KNOWLEDGE MANAGEMENT VIA SMART LIBRARY APPLICATION :
UTM EXPERIENCE
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ABSTRACT

The objective of the PSZ's Digital Library System is to make UTM's Library fully electronic, fulfilling the needs of its customers for current and fast information. This is in line with the Library's mission of providing and disseminating information and knowledge in the field of science and technology, fast and accurate; based on its professional expertise and employing information technology. In doing so, it will achieve its aim of being a reference centre of international standard.

INTRODUCTION

As an information provider, a library plays a role in managing information including knowledge. How does librarians manage knowledge? To answer the question, librarians have the mechanism to manage it. With the multi platform system and high skills of the librarian, a library is able to manage knowledge successfully.

Knowledge Management (KM) is not easy to define. KM is the process of creating value from an organization's intangible asset. (Liebwitz, 2001). It refers to intellectual asset or in other word is people knowledge. KM is also the collection of process that govern the creation, dissemination and utilization of knowledge. In one form to another, knowledge management has been around for a very long time. Practitioners have included librarians, philosophers, teachers, politician and so forth (Newman, 1991)

In the information technology era, (internet, web based technologist, etc), we have the connectivity to bridge across isolated islands of knowledge, or the simple word knowledge can be shared. Knowledge sharing is a collaborative way to simulate new ideas, although facilitating this sharing is through

electronic networking fashion. In the IT environment, KM could not be isolated from knowledge Engineering (KE). KE is a process which involves the capture, representation, encoding and testing or evaluating of expert knowledge.

AN APPROACH TO KNOWLEDGE MANAGEMENT

Knowledge is both explicit and tacit. Explicit knowledge comprises of objective facts that are readily documented in various forms or format such as theses, articles, audio, computer files and so forth. Tacit knowledge is very subjective like values, judgment, assumption and intuition. In other words tacit knowledge is in people's head and only surfaces through interaction.

data   *Data: Captured/analyzed*   *Human capability to generate knowledge*
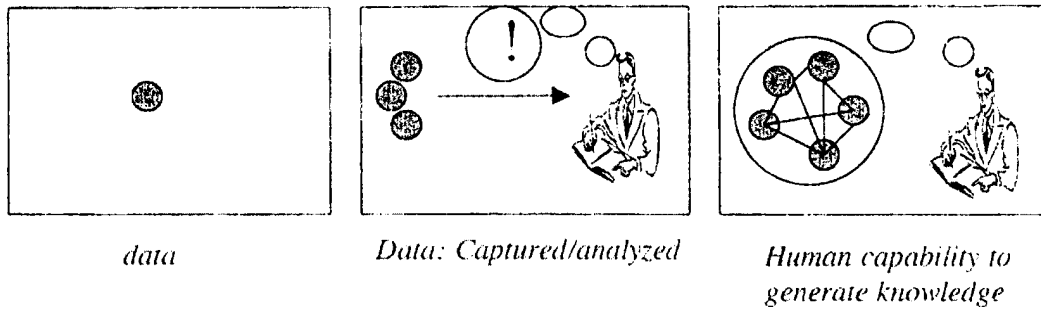
Knowledge has usually been only indirectly managed through resources and information technologies initiatives. The major aspects of knowledge management are:-

- The identification of knowledge needs and knowledge problems and opportunities.
- The design development and implementation of knowledge management strategies and solutions

KM is also concerned with management as shown in the underlying KM life cycle
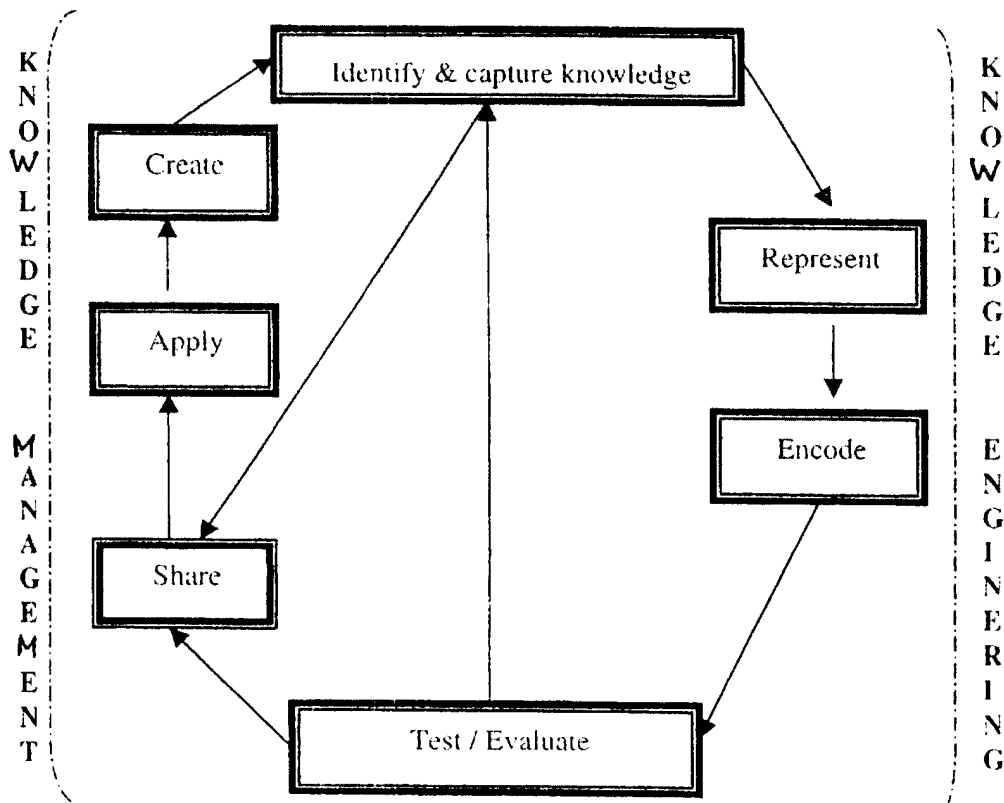
COMBINATION OF KNOWLEDGE MANAGEMENT AND
KNOWLEDGE ENGINEERING LIFE (Liebowitz, 2001)

Knowledge Management: Mapping-Acquisition-Distribution

Knowledge management solution and strategies comprise of the following:

a) Human aspects: training, development, recruitment, motivation, retention, argumentation, job design, cultural change

b) e and encouraging thinking and participation.

c) Process aspect: process innovation, reengineering, both for radical and continuous improvement, mapping and distributing.

d) Technology aspect: information and decision support system, knowledge-base system, data mining system and other system related to this field.

KNOWLEDGE MANAGEMENT VIA PSZ'S SMART LIBRARY APPLICATION

PSZ's Digital Library System meets the challenge of integrating, creating and disseminating, delivering and managing information in the network age with total library solution. With the client/server and web based approach, usage is not only easy, but also comprehensive in function. The design fulfills the requirement of the library's works flow, provides user friendly access to information resources within the library and around the world. PSZ's digital Library system comprises of the following components:

- Library Management System (LMS)
- Document and Knowledge Management
- SMART Library Application System

The system implemented is based on the concept whereby the anchor software is the library Management System, it is integrated to other applications.

HOW DOES PSZ'S DIGITAL LIBRARY SYSTEM WORKS?

Library Management System (LMS)

As the anchor of the Digital Library System, LMS has been designed to run as multi-site system and support all PSZ's branches. The clients provide the library with the ability to

redefine library work-form to suit and individual's need. LMS provides the functionality required for the following modules:

1. Accessing the library Catalogue and contents
2. Cataloguing and Record Maintenance
3. Acquisitions On-line
4. Holdings and Serials Management and Maintenance
5. Check in/ Check-out and Hold library materials

Here is the overview of the LMS functionality.

1. Comprehensive integrated system

   All files and data, including the bibliographic, full-text, authority and holding database files are accessible from all modules and functions
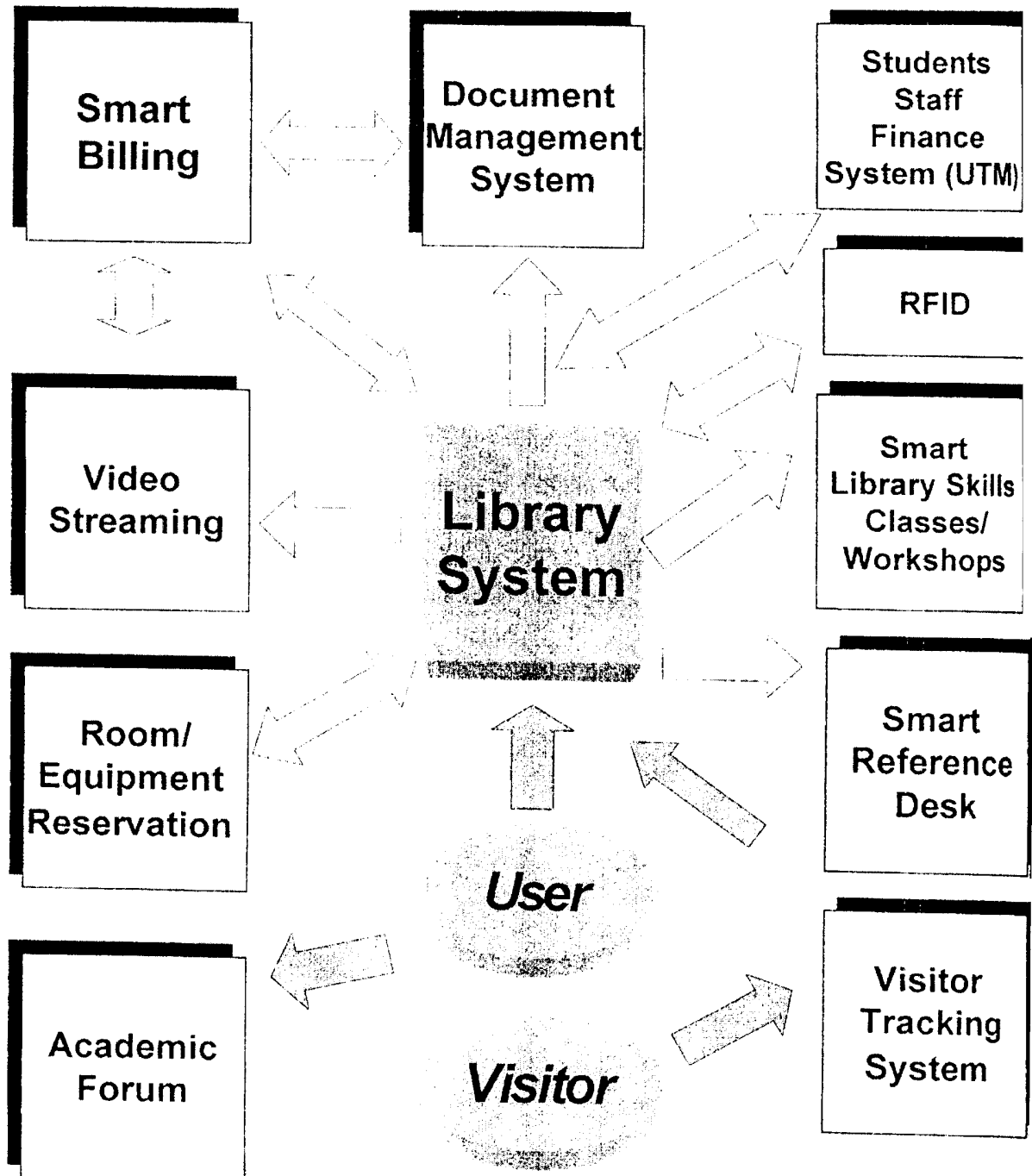
2. Support Library and Data processing Standards

   LMS support including standards such as MARC bibliographic, Z39.50 and related ANSI Standards so that resources sharing and inter-system communication are easier to manage

MARC record can be down loaded from Internet and entered directly into online work-form, maintained and updated online.

The GeoWeb function as a gateway between the hypertext transfer protocol (HTTP) use on the Web, on the library's server using Z39.50 communication standard for search and retrieval of bibliographic data across any range of database. PSZ provides access to the catalogue of multimedia collection such as audio, video, scanned document and information database. Ability to combined search term from different indexes using Boolean operators, refining search result when large set data are returned, limiting result to specific format location and linking to other databases. Different grouping of databases can be presented to different user group such as internal and external users (opening other terminal to display the consortium catalogues and other database selection menu. With the online public catalogue for library's staff, the client station provides a set of bibliographic records to be updated in the cataloging function.

Digital Library : PSZ

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Smart                Document              Students
Billing              Management            Staff
                     System                Finance
                                           System (UTM)

                                           RFID

Video                Library               Smart
Streaming            System                Library Skills
                                           Classes/
                                           Workshops

Room/                                      Smart
Equipment                                  Reference
Reservation                                Desk

                     User
Academic                                   Visitor
Forum                                      Tracking
                     Visitor               System
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Document Management System

PSZ has both systems, Knowledge Management and Document Management System. They have a comprehensive document management platform. Both of them enable PSZ to store & retrieve information or knowledge. PSZ uses CyberDocs which is the Document Management System. Whatever the document type may be whether it is word processing, spreadsheet, image or multimedia, the system provides a secure infrastructure to store, locate, and manage these document-based information.

This system has a profile card, that describes the attributes of the document, and is used as the principle searching mechanism. The profile is like a library card, with common classification information about all documents.

Each document can have any number of attachments, which are essentially response documents, or related documents. Each version may be made up of multiple components. A component is a pointer to the electronic file that the document is stored in. Some products, such an imaging applications, store multiple files for each document, and multiple components will be created

All document activity is logged in an audit trail, or called the history. This includes retrieves, saves, copies, and so forth. It integrates with a wide range of products, including word processors, spreadsheets, groupware, and email. Through integration, users are able to perform some of document clients tasks within the application itself.

One of the primary functions of this system is searching for documents across an enterprise WAN. Searching can be done on the content of the document and on the profiles which describes the document.

Knowledge Management System

Fulcrum Knowledge Server is a knowledge management solution used by PSZ. Through this system, users can conduct single, unified searches across information sources that include Lotus Notes, Microsoft Exchange Server, Web sites, file systems, document management

repositories and databases. With the distributed searching capability, it permits users to seek information that resides anywhere on their network from anywhere on their network.

The main key functionality of this system is knowledge map. Users focus their searches through use of the knowledge map, which can present an enterprise knowledge base in a hierarchical folder structure Knowledge folders respond to areas of endeavour, such as management, sales, human resources or marketing and so forth. They gather together documents that may reside on many different physical devices.

The system searches return a unified result list of document summaries ranked in order of their relevance to the search query. To further refine search results, users use personal Result List Clustering, which groups search results on content.

Agents can be set to monitor Web sites of interest and deliver new information on a schedule they have set. Agents can be created and shared, as queries, to help make important new information more widely known. The system provides access to information in an organization and on external Web sites. Through its Web-based user interface, users gain access to Fulcrum Knowledge Server from any location, without running a local copy of the client application. Users with Web browsers can search indexed information sources on intranets.

SMART LIBRARY APPLICATION

The main objective of the Smart Library Application is to make library services more efficient and to educate users to familiarise with the library environment. PSZ's Smart Library Applications comprise of the following modules:

Billing System

Smart Billing System allows PSZ to control document delivered to users and at the same time will generate fund. This is a highly integrated module with the Library Management System, Document Management System and other library application system to enable Billing

charges to certain digital resources as per view basis and also download. Billing function will automatically appear whenever users view resources that are chargeable. Digital resources that are chargeable can be printed items such as articles, theses, research papers, audio and video publications . These resources are searchable via the library OPAC.

When a user is accessing an item that is chargeable, the system will automatically prompt users for payment before they can download a particular document. The payment to this purchase is made through online credit card payment. Users can choose to use Secure Socket Layer (SSL) or Secure Electronic Transaction (SET) when submitting user's credit card information. Only when the payment is cleared users can download the particular document.

The purchased resource items should be sent to the requestor online or through email. The library may need to set up policy on intellectual property because once the resource items have been sent to the buyer; the buyer actually owns the downloaded copy. This system is linked to the registered bank and also Credit Card Centre.

Video Streaming

Beside printed materials, knowledge can be captured and stored in various format. This is to provide PSZ to publish video or audio contents over the Internet and Intranet. PSZ staff is able to convert analogue video or audio contents using the video workstation. The content feed can easily be converted from WAV and AVI files to ASF for streaming to the Windows Media Player.

The converted videos and audios will be placed in a public directory and create a catalogue item in the library system. Users of the library system will be able to access to this item when they search the library system search engine. The videos and audios is integrated to Smart Billing system so that they can be chargable when there is a request for viewing.

Academic Forum

One method for PSZ to capture tacit knowledge of people is via Academic Forum. Academic Forum is a central discussion area for academicians, researchers and other professions to share their ideas and findings without physically meeting up each other. Users can post their messages onto a common message board and allow others to participate by posting reply messages to the original message

This Forum provides a point of reference where participants can contribute their ideas at different time. These participants can leave the site and come back later to check if there are any additional entries.

The Forum can be offered online for participants in different physical locations to access using web-based interfaces.

Users can create any forum topic within a forum room. Students may raise new questions by creating new topic where as lecturers and other students can participate in the discussion of that topic. All message posted to the original message here will be grouped under the same forum topic.

Administrator can control the right to create new forum room. Therefore, administrator can control the topic to be discussed within the campus. Administrator can also schedule forum to be held at certain time and invite others to attend the forum within the given period. Administrator can do so using a web-based interface to change the message content. The library should define terms and conditions apply to all users who use this forum.

Forum discussion can be archived as a hypertext markup language (html) file for other people to view the content of forum discussion after it is closed. The forum archive can become part of the library reference materials. Patrons can search forum topics together when they are performing a search in the library reference database. The search result will lead patrons to the forum archive directly.

Library Skills Classes/Workshops

PSZ's Smart Library skills, classes and workshop assist librarians to manage or conduct the classes/worshops. This system provides online workshop of library skills to library users. The objective of this module is to provide an alternative for library users to learn about library skills without physically attending the classes. The library skills course materials are divided into sections so that they can be categorized, indexed and formatted to specific content layout. These contents can be in the form of text, pictures and multimedia.

The library can create multimedia video clips of library skills using video streaming. Each video clip is categorized by keyword and topics. These video clips can be as short as one to five minutes. Shorter video clips allow visitors to find out what they are looking quite instantly because each video clip can have more specific keywords. Shorter video clips can also save the visitors' time because of the viewing duration. These video clips are then grouped into sections to create a web-based workshop of library skills.

The front-end user interface is fully web-based. User can use PC desktop that has Internet browser to view the content. Users can also access this system without coming into the library by browsing it over the Internet.

Reference Desk

Smart Reference Desk provides online help to library users by providing frequently ask questions (FAQ). The objective of this module is to help library users without seeking assistance from the reference desk.

This module allows administrator to create FAQ database by entering its question and answer through Internet browser. Administrator can maintain this knowledge- based from anywhere in or out of the campus as long as the application is accessible.This database also allows administrator to key in response between each enquiry. In this way, after patron has finished reading a particular answer, the end of the answer page shows related questions for patron to proceed to the next step.

This module is web-based interface that allow patrons to access even if they are not in the library. The scope of access to this module is determined by how the library has made this module available on Internet.The FAQ can be part of the library system search database. The smart reference desk can publish these contents depending on the librarian's choice.

If users have questions that they cannot find appropriate answer from the Smart Reference Desk, they can post the question using web-based posting question feature. The question is then posted to the librarian and is monitored through this system to ensure that the question is being answered.There are other features such as rating each FAQ to determine its effectiveness. The patrons can use this rating to know the usefulness of the answer. This system also provides schedules for reference desk duty among the librarians.

Visitor Tracking

Smart Visitor Tracking System allows library to register new visitors and monitor their access every time they visit the library again. For non-members who visit PSZ, there should be a defined procedure to register them. For instance, the library may want to implement visitor tag system so that all visitors are registered through the Smart Visitor Tracking System first before they enter the library.

The visitor data is real time from database so that the librarian can view all particulars about the visitor during registration. The librarian can also see the visit log of the visitor over the reference desk

The Smart Visitor Tracking System is flexible enough to handle different admission processes. This system is developed based on Microsoft architecture, a scalable system architecture that allows application to change its components quickly to handle fast pace business requirement changes. This maybe so since the visitor data as well as visitor's usage data to the library resources are stored in the visitors database.

The Smart Visitor Tracking System is integrated to the Library Management System for Library Patron database. In this way, the librarian does not have to recreate non-member data

in patron database if nonmember has decided to register as a member. Instead, the librarian can just transfer the nonmember's data that is available in Smart Visitor Tracking database to the patron database. Thus reducing the time to re-create the patron data as well as the mistakes may make along the way.

Reservation, Check-Out And Check-In Of Rooms/Equipment

The smart reservation system allows library users to reserve library resources such as rooms and equipments over the network. Library users can first view the resources available before they make the reservation. For new library users who are not very familiar with the library resources available, they can view the description of the resources such as incurrence of charges and other information before they can decide to reserve the resource.

This module contains the functionality for the staff to check-in and check-out the rooms. Library users can come forward to the librarian to collect room- key or pay for any charges while librarian check-in the room through this system.

Administrator can program the usage of rooms or equipment in schedule or on first-come first- serve basis. Schedule reservation allow users to view and make reservation using the time slots preprogrammed by administrator.

First Come First Serve is a reservation on queue basis. It is similar to the waiting list on borrowing books from the library. When a user has made a reservation on such resource, PSZ can put in user's choice for the librarian to contact them when the resource is available. When a room is available or when an equipment is returned, if there is reservation on the waiting list for that particular resource, the system will prompt librarian that there is a subsequent person who has reserved this resource item.

INTEGRATING UTM STUDENT/STAFF RECORD SYSTEM AND UTM'S FINANCE SYSTEM WITH THE DIGITAL LIBRARY SYSTEM.

The purpose of the integration of this system is to make library work flow faster and more efficient. This integration allows UTM Students/Staff Records to integrate with Library System. The integration assists UTM to transfer the students and staff profiles from UTM's records to Library System Database electronically and online. The integration will also ensure the profile in Library System updated periodically to maintain consistency. The students and staff profiles (new records or updated records) are captured in the UTM Student and Staff records system and then transferred to Library System upon confirming the accuracy. This also allows UTM Treasury to integrate with the Library System. The integration will assist UTM to transfer payment details from Library System to UTM System. The integration also ensure the payment details in Library System are updated periodically.

RADIO FREQUENCY IDENTIFICATION DETECTIONS (RFID)

To make the arrangement of library materials more reliable and accurate, PSZ's goes step a head to implement the RFID functionality. Digital Identification Collection Management optimizes both materials and human resources in libraries. The system is based on Radio Frequency Identification Detections (RFID) that identify, track and secure library materials. The functionality of this system are as follows:
- ✓ Re-shelving time by identifying the items exact location.
- ✓ Capture usage of these materials and generate summary reports by providing a more accurate measure of library's use.
- ✓ Allows library staff to find materials virtually in every search. It can download almost any list of items from library's circulation system on the digital library assistant and locate them quickly on library shelves.
- ✓ Scan shelves and get immediate feedback on the items that are out of order.

The RFID comprise of the following components:

- ✓ Digital Identification Tags
- ✓ Digital Conversion Station
- ✓ Digital Self-check System
- ✓ Digital Staff Workstation
- ✓ Digital Library Assistant

CONCLUSION

The system is able to provide a complete library managements system to PSZ with the multi-search capability, such as full text search/free text search, parametric, Boolean (single word phrase), relevance ranking and natural language search. Real-time interactive processes, with the integration of the Student and Staff Record System, Treasury System and other applications. The integration with Smart billing mechanism (billing system to control payment) and also supports a wide range of heterogeneous client. The access via Internet, users are able to use the system easily and search documents efficiently. With the remote electronic access to all services including user assistance, ordering and electronic full text delivery where possible make library management system more flexible. scalable and reliable.

References:

Arms, Wlliam Y. *Digital libraries*. MIT Press, England, 2000.

Bhatt, Ganesh D. Orgaizing knowledge in the knowledge development cycle. *Journal of knowledge Management*, Vol4. Issue 1, 1-11 2000.

Liebowitz, Jay. *Knowledge management : learning from knowledge engineering*. CRC Press : Washington, D.C, 2001

Liebowitz, Jay and Wilcox, Lyle Chester (Ed.) *Knowledge Management and its integration element*. CRC Press : Florida, 1997.

Rowley, Jennifer. Is higher education ready for knowledge Management ? *The International Journal of Educational Management*, Vol.14, Issue 7 , 1-10, 2000.

KNOWLEDGE MANAGEMENT VIA SMART LIBRARY APPLICATION : UTM EXPERIENCE

by
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Introduction:

a. Knowledge Management

- process of creating value from an organization's intangible asset.

- intellectual asset or in other word is people knowledge.

- the collection of process that govern the creation, dissemination and utilization of knowledge.

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b. Knowledge Sharing

- a collaborative way to simulate new ideas and facilitating this sharing is through electronic networking fashion.
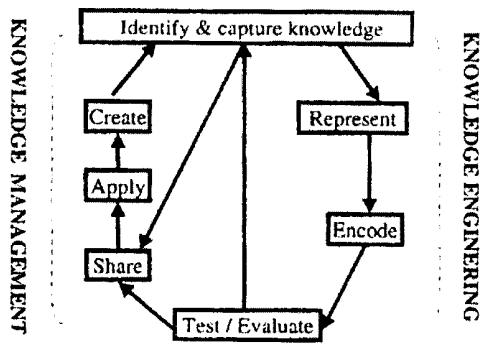
c. Knowledge Engineering

- a process which involves the capture, representation, encoding and testing or evaluating of expert knowledge.

Major Aspects of Knowledge Management

- The identification of knowledge needs and knowledge problems and opportunities.

- The design development and implementation of knowledge management strategies and solutions.

COMBINATION OF KNOWLEDGE MANAGEMENT AND
KNOWLEDGE ENGINEERING LIFE (Liebowitz, 2001)

Knowledge Management Solution & Strategies

• Human aspects: training, development, recruitment, motivation, retention, argumentation, job design, cultural change and encouraging thinking and participation.

• Process aspect: process innovation, reengineering, both for radical and continuous improvement, mapping and distributing.

• Technology aspect: information and decision support system, knowledge-base system, data mining system and other system related to this field.

KM via PSZ's Library Applications
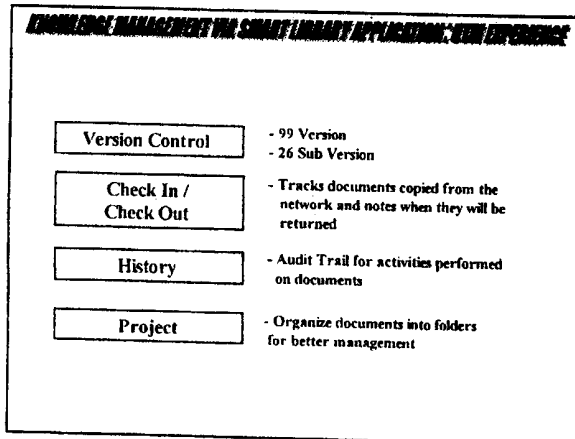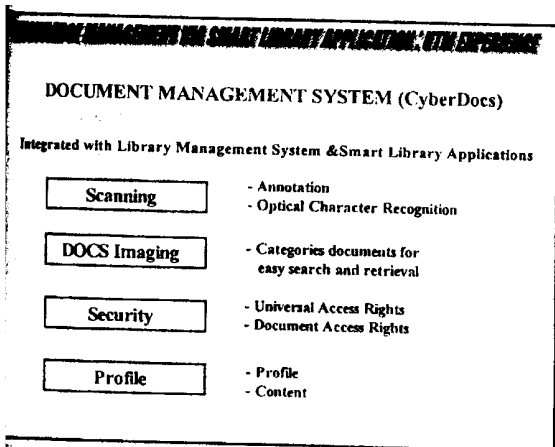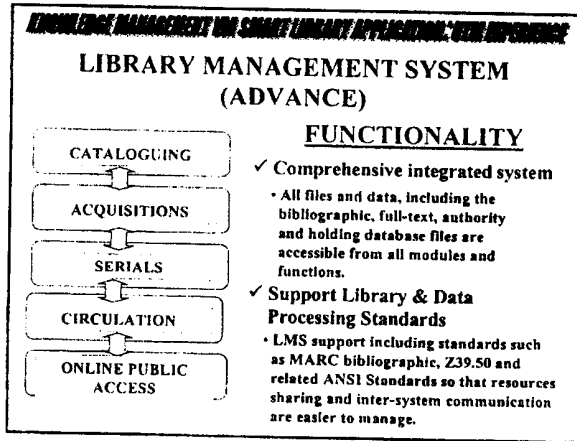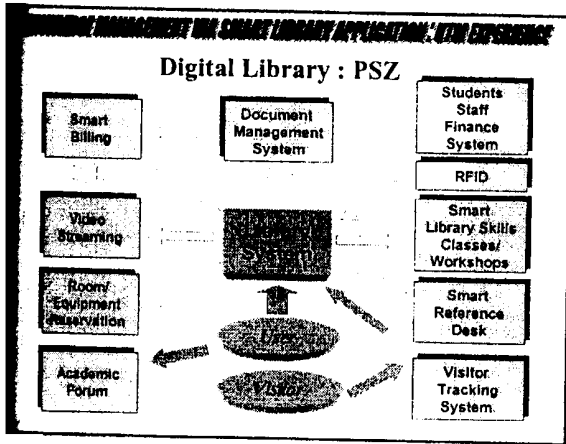
• PSZ's digital library system meet the challenge of integrating, creating, disseminating, delivering and managing information
• The system will fulfills the requirement of the library's works flow
• Provides user friendly access to information resources within the library and also around the world.

How does PSZ÷s Digital Library Works?

The System Consists of 3 Components :

Digital Library : PSZ

Smart Billing	Document Management System	Students Staff Finance System
Video Streaming		RFID
Room/ Equipment Reservation		Smart Library Skills Classes/ Workshops
Academic Forum		Smart Reference Desk
		Visitor Tracking System

LIBRARY MANAGEMENT SYSTEM (ADVANCE)

FUNCTIONALITY

CATALOGUING

ACQUISITIONS

SERIALS

CIRCULATION

ONLINE PUBLIC ACCESS

✓ Comprehensive integrated system
- All files and data, including the bibliographic, full-text, authority and holding database files are accessible from all modules and functions.

✓ Support Library & Data Processing Standards
- LMS support including standards such as MARC bibliographic, Z39.50 and related ANSI Standards so that resources sharing and inter-system communication are easier to manage.

DOCUMENT MANAGEMENT SYSTEM (CyberDocs)

Integrated with Library Management System &Smart Library Applications

Scanning	- Annotation - Optical Character Recognition
DOCS Imaging	- Categories documents for easy search and retrieval
Security	- Universal Access Rights - Document Access Rights
Profile	- Profile - Content

Version Control	- 99 Version - 26 Sub Version
Check In / Check Out	- Tracks documents copied from the network and notes when they will be returned
History	- Audit Trail for activities performed on documents
Project	- Organize documents into folders for better management

KNOWLEDGE MANAGEMENT SYSTEM
(Fulcrum Knowledge Server)

FEATURES

| Knowledge Map | - Logical view of all information sources |

| Activators | - File Systems
- Web Sites
- RDBMS
- DOCSFusion
- Lotus Note
- Microsoft Exchange
- Search Server |

| Agents | - Search for information and notify users when it is updated |

FEATURES - continue

| Web Crawler | - Crawl to web sites to identify new information |

| Summarization | - Document summarization to identify the document contents easily |

| Categorization | - Organize document list into meaningful groups |

SMART LIBRARY APPLICATIONS

| Video Streaming | - High Quality, interactive, on-demand audio and video
- Intelligent Streaming, Best-of-breed Multicast
- Fully scalable view window
- Open and extensible architecture
- Support for Windows NT security
- Searchable from library reference database |

| Visitor Tracking | - Smart Card access - Higher Security and Control at door entry
- Profiling new visitors for Customer Relationship Management
- Integrated with Advance Patron database |

| Smart Billing | - Online Resources are chargeable upon access
- Pay-per-view features
- Integrated to Advance Library Catalogue |

| Smart Library Skills | - Multimedia guide to Library Resources and Skills
- Searchable by keyword
- Web-based, accessible through out the campus
- Searchable from Advanced Library Catalogue |

Reference Desk	- Provide interactive content to users - Assist users with possible questions and answers to their query - Help student in their project research with Frequently Asked Questions - Searchable from Advance Library Catalogue
Academic Forum	- Central place to share ideas and conduct open discussion - Web-based, real time - Archive for future reference - Searchable from Advance Library Catalogue
Smart Reservation	-Web-based reservation of equipment, rooms, and facility - Reserve facility without assistant from librarian - Check for rooms availability - Integrated to Smart Billing.
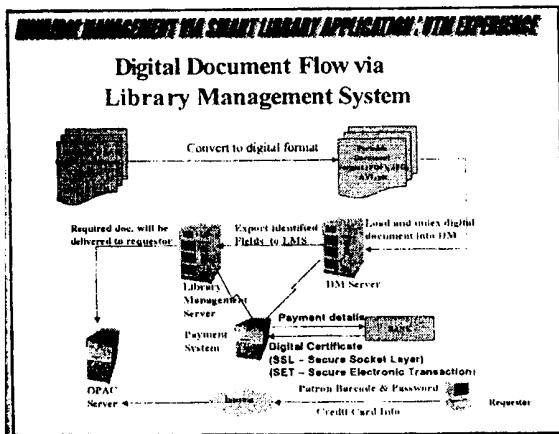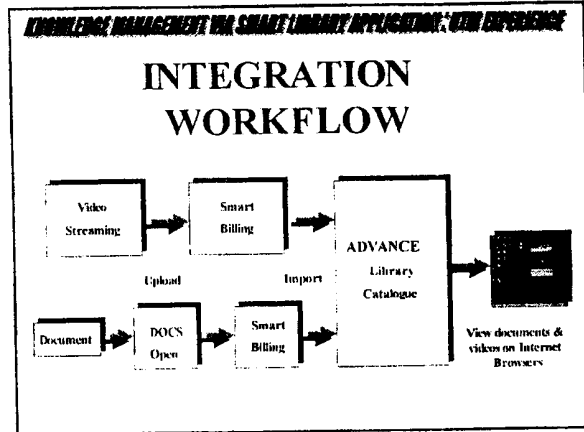
INTEGRATION WORKFLOW

Digital Document Flow via Library Management System

CONCLUSION

•The system is able to provide library management System solution.

•The access via Internet, users are able to use the system easily and search documents efficiently.

•With the remote electronic access to all services including user assistance, ordering and electronic full text delivery where possible, make library management system more flexible, scalable and reliable.