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Role of Metadata in Knowledge Management of Multinational Organizations

Ms. Meenakshi Dalal
(Research Scholar), Ph.D. (Computer Science),
Jodhpur National University, Jodhpur (Rajasthan), India.

Ms. Shivali Yadav
(Research Scholar), Ph.D. (Computer Science),
Jodhpur National University, Jodhpur (Rajasthan), India.

Dr. K P Yadav
(Research Guide), Director, IIMT College of Engineering,
Greater Noida (U.P.), India.

Abstract

Metadata refers to any substantial part of raw data or key information which facilitates understanding of data and data-related processes pertaining for a specific purpose. Metadata is instrumental for getting the grasp of what data reflects and applying the reflections to different utilities. Metadata empowers the user to reach at good quality decisions by making use of these grasped reflections. Metadata comes into play when the data needs to be converted to information and information needs to convert to knowledge for business or technical purposes. Many a times Metadata consists of knowledge and knowledge-related processes. Metadata assists organizations to take care of and apprehend their knowledge assets as well as enable them to extract the best utility from their knowledge bearing assets.

This paper presents the metadata approach to Knowledge Management (KM) process and the core connections between them are discussed. The paper also throws light on the interdependency between Resource Definition Framework and Metadata. At the end we have summarized the enhancement of Knowledge Management (KM) with focus on metadata. KEYWORDS: Knowledge, Knowledge Management (KM), Resource Definition Framework (RDF), Metadata utility for Knowledge management.

INTRODUCTION

Organizations having huge data centres know the value of metadata. Knowledge management is a program employed to retain, share, and build on knowledge to increase productivity and profitability for an organization. Knowledge management (KM) as an academic area is focused on the problems and opportunities of using organizational knowledge as a resource. Semantic Web is large semantic network engaged in offering a common framework that allows data to be stored, shared and reutilised across enterprise, application & communities. For managing and automating the massive volumes of data on the web, Semantic Web provides semantic interoperability of data via technologies like RDF.

RDF offers the basic groundwork for processing metadata.

Meta-knowledge refers to the knowledge of knowledge (usable information) and also details its importance, reliability, performance evaluation.

The Resource Description Framework (RDF) is a family of World Wide Web Consortium (W3C) specifications[1]("XML and Semantic Web W3C Standards Timeline" *(PDF). 2012-02-04.*) originally designed as a metadata data model. It has come to be used as a general method for conceptual description or modelling of information that is implemented in web resources, using a variety of syntax notations and data serialization formats. It is also used in knowledge management applications.

Metadata stands for any data that characterizes other data in a reflexive way, e.g., data about data. Analogous to words about words. In data processing, it is definitional data that provides information about or documentation of other data managed within an application or environment. For example, metadata would document data about DATA ELEMENTS or ATTRIBUTES, (name, size, data type, etc) and data about RECORDS or DATA STRUCTURES (length, fields/columns, etc) and data about DATA (where it is located, how it is associated, ownership, etc.). Metadata may include descriptive information about the context, quality and condition, or characteristics of the data. [2]

Dublin Core "The Dublin Core Metadata Initiative (DCMI) is an organization dedicated to fostering the widespread adoption of interoperable metadata standards and promoting the development of specialized metadata vocabularies for describing resources to enable more intelligent resource discovery systems." [3]

Metadata approach to Knowledge Management (KM) process.

Many factors have led to explosive growth in the use technology to support managerial decision making. Technology requires a significant amount of specialized knowledge for effective use. Decision support system (DSS) design approach covers much of this knowledge in well-structured metadata and presents it to the decision maker through an appropriate interface or software agents, thereby decreasing system learning costs and improving effectiveness. The metadata design from a spatial

decision support system (SDSS) addresses specific knowledge management (KM) problems. The knowledge management design approach can be generalized to other SDSS, to DSS in general, and to data warehouses. [4]

It is usually challenging to find knowledge within an organization. Presence of a purposeful knowledge repository can be very advantageous, but the true knowledge in organization generally lies beyond a single specialized place or department to store articles, logs, documents. Metadata is truly helpful in extracting knowledge through blogs, discussion boards, documents, wikis, social newsfeeds and other content, but this knowledge often loses its accessibility parameter over time, whenever new content gets added throughout the external and internal environment. The issue of harnessing this knowledge in order to make it more relevant and useful for the users arises from time to time.

The key groundwork to an efficient knowledge management system is the description of content types and metadata management. This establishes a global structure that works across organization's sharing environment and maintains consistency while conducting searches for related information, irrespective of the location.

With use of enterprise keywords users join the various content with metadata that doesn't feature in the structured taxonomy. The managed metadata service moves these enterprise keywords into the formal taxonomy whenever the need arises. Metadata search is helpful in returning content from across the organization into a single location as it pulls all of this content together. Users can further refine their results on the search results page by using both structured and non-structured metadata. Great benefits can be generated by capturing & reutilizing the knowledge of the people within an organization. [5]

Search in metadata framework can also determine the relationship between people and the documents they have authored, making it even easier to find the right person with the skills or experience you are looking for without the need for users to keep their profile constantly up to date.

Metadata based profiling and data storage framework will rank the results based on relevance. Metadata search can get a very specific ranking of the content for the organization with some additional configuration being done in it. The ranking is based on the the popularity of the content, age of the content, the source of the content, the feedback (or ratings) of content received by peers.

By performing initial planning and configuration on metadata and metadata search, users can extract great deal of useful information for finding knowledge throughout the organization.

In knowledge management solution making process, creating a metadata schema and developing a system in which metadata is managed are very important. In a project like that, it's necessary to maintain adherence to metadata and information management standards. There is a need for a metadata strategy, and then the implementation.

Managing the metadata in a knowledge management solution is an important step in a metadata strategy. It is essential that the metadata are current, correct, complete and consistent at any given time for a workable knowledge management solution.

KM supports the creation, assimilation and dissemination and the application of knowledge. All KM tools generally have in common that they provide an interface to acquire various artifacts that contain knowledge in a certain way and designate a meaning to it. These artifacts can be of many types like documents, databases, spreadsheets, simulation models etc. Other metadata sub-fields like authors, categories, or a context should be mentioned as well. To provide the necessary information manually for random data that do not contain a structure, the user must be asked for easy extraction of important metadata. KM tools should offer a smart user interface. This helps to improve user acceptance and increase KM's task solving effectiveness. A simple smart interface that presents the currently required metadata fields is very successful. A smart user interface should adapt to the type of artifact and the information a user has already filled in. [6]

Interdependency between Resource Definition Framework and Metadata

The Resource Description Framework (RDF) is a universal, adjustable and capable model of metadata management which is turning out to be the real standard for metadata representation. Its introduction in Knowledge Management has led to a massive growth of the amount of available RDF data that calls for efficient management solutions. Relational technologies can offer efficient storage and high performance querying at relatively low cost.

Resource **D**efinition **F**ramework - "The Resource Description Framework (RDF) is a language for representing information about resources in the World Wide Web. It is particularly intended for representing metadata about Web resources" [7]

RDF's simple data model and ability to model disparate, abstract concepts has also led to its increasing use in knowledge management applications unrelated to Semantic Web activity. This theoretically makes an RDF data model better suited to certain kinds of knowledge representation than other relational or ontological models

RDF - the Resource Description Framework, as our proposed mechanism is called - is a foundation for processing metadata; it provides interoperability between applications that exchange machine-understandable information on the Web. RDF emphasizes facilities to enable automated processing of Web resources. RDF metadata can be used in a variety of application areas; for example: in resource discovery to provide better search engine capabilities; in cataloguing for describing the content and content relationships available at a particular Web site, page, or digital library; by intelligent software agents to facilitate knowledge sharing and exchange; in content rating; in describing collections of pages that represent a single logical "document"; for describing intellectual property rights of Web pages, and in many

others. [8]

RDF encourages the view of "metadata being data" by using XML (the eXtensible Markup Language) as its encoding syntax. The resources being described by RDF are, in general, anything that can be named via a URI (Uniform Resource Identifier).

The recently published document about RDF introduces a model for representing metadata and one possible syntax for expressing and transporting this metadata in a manner that maximizes the interoperability of independently developed web servers and clients.

At the core, RDF data consists of *nodes* and attached attribute/value pairs. Nodes can be any web resources (pages, servers, basically anything for which you can give a URI), even other instances of metadata. Attributes are named properties of the nodes, and their values are either atomic (text strings, numbers, etc.) or other resources or metadata instances. In short, this mechanism allows us to build labelled directed graphs.

RDF in itself does not contain any predefined vocabularies for authoring metadata. We do, however, expect that standard vocabularies will emerge, after all this is a core requirement for large-scale interoperability. Some of the vocabularies in the foreseeable future are a PICS-like rating architecture, a digital library vocabulary (currently referred to as "Dublin Core"), and a vocabulary for expressing digital signatures. Anyone can design a new vocabulary; the only requirement for using it is that a designating URI is included in the metadata instances using this vocabulary. This use of URIs to name vocabularies is an important design feature of RDF: many previous metadata standardization efforts in other areas have foundered on the issue of establishing a central attribute registry. [9]

Enhancement of Knowledge Management (KM) with focus on metadata

Enhancement of KM can be done in many ways. The good way to start is by differentiating the sets of metadata. There are three types of metadata associated with knowledge: stewardship metadata, business metadata, and artifact metadata. Below are their roles described in enhancing knowledge management-

Knowledge Stewardship Metadata : This comprises of the information on the people associated with the knowledge handling (called as knowledge stewards). Stewardship metadata – or data about who is accountable for the knowledge. When knowledge is created with its “next use” in mind, it’s imperative to record the people associated with the knowledge to make certain that the information is kept accurate. When the knowledge stewards are designated and recorded, this information can be used in with a date in which the knowledge should be reviewed. With two fields of metadata (steward and review date), a organization can begin to build a process to keep updated knowledge by reminding to the knowledge stewards. Just like data and information

(probably more so with knowledge), knowledge needs to be managed as a shared corporate asset.

Knowledge Business Metadata: A knowledge artifact is a set piece of recorded knowledge stored in a retrievable format to be used by others. Artifacts are more tangible as for example a picture, a document or graphic, a video, an audio, a presentation, a template, a project plan. These basic pieces of information about artifacts along with the steward metadata are the foundations of a knowledge taxonomy that can be developed and used to classify and record every piece of recognized knowledge in a knowledge repository (database that stores information about the classified knowledge). Knowledge taxonomy calls for the the development of a knowledge metadata model and enables the organization to name or label and classify the knowledge in the knowledge repository. After when the knowledge is captured in the repository, users can search for and identify the knowledge that exists, and retrieve the knowledge in the hour of need.

Knowledge Artifact Metadata : An important step of the knowledge development process includes labelling or giving a name to each artifact. It's imperative to establish an artifact naming convention much like a data naming convention that contains a context, class words and modifiers. For example, artifacts may be made or created by a business unit and for specific business functions. The artifact may be of a specific type and will usually exist in one or more formats. Using just this high level description of how an artifact is created, one can derive a simple artifact naming convention that includes just this information.

Metadata and the Impact on Searches: Get the organization's users to identify knowledge artifacts, then classify the artifacts using a knowledge metadata database and put them in formats that can be used by others in the organization. Once the process to harvest artifacts is in place, getting people to share and use available knowledge requires the ability to readily locate that information through the use of portal search utilities. Searches that can be performed on a knowledge repository are of three types - full text searches, key word searches and metadata searches. In the case of key word searches and metadata searches, a organization is required to assign specific information to each artifact that will be used to locate knowledge for a specific use. Many of today's vendors has been creating scanners and other programs that will scan through a document and simultaneously assign key words or else make an attempt at classifying artifacts according to a user defined metadata structure (meta model).

Full text searches scan documents from top to down, finding the words or parts of words that match the user's selection. This type of search returns and recognizes textual artifacts that comprise of the selected words and rank them by level of appropriateness according to frequency of the word or how the words are combined in the relevant context..

Key word searches make use of specific key words that are associated with artifacts to recognize which artifacts that will be found as part of the search process results. The

application of key words typically is applied manually at the time that an artifact is recorded in the knowledge repository or through automated functions that are developed to scan artifacts and record key words. Results of these searches are typically good with less total results, but more focused results, then the full text search.

Metadata searches are based on a pre-defined taxonomy or classification schema (perhaps using the types of metadata defined above) that identifies specific business-defined attributes for every artifact that is recorded. The taxonomy can be applied manually at the time that an artifact is recorded in a knowledge repository or through automated functions that are developed to scan artifacts and record the classifications in the knowledge repository. Results of these searches are typically found to be excellent when the specific selection criteria are based on the taxonomy and are built into the search engine.

The metadata repository is the core of an organization's knowledge management solution.

The importance of tagging documents with metadata [10] is:

- automating the collection, fusion, analysis and dissemination of unstructured information;
- rapidly delivering relevant information to users from multiple information repositories, such as the Knowledge Exchange; and
- ensuring positive outcomes.

Conclusion

Knowledge management is a program employed to retain, share and build on knowledge to increase productivity and profitability for an organization. Sharing the knowledge makes it more valuable; Storing knowledge in a codified way can save resources but it should be easily retrievable by users. Organising codified knowledge in a KMS becomes easy when it is described with metadata.

In this paper we covered three aspects of metadata approach to Knowledge Management (KM) process. Firstly the core connections between them are discussed. The paper stated the interdependency between Resource Definition Framework and Metadata. The enhancement of Knowledge Management (KM) with focus on metadata was discussed.

The key groundwork to an efficient knowledge management system is the description of content types and metadata management. This establishes a global structure that works across organization's sharing environment and maintains consistency while conducting searches for related information, irrespective of the location. In knowledge management solution making process, creating a metadata schema and developing a system in which metadata is managed are very important. In a project like that, it's necessary to maintain adherence to metadata and information management

standards. There is a need for a metadata strategy, and then the implementation. RDF - the Resource Description Framework, as our proposed mechanism is called - is a foundation for processing metadata; it provides interoperability between applications that exchange machine-understandable information on the Web. RDF emphasizes facilities to enable automated processing of Web resources. RDF metadata can be used in a variety of application areas. There are three types of metadata associated with knowledge: stewardship metadata, business metadata, and artifact metadata. Stewardship metadata – or data about who is accountable for the knowledge. A knowledge artifact is a set piece of recorded knowledge stored in a retrievable format to be used by others. Artifacts along with the steward metadata are the foundations of a knowledge taxonomy that can be developed and used to classify and record every piece of recognized knowledge in a knowledge repository (database that stores information about the classified knowledge). Once the process to harvest artifacts is in place, getting people to share and use available knowledge requires the ability to readily locate that information through the use of portal search utilities. Searches that can be performed on a knowledge repository are of three types - full text searches, key word searches and metadata searches. In the case of key word searches and metadata searches, a organization is required to assign specific information to each artifact that will be used to locate knowledge for a specific use. Metadata searches are based on a pre-defined taxonomy or classification schema (perhaps using the types of metadata defined above) that identifies specific business-defined attributes for every artifact that is recorded.

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