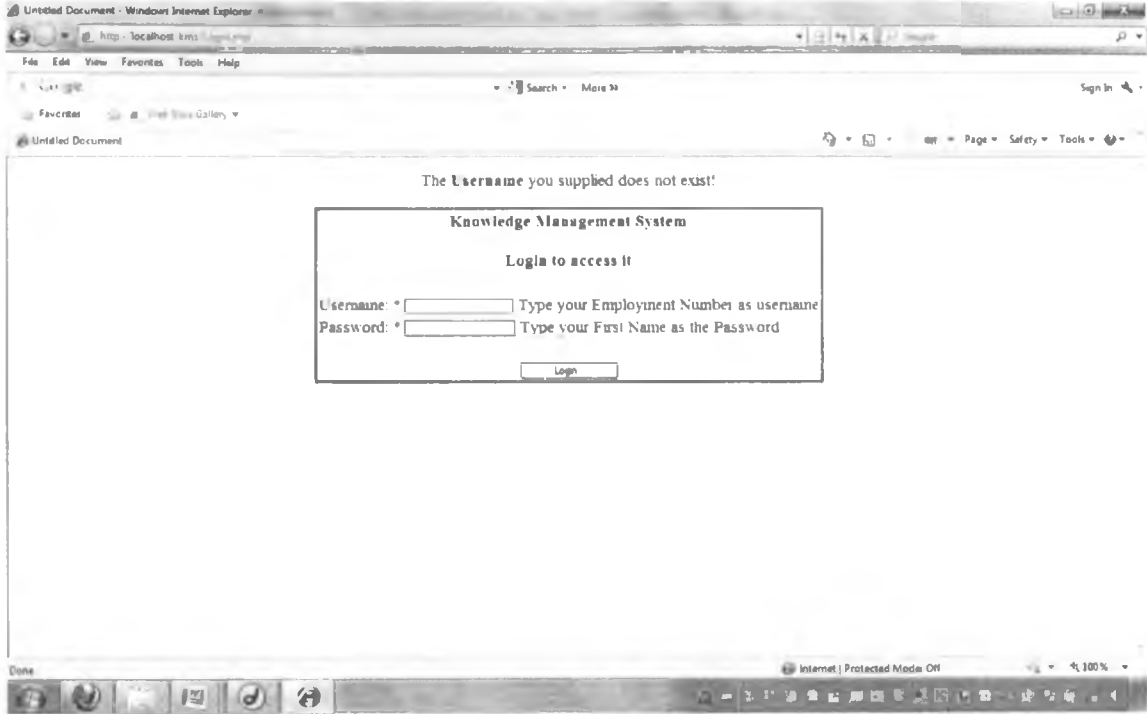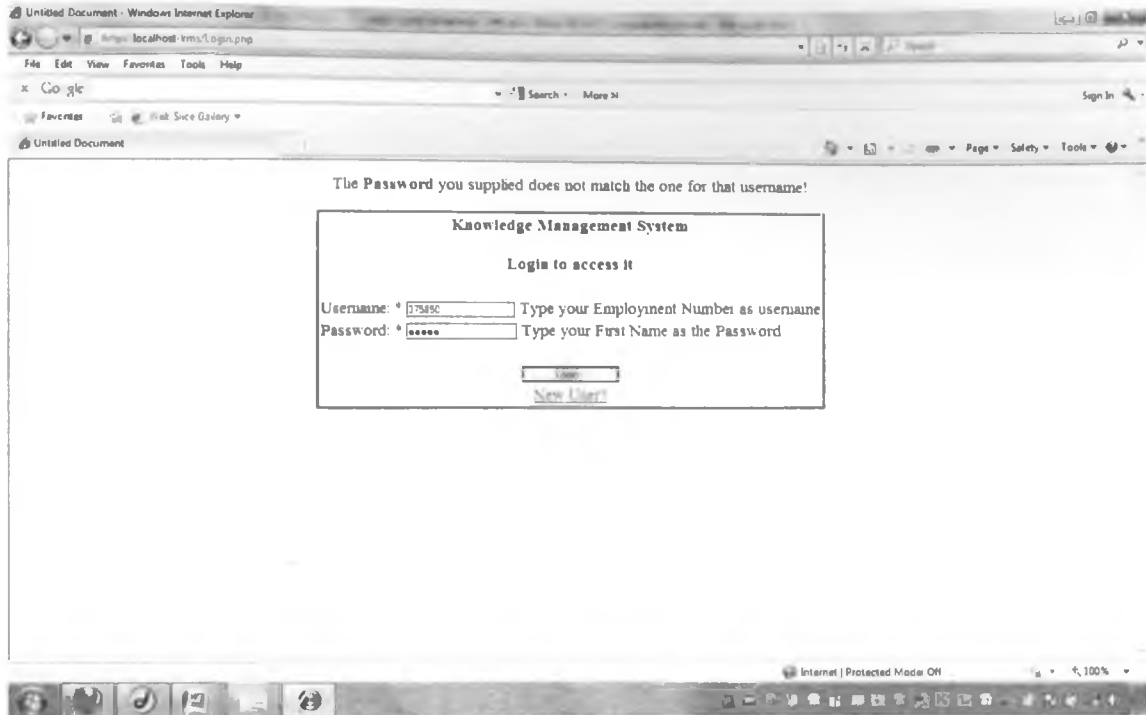
APPENDIX 6: Testing the System
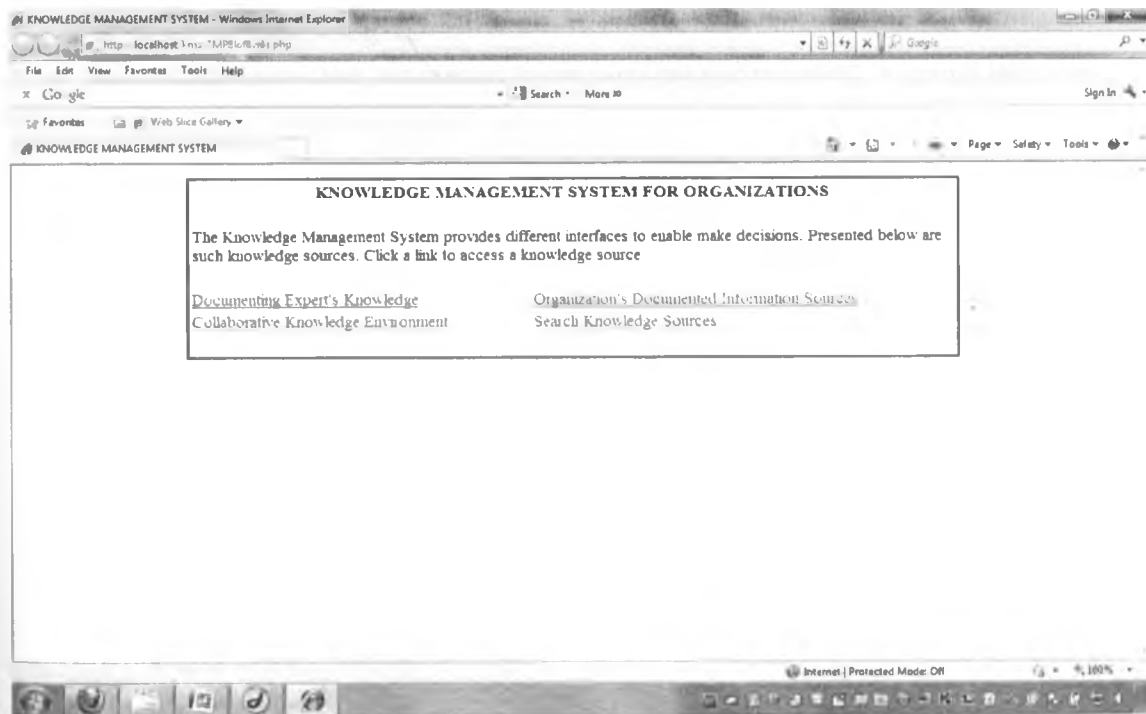
Authentication

Incorrect authentication details, login rejected
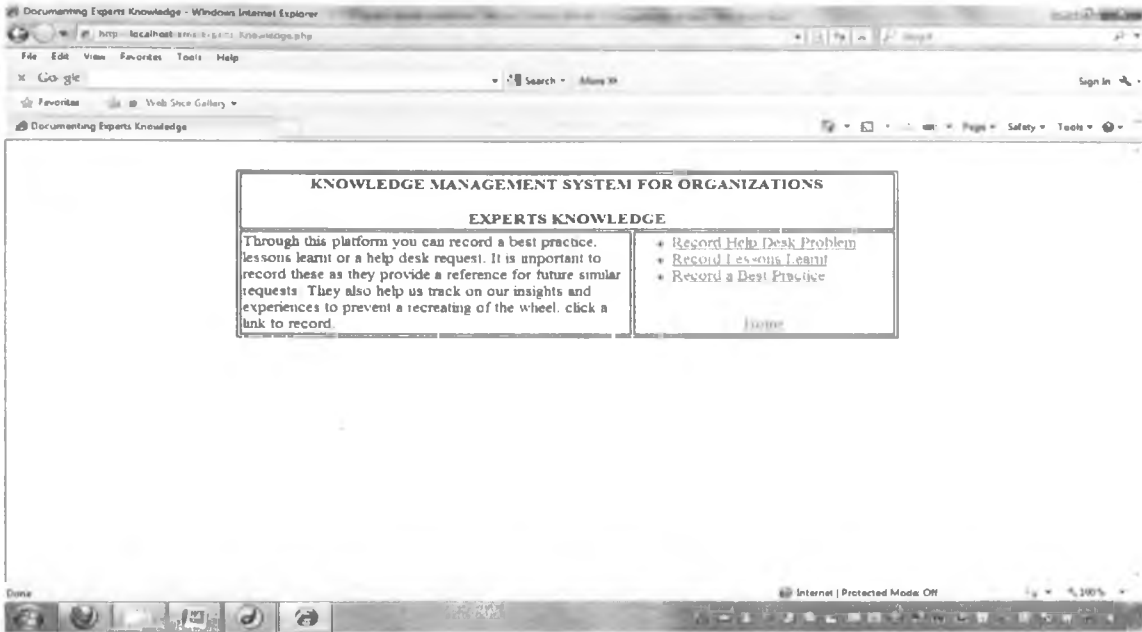
Correct authentication details

Loads the system main page with clickable links to different parts of the knowledge system
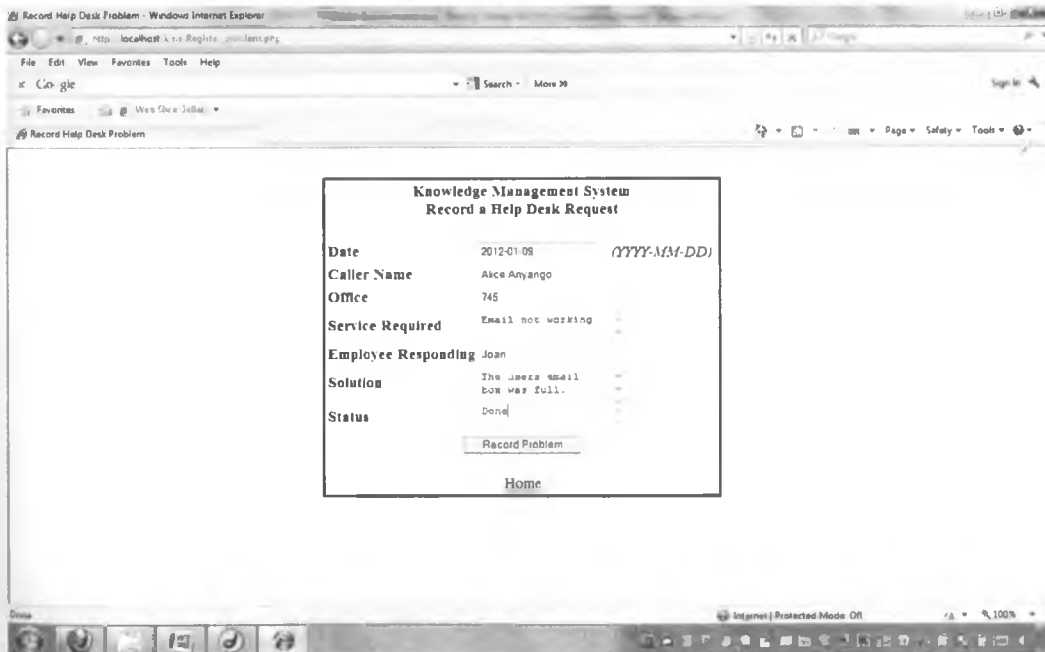
Documenting Experts' Knowledge

Through the interface users record/capture/store experiences and skills as demonstrated in handling user requests for help, lessons learnt from a past experience or a best practice for posterity.
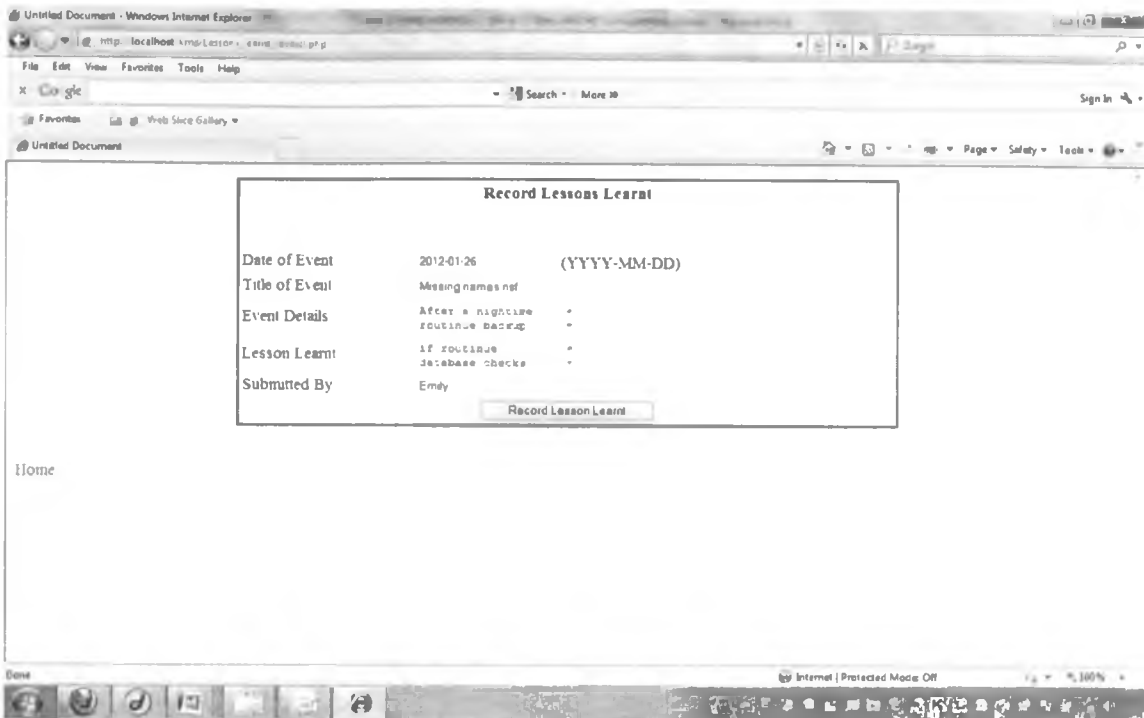

Help Desk Records

Help desk calls and how they are reacted to are captured and recorded. A search later can make it easier to have a faster decision.

Document Lessons Learnt

A record of the lessons learnt is made.

Document a best practice

Search Knowledge Sources

Search for expertise

In a scenario where a new employee would want to easily know who is who in the organization, a search for employees is made possible. This was tested by a search for all employees holding a certain expertise.
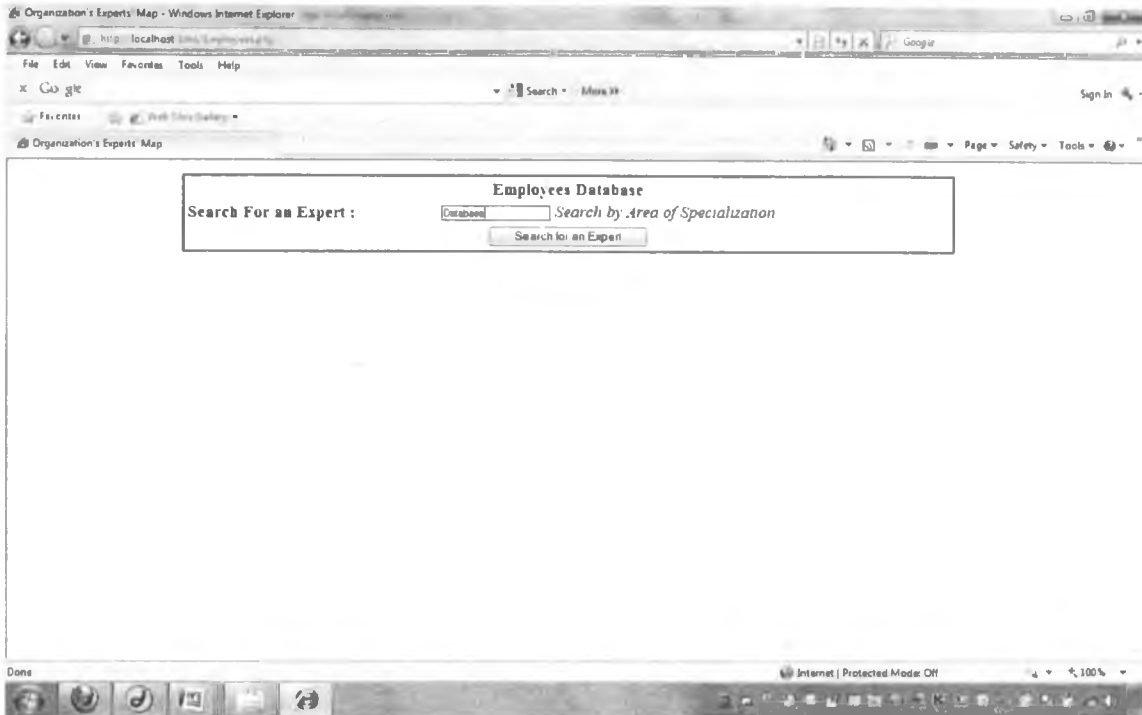
A search for employees with expertise in databases is returned

First Name	Middle Name	Last Name	Department	Date Employed	Expertise	Designation	Room Number	Email Address	Phone Extension	Status
Joan		Njoki	ICT	2012-02-01	Databases	Intern	811	njoki@gmail.com	33183	Intern
Emily		Murerwa	ICT	2008-08-04	Networking, Database	ICT Specialist	811	emurerwa@kms.org	33183	UNV
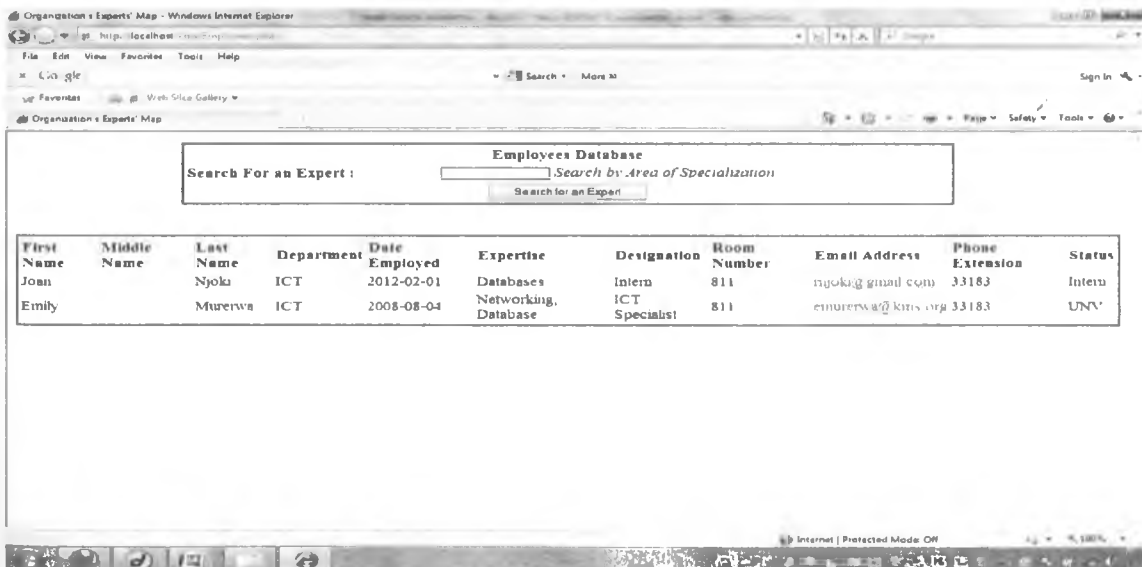
The user searching can now either call using availed phone extension, visting the expert in his office room or send an email via the email link provided. The email link is tested below:

Without specifying a search term all employees are returned.

User utilizes the help desk system

Search records are returned

Help Desk Previous Incidents

Search a previous incident :   Search by topic area: type a word(s) of the topic

Search Past Help Desk Problems

Home

Problem Number	Date of Call	Caller	Room Number	Service Required	ICT Officer	Solution	Status
8	2010-10-25	Mr. Mwalwa	301A	Printer Installation	Wilberforce	A new printer that lacked appropriate drivers for the operating system. Downloaded and installed the drivers.	User able to print
3	2010-06-22	Mr. Nyachiro	730	Printer connection	Bernard	Printer cable was loose. Reconnected the cable	Printer working now
2	2010-07-22	Monica Kagwiria	942	Unable to print.	Emily	The user is using a Network shared printer with other colleagues in the office. User had problems printing because she wasn't connected to the Domain server. Reconnected to Domain, Updated antivirus, scanned machine. Printer working now.	Successfully completed.

User searches for lesson recorded

Date	Event Title	Event Details	Lesson Learnt	Submitted By
2012-01-26	Missing names.nsf	After a nighttime routine backup found that the names.nsf database was missing from the servers mount location. hence all users were not being visible on the database.	if routinue database checks and backup take place on server with limited space. some files may dissapear. always take a backup of important files including names.nsf. ensure there is space on the server mount if databases or files disappear. restore from a most recent backup	Emily

Search Best Practices

Search Best Practices - Windows Internet Explorer

http://localhost/ims.best_practice_search.php

File Edit View Favorites Tools Help

x Google   Search · More >>   Sign In

Favorites   Web Slice Gallery

Search Best Practices   Page · Safety · Tools ·

Best Practices

Search Database :   [andy]   *Search by either author or topic*

Best Practice Search

Done   Internet | Protected Mode: ON   100%

Search Best Practices - Windows Internet Explorer

localhost/ims.best_practice_search.php

File Edit View Favorites Tools Help

x Google   Search · More >>   Sign In

Favorites   Web Slice Gallery

Search Best Practices   Page · Safety · Tools ·

Best Practices

Search Database :   [   ]   *Search by either author or topic*

Best Practice Search

Submitted By	Topic	Best Practice
Emily	Red Hat Linux Command Terminals	Using Linux you can either work from a GUI interface or from a command line interface. There is one GUI and six command terminals. To change to GUI, press CTRL+ALT+F7. To go to command line terminal 1, press CTRL+ALT+F1; terminal 2, press CTRL+ALT+F2; terminal 6, press CTRL+ALT+F6; doing the same for each of those respective terminals.
Emily	Reboot, Shutdown Red Hat Linux Server	1. Ensure all running applications have been stopped To Reboot: 1 At a command prompt, change to superuser status 2. Type command init 6 3. Press enter 4. server shuts down then comes up by itself To completely shut down server 1. open a command line interface 2. type command init 0 3. press enter 4. server will completely shut down
Emily	Stopping Domino Services without shutting down server	At the Domino server log window, type command quit and press enter

Internet | Protected Mode: Off   100%

Organization's Documented Information Sources

KNOWLEDGE MANAGEMENT SYSTEM FOR ORGANIZATIONS

DOCUMENTED KNOWLEDGE SOURCES

This platform aims at centralizing the management of documents in the organization. Documents are uploaded to a central place from where they can be downloaded. Click a link either to upload or download a document.

Online Documents

Home

Upload, View and Upload Documents

This is a central place to manage your online documents. choose to upload, view or download documents

Upload a Document
Download a Document

Documents can be uploaded

File ICT Policy Framework Document.doc uploaded

To upload another file Click Here

Download Files

Document: PROCEDURE MANUAL	Ref No: PMR-12-17
Title: Procedure for System Recovery by use of backed up data/ Business Continuity Plans	Date: 8th March 2010
	Issue No: Draft 1
	Revision: 0
	Page: 1 of 2 Pages

1.   **SCOPE**

From the time a system is unavailable or an inconsistency is discovered to the time a full complete backup restore is done ensuring system availability as it was before.

2.   **PURPOSE**

Collaborative Knowledge Environment

KNOWLEDGE MANAGEMENT SYSTEM FOR ORGANIZATIONS

COLLABORATIVE KNOWLEDGE ENVIRONMENT

Tacit knowledge including expertise, insights and skills is best shared when people collaborate as they ask questions, point out stuff and communicate one another. this can be done informally when we meet over coffee etc, but we can also post to a forum or chat over a technology offerred application. Presented are interfaces to help you share tacit knowledge. Click to access.

- Discussion Forums
- Chat with a colleague

Home

Chat to share knowledge

Real time chatting through a chat interface to share tacit knowledge

Discussion Forums

Discussion forums likened to a message board is utilized both for tacit knowledge sharing and as an expertise storage interface

Post a message

Your name:
Mary

Subject:
License Red Hat Server

Your message:
How can we go about licensing the red hat email server?

submit

Your name:
Runene

Your message:
i guess we can first contact either kipepeo or gestalt..

reply

Page 105

Back to main forum-New Topic-Reply

Author	Post
Mary	Last replied to at August 15, 2012, 5:35 pm
	How can we go about licesning the red hat email server?
munene	Last replied to at August 15, 2012, 5:35 pm
	i guess we can first contact either kipepeo or gestalt..

Logout

Testing - Questionnaire

KNOWLEDGE MANAGEMENT SYSTEM – USER TESTING

Please take a few minutes to fill in the questionnaire below for us to understand your views on the knowledge management system

User testing questionnaire:

Name of the user:

Department:

Phone number:

Email address:

1. I am interested in knowledge management as part of my job

     a) Agree (1)

     b) Disagree (2)

     c) dont know (3)

2. What is your current level of background knowledge of knowledge management?

     a) None (1)

     b) Basic (2)

     c) Advanced (3)
3. Did you find the user interface of the system friendly?
     a. Yes (1)
     b. No (2)

4. If the answer to the above question is 'No', please give your recommendation-----------
     ----
     ----

5. Did you find any issues while accessing the application?
     a. Yes (1)

     b. No (2)

6. If the answer to the previous question is 'Yes', please give a brief description of the issue(s) faced.---
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7. Did the system break in between the usage?
     a. Yes (1)

     b. No (2)

8. How would you rate the whole system in terms of access and ease of use?
     a) Very difficult (1)

     b) Difficult (2)

     c) Moderately easy (3)

     d) Easy (4)

     e) Very easy (5)

9. Was the system exhaustive?
     a) Yes (1)

     b) No (2)

10. Is the system easy to navigate?
     a) Yes (1)

     b) No (2)

11. What suggestions would you give to improve the system?-------------------------------------
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12. Does the knowledge management system reduce the time spent looking for information compared to what was there before?
     a) Yes (1)

     b) No (2)

     c) To a significant extent (3)

d) To a small extent (4)

13. Comparative how much time did you use in the former system to:

    a) Contacting an employee with certain expertise

    b) Getting an answer to a hard problem

    c) Viewing / accessing centralized information?

14. Approximately how much did you spend using the knowledge management system to:

    a) Contacting an employee with certain expertise

    b) Getting an answer to a hard problem

    c) Viewing / accessing centralized information?

15. Did you experience significant improvement in the speed of searching for knowledge compared to the old system?
    a) Yes

    b) No

16. In your own view, will the knowledge management system help you in cutting down time for making decision and hence lead to increase in productivity?
    a) Yes (1)

    b) No (2)

    c) May be (3)

17. What was your purpose for using the software? ---

----

18. Did the system completely solve your purpose?
    a) Yes (1)

    b) No (2)
19. What according to you is the best feature of the system?
    a) Document Management (1)

    b) Sharing tacit knowledge (2)