Document Management System: An Explicit Knowledge Management System

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Abstract - Knowledge management has become an important aspect of any enterprise today. In today's competitive environment capturing and sharing of knowledge are important for correct and timely decisions. Knowledge can be classified as mission critical, confidential or open knowledge. It may exist in variety of sources, formats and devices viz, in people's heads, databases, files etc. According to Larry Prusak, Executive Director of the Institute for Knowledge Management, the practice of Knowledge Management (KM) is "getting the right knowledge in the right context to the right people at the right time." Knowledge Management is an integrated approach to identify, create, manage, share, and exploit all information and knowledge assets of an organization.[6] Knowledge is of different types namely tacit and explicit. Tacit knowledge is possessed by people and difficult to capture or share. Explicit knowledge is reasonably self-contained. The users can understand easily and learn how to use the same effectively. In this paper we have discussed about a system that is based on the concept of organizational document management system (DMS) for capturing explicit knowledge available in organization in the form of reports, documents etc. for sharing among the users. The system has been implemented successfully. [1]

Keywords - DMS: Document Management System, DSS: Decision Support System, ECM: Enterprise Content Management, HRIS: Human Resource Information System, KMS: Knowledge Management System, PO: Personnel Officer, RDCIS: Research & Development Centre for Iron & Steel, SAIL: Steel Authority of India Limited

I. INTRODUCTION

R&D Centre for Iron & Steel (RDCIS), SAIL has initiated the knowledge management system to capture and disseminate explicit knowledge long back. Examples of such systems include Information Portal to store and share organizational information and knowledge available in documents, reports etc. and development of Document Management System (DMS) to scan, store and share employee vital documents.[1] RDCIS also developed personnel information system where the employee data have been populated and validated over the years. These on-line systems contain the important data of all the employees of the respective plants/units. However, these systems do not have the provision to store various kinds of certificates and service documents of the employees. The Personnel Officers often refer these files for important information like date of joining, birth certificate, promotion history and qualifications etc. of the employees. Locating such files from the lot is time consuming and tedious. To address this issue, RDCIS took up a software development project named "On-line document management system (DMS) in personnel department" for the first time in SAIL. The job has been completed as per the requirements and has been implemented in all the sections of Personnel Department in an integrated steel plant. This new system helps in achieving a central repository of all vital documents and would facilitate on-line access to these documents by Personnel Officers for quick decision making and less manual handling, thus reducing wear & tear of papers. The project is a step towards paperless office in Personnel Department.[1]

II. DMS AS AN EXPLICIT KM SYSTEM

With the advances in Information Technology and processing power of computers, it is possible to build large KM systems (KMS) for explicit knowledge that increase the performance as well as updating of knowledge. A consistent KMS integrate the information with an aim to expedite the access, circulate and archive the different outputs. With the help of intranet, internet, extranet, databases, expert systems, one can easily collect, create and share knowledge in an organization, with

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customers, among partners and competitors in a structured way. The main areas where IT contributes in knowledge management are creating knowledge bases, resource management and collaborative technologies etc. [6]

Document management system also knows as content management system manages large amounts of information being generated in the organizations. Amount of information that could be archived and retrieved is always limited physically. Today's application software helped users to come out of this physical limit. With the increase in information/data, document management software has become an essential part of most enterprises/organizations as it helps to manage the large quantities of information/data the organizations possess [5].

Today, three-tier web enabled application with access to company database with proper security features is the answer for such requirements. Further, with web portal, the contribution are generally made via web forms or posted directly in an HTML/XML format. It is also necessary to have access to the web server to post the content. KMS can also display the contents in different formats based on the native application of the content viz., Word, Excel, PDF, graphic, audio and video formats for full understanding of a topic. The application should be easy to learn by non-IT professionals. If the interfaces are simple then the employees can easily contribute to the knowledge base and access the stored knowledge from anywhere on the intranet or internet. Remember simple solution for a complex issue is not an easy solution.[6] There are various KM tools and strategies in service as well as process industry. The Enterprise Content Management (ECM), a good KM tool which associates with document management, imaging/drawings/designs, web based contents, collaboration on real-time, digital library, e-learning tools, digital asset management, report management etc. This tool improves the company's digital asset management capabilities and provides a single source of corporate information.

Under the project, software for Document Management System (DMS) for explicit knowledge management has been designed, developed and implemented to scan and store the vital documents in personnel files in a central repository on a computer server to aid the decision making by the personnel officers. The stored documents can be accessed on-line by the staffs of all personnel offices through user friendly interfaces on enterprise LAN. DMS is a centralized repository used to manage the storage and retrieval of any type of information/data that could be of value to the organization - and archive or protect the same against any type loss including wear and tear of physical paper documents.

III. HOW DMS IS DIFFERENT FROM OLTP?

Today, a business is run having complete reliability on data available as and when required and maintaining full confidentiality. These days, online transactions processing (OLTP) require transactions spanning over a large network or even the internet. And, we need reliable network for faster and accurate transactions. OLTP is a collection of systems to manage and facilitate transaction based applications, mainly for data entry, update and search mechanisms. The term is somewhat unclear; some understand a transaction as computer transactions or database transactions and others as business or commercial transactions. OLTP also refers to processing in which the software responds almost immediately to user queries/requests. The OLTP systems bring high speed, efficiency, economy and accuracy to operations, Management Information Systems (MIS) and Decision Support Systems (DSS).

In an OLTP system within one premise of an organization all the data are kept in one or more databases on as many server computers, which are generally located far from the users. The user transacts with the computer database through his PC node on the Local Area Network (LAN). The software has to provide highly user-friendly interfaces to the user for his work. These interfaces are in the shape of 'forms', 'menus' or simple commands developed for the purpose.

Document management system (DMS) is a software system (or set of programs) used to store, search and retrieve electronic documents and/or scanned images of paper documents. It also keeps track of the different versions of documents created by different users. This is similar to the content management systems and is related to digital asset management or explicit knowledge management system, document imaging and records management systems.

There are many different types of software for document management. Typically popular document management systems have the following features: [2, 3, 4]

- Focused primarily on storage, archiving and retrieval.
- Aimed to manage explicit knowledge or documents. They are most often in-capable of managing information such as images, videos etc.
- Includes workflow for integrating business logic into the document management systems.
- Store and presents documents in the original formats.
- Document access control mechanism is implemented with restrictions at user, folder or document level.
- Provides a unified storage for multiple media types such as paper, video, audio, electronic spreadsheets, and word-processor documents.

IV. APPROACH ADOPTED FOR DMS

Document management systems are designed to assist an organization for managing the document creation, document storage and document retrieval. Contrary to a file structure, a DMS works around a central repository to manage the storage and retrieval of any type of information that is important to an organization.

Development of the Document Management System (DMS) was done for on-line availability of personal documents of employees. Developed software has mechanisms to avoid tampering of stored images and its access is based on the user

authentication. Vital documents in personnel file have been identified for scanning and storing by the DMS application software. The developed software has been integrated with the existing HRIS (Human Resource Information System) database. Roles of the users of varying responsibilities were defined and built into the system with proper authentication/security.

V. FEATURES OF DMS

Explicit knowledge management with document management systems commonly provides scanning of documents, storage of meta-data, storage of documents/videos, versioning of documents, data/information security, as well as retrieval and search capabilities. The logic for complexity of processing and linking of various data has been built into this software. The software facilitates all types of performance analysis including on-line faster and accurate query. There is no data duplication in DMS which reduces the data volume for entry and avoids any data conflict. The DMS software has been validated by verifying documents in the personnel file with the meta-data and digitized documents stored in the server. Description of some these features of DMS are given below:[3]

- Scanning: Scanning of physical documents/files is an important activity in DMS for digitization. Scanning with proper resolution for file size management is given due importance. The documents are either encrypted or password protected for its security and as a measure against its misuse.
- Metadata: Metadata is data about data for identification and easy retrieval of stored documents. Metadata is defined for each document. Examples of metadata include the document type, date of creation, version, identification of the user storing it etc. DMS extracts metadata like user, date etc. automatically and prompts the user to add other metadata through user-friendly interfaces.
- Capture: Capture involves scanning of paper documents using devices like scanners. Interface for scanner can be opened from the application itself so that the meta-data is also captured as the scanned document is saved to the file server or database. Optical character recognition (OCR) software is sometimes used to convert scanned images to machine readable text. Similarly, Optical Mark Recognition (OMR) software is used to covert values of check-boxes. Capturing activity also include e-documents and other files.
- Integration: Document management systems has been integrated with other applications, so that users may retrieve relevant meta-data information about documents from other databases, make changes, and save the documents into the DMS repository, all without leaving the application. The developed system has been seamlessly integrated with Human Resource Information System (HRIS) for easy and friendly access by the users.
- Indexing: Indexing keeps track of unique document identifiers. Indexing exists mainly to support faster retrieval/query of documents from the database.
- Storage: Electronic documents are stored in the file server or database. DMS stores the documents in file server.
- Retrieval: Retrieve the electronic documents from the database/file server. Simple retrieval of documents allows users to specify the document key. The system uses the basic search mechanism to retrieve and display the document. More powerful retrieval allows the user to specify search mechanism involving meta-data of the document.
- Confidentiality: Information is not publicly available. DMS has an access rights or authentication management module that allows access to documents based on documents types to only certain users
- Integrity: Data/information integrity is vital in many document management systems. DMS is able to say if any document has been tampered or not.
- Availability: Documents can be accessed and used by authorized users on demand. Since, DMS maintains version control, all the versions of a document can be seen by the users.
- Searching: It finds documents and folders using attributes. Documents can be searched using various attributes including document content and document types using drop down list wherever possible.

VI. MODULES DEVELOPED

The DMS menu has two parts: windows style drop down menu and simple buttons to access different forms and reports. Drop down menu items have other sub-menu items for different activities. Buttons on the main menu calls a form/interface to perform a specified activity. The various modules are:[1]

- Master Modules: These modules deal with the building of software structure for document categories, user authentication module, employee base data module etc.
- Employee Document Upload Interface Modules: This user interface is for scanning and uploading documents to the database/file server using the application software.
- Document retrieval and edit modules: User-friendly interfaces have been provided for retrieving the documents category wise from file server. This also contains the meta-data details of the document like document date, version no, page no, document type, document verifier, document verification date. Wrongly uploaded documents can be modified by appropriate interface before it is finally verified and locked by the concerned personnel officer dealing with the employee. Provision has been kept to delete

the documents along with the meta-data if required by the concerned personnel officer.

- DMS Journal: As the name indicates this interface shows meta-data of all the records which have been inserted, deleted or updated in all the database tables during a period. It keeps the history of all records with the timestamp and the user-id. When entries in the journal table are no longer needed, the records may be deleted by the administrator.
- Album Module: This module retrieves the documents based on the employee personnel number and document category in album fashion. If the document is tampered, the application gives an alert message that the document has been tampered. The system is designed to take care of the integrity and confidentiality of documents.
- MIS Module: This module includes different MIS reports like document discrepancy detail, discrepancy summary, verification detail, verification summary etc.

VII. VOLUME OF DATA HANDLED

The software has been implemented in one integrated steel plant and is being implemented in another. The vital employee documents like offer document, joining report, qualification, date of birth etc. have been scanned and uploaded into the system for reference and decision making by the personnel officers. Presently more than 20 vital documents in personnel files have been identified for scanning and storing through DMS application. More than 30 personnel offices are involved in fruitful utilization of this software. Scanning has been completed for more than 25000 files of employees consisting of all vital documents.

VIII. BENEFITS OF EXPLICIT KM SYSTEM

The logic for complexity of processing and linking of various data has been built into this software. There is no data duplication in the system which reduces the data entry and avoids any data conflict. The software has a built-in security system, which helps in keeping the data safe and secure. Regular use of the system would lead to the following benefits:

- Central Repository of all documents
- Easy access/retrieval of vital documents on-line by users for quick decision making
- Easy distribution of documents in the organization
- Restricted access with proper authentication
- A step towards paperless system

IX. SOFTWARE PLATFORM

The software has been developed with 3-tier approach. The software tools used are Oracle Developer Suite and Oracle Database. The software has been deployed in middle tier with Oracle Application Server on Windows server. The user interface for data entry and the processing programs along with the validation logic were developed in Developer Suite. All necessary security provisions and data integrity are also built into the forms as well as at database level. The user interfaces for purposes like accessing of different forms by users, preparation of reports and accessing of different on-line queries are provided through menus and buttons.

X. CONCLUSION

The explicit knowledge management system known as DMS has been validated by verifying documents in the personnel file with the meta-data and digitized documents stored in the server. Software validation document has been prepared showing the results. The software has been designed for storage and retrieval of the scanned documents. It has been integrated with the on-line existing HRIS database. The software has been designed to operate with integrated centralized database with proper data security features. It is an open and soft coded system, which can be horizontally transferred to other steel plants or any other industry having similar working and operational practices with minor modifications. It is also possible to integrate the new applications with existing on-line applications running on heterogeneous platforms.

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