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CONTENTS

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ISSUES OF ENTERPRISE RECORDS MANAGEMENT APPLICATIONS: A SEMANTIC ONTOLOGY-BASED SOLUTION PERSPECTIVE

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Abstract: *Enterprises have increasingly been employed various enterprise record management (ERM) applications for better managing records and contents electronically. However, there are issues in existing ERM applications that impact negatively on users' support, specially to resolve their information query on various records.Throughout a literature review this study identifies both common issues of ERM applications and potential use of semantic ontology, in order to outline a solution foundation. For conducting the investigation the study takes a particular focus on a case of records management in educational institutes. The discussion in this paper helps create a basis for developing a suitable ontology based solution by offering practical benefits to users.*

Keywords: *Semantic Ontologies, Enterprise Records Management, Content Management, Education Institutes*

INTRODUCTION

Various approaches for effective enterprise records management (ERM) have been employed to meet user's access demands within organisations. Approaches vary from organisation to organisation due to the fact of various regulatory compliances and types of records (Brett, 2005) they have in place. Records can be physical records and electronic or digital records that can be seen in all formats (Sprehe, 2005). While

enterprises carry on their activities today almost universally with the use of information technology (IT), the demands of access and storing older and new form of digital records in electronic repository are growing for their better management and preservation.

Over the history of information systems (IS) application development, technologies of enterprise records management have still been underdeveloped to meet the growing demand of industry's records preservation, meeting regulatory compliances and its further effective use for decision makers (Katuu, 2012; Alalwan and Weistroffer, 2012). Beyond the provisions for records and documents preservation simply in records repository, existing approaches do suffer on providing useful features to meet the regular information access demand within their different business conditions.

Sprehe (2005) highlights three case studies that demonstrate the positive benefits of ERM in terms of enterprise content management. Katuu (2012) evaluates the implementation of enterprise content management (ECM) in South African organisations through a literature survey and reveales that a very limited number of studies represented institutional experiences related to implementing electronic document and records management in South Africa. Katuu (2012) recommends that further research is required to develop practical applications as well as the impact analysis of ECM implementation especially for providing features for end users.

To address this, the study investigates the requirements of developing a semantic ontology-based records management solution for the benefit of decision makers. As Semantic Web (SW) (e.g. ontology) based technologies offer potential benefits to the user-access and decision support oriented issues, the study aims to address the technical issues of the ERM by offering ontology based features.

According to Fensel et al. (2000), ontology is a consensual, shared and formal description of key concepts in a given domain. Furthermore, Domingue, Dzbor, and Motta (2004) describe ontology as "an explicit, declarative representation of a discourse". Previous studies describe the use of ontologies for demands of context sensitivity, especially for content management (Euzenat, 2002; Uren et al. 2006). Euzenat (2002) discusses the advantages of the semantic ontology extending capabilities of the web with formalised knowledge and data processing for computer applications.

The paper is organised as follows. It presents a background of the ERM approaches. The section after that, describes the literature within the ERM areas and issues identified from existing studies. The forth section provides potential benefits of

semantic ontology discussed in the relevant studies. Finally, the fifth section after that provides a general discussion and conclusion of the study.

BACKGROUND

As a type of ERM, there are many definitions of enterprise content management (ECM) that have been introduced over the past. According to Blair (2004), ECM was coined by AIIM (Association for Information and Image Management) International and has been widely used by vendors and users. Smith and McKeen (2003) define the ECM as *"the strategies, tools, processes and skills an organization needs to manage all its information assets regardless of type over their lifecycle."*

The ECM Association (AIIM International) defines ECM as *"the strategies, methods and tools used to capture, manage, store, preserve, and deliver content and documents related to organizational processes. ECM tools and strategies allow the management of an organization's unstructured information, wherever that information exists"*[1].

On the other hand, Woolley and Fletcher (2007), identify the core components of ECM such as: document management, web content management, records management, document imaging, document centric collaboration, and workflow. In addition, Munkvold et al. (2006) define ECM as *"the technology that provides the means to create/capture, manage/secure, store/retain/destroy, publish/distribute, search, personalize and present/view/print any digital content"* (Munkvold et al., 2006, p. 71). Based on the definitions, it is found that most of the researchers view ECM as the evolution of document management, records management, workflow (business process) management, and web content management systems (CMS) that started in the 1980s. Therefore, it can be concluded that an electronic document and records management systems (EDRMS) can be classified under the ECM which cover the elements of document management and records management and therefore the study focuses on the issues of EDRMS as issues in ECM.

ISSUES OF ENTERPRISE CONTENT MANAGEMENT (ECM)

As mentioned earlier, EDRMS can be considered as one of the ECM applications since it handles the elements of document management and records management. There are few studies that discussed issues of EDRMS. For instance, Maguire (2005) discusses an experience of implementing EDRMS and identify issues of the process. Similarly,

[1] http://*www.aiim.org* , accessed on 22nd July 2014

Wilkins, Swatman and Holt (2009) also discuss about an implementation of EDRMS and found its quite challenging to bring the people and process together in the life cycle of records, specially when it involved long term commitment and compliances. On the other hand, Johnston and Bowen (2005) identify benefits of implementing EDRMS for users. These benefits can be a guide to the organization to implement further systems. Garrido (2008) explores whether the records manager take into consideration the user needs and preferences in creating folder structure while implementing EDRMS. This study found that that prioritising user needs can be the best way to achieve records management objectives.

There have been a few studies conducted on oral history systems. The studies focus on the requirement for understanding, conceptualizing, and designing a database system (Gallacher & Treleven, 1988); improving bibliographic control and access to oral history interviews (Bruemmer, 1991); metadata model (Hunter & James, 2000); the creation, indexing and provision of access (Gustman et al., 2002); and more recently on the provision of online access to oral history (Daniels, 2009). However, there appears to be no studies to date which examine the benefits and problems of developing and using systems for oral history and record management.

The present approach of EDRMS is limited to keyword-based searching that often relies on dissimilar terminology to represent the most related concepts (Bates, 1977; Rabiyathul Basariya et al., 2012). The procedure is always static and does not meet any of the demands of context sensitivity of records searching for personal and context-specific enquiry resolution. The limitation results from vocabulary inconsistencies in the domain. This may lead to mismatches between the users' desires and content of a system's knowledge repository. Research has shown that one of the major problems with information retrieval is the inability of users to interpret their information needs into appropriate search terms or keywords(Aroyo, 2002 ; Bates, 1977; Rabiyathul Basariya et al., 2012). Besides, the quality of outcomes that traditional full-text search engines offer is still not optimal for many types of user queries (Ceccaroni et al. 2004).

POTENTIAL USE OF SEMANTIC ONTOLOGIES

Philosophical ontology concerned with the *'establishment of truth' by finding answers to questions such as 'what kind of things exists'*. On the other hand, the field of Artificial Intelligence utilizes the term 'ontology' to mean the science of specification of existing concepts. According to Tom Gruber, an artificial intelligent specialist at Stanford University, ontology is "a specification of conceptualization" (Gruber, 1993,pp.

907). According to Gruber (1993), 'conceptualization' refers to couching of knowledge of a particular domain (or general) in terms of entities (things, relations and constraints). While 'specification' implies representation of conceptualization in concrete form. Furthermore, the field of information science considered the notion of 'ontology' as a formal theory involving definitions and a supporting framework of axioms themselves providing implicit definitions of terms involved (Smith, 2003).

In the context of IS development, SW aims to provide enhanced meanings to user groups with timely, useful and valid information support based on some pre-coded domain knowledge settings (Cardoso, 2007; Joo and Lee, 2009). Educational users such as academics and students can benefit from such provisions of technologies implementing in records management systems (Cardoso, 2007; Boyce and Pahl, 2007; Sampson et al., 2004). The underlying condition for successful development of using SW provisions such as ontology to enhance ability of decision support can be seen as a creation of reliable instrument for the benefits of information retrieval for better practice of domain knowledge management. An ontology is distinguished as *"a software artifact or formal language designed with a specific set of uses and computational environments in mind"* (Viinikkala, 2004, pp. 7).

Furthering this notion, Zuniga (2001) notes that ontology within the notion of information systems is *"a formal language designed to represent a particular domain of knowledge, which depicts the structure of domain objects in question and accounts for the intended meaning of a formal vocabulary or protocols" (pp. 193).*

The notion of ontology as a *"representation of knowledge about a particular domain"*, which would be utilized for generating rich semantic metadata structures, to be acted upon as 'search points' for providing value added information services in EDRMS. Miah, Gammack and Kerr (2007) describe an approach of EUEDE (End-User Enabled Design Environment) for dairy farm management applying a semantic ontology tool to achieve effective decision options for users, which provided a generic knowledge model applicable across various users in rural industry.

One of the examples of SW applications in the education domain identified by Cardoso (2007). Cardoso (2007) demonstrates the applicability and the benefits of using SW technologies, by developing a real-world application. The application is called a Semantic Course Management System (S-CMS) which entirely based on the semantic web that uses the latest technologies of this field such as Web Ontology Language (OWL), *RDF Query Language* (RQL), *RDF Data Query Language* (RDQL), and Semantic Web Rule Language Combining OWL and RuleML (SWRL). It is noted that the more

expressive markup languages like SWRL allow developers to write application-specific declarative knowledge, and can improve the ontology and annotation richness of information on the SW. It shows that SW technologies can contribute to improve the process of managing course management system. On the other hand, Boyce and Pahl (2007) develop domain ontologies for course content. The study presents a method for domain experts rather than ontology engineers to develop ontologies for use in the delivery of courseware content. Boyce and Pahl (2007) focus in particular on relationship types which contribute to model rich domains adequately.

In addition, Jacinto and Parente de Oliveira (2008) propose architecture for Intelligent Tutoring Systems (ITS) supported by several ontologies. This architecture extends the use of Semantic Web concepts, where the representation of each component is made by a specific ontology, making possible a clear separation of concerns of the components of ITS and explicit the communication among the components.

Furthermore, Sampson et al. (2004) explore topics related with the new opportunities for e-learning created by the advent of Ontologies and the Semantic Web. The papers published in this special issue cover a wide range of research problems in Semantic e-learning. In this special issue readers will not only gain a state-of-the-art literature review but also will be able to understand the design and development of real world applications, prototypes and tools of e-learning in the Semantic Web.

DISCUSSION AND CONCLUSIONS

The main objective of the paper was to identify issues of ERM applications and potential benefits of ontology over the issues for users. As the ontology construction has been a successful solution for enhancing users' decision support-ability options, the study aimed to explore literature in order to find supportive ontology features for addressing the issues of EDRMS. This idea can give us a basis to think about and understand a new ontology-based solution aspect for records management. The importance of incorporating ontology into EDRMS architecture has also been a new area of interests in the context of decision support development recently. This is because ontology has promises to improve information retrieval and enhances accessibility of data, meta-data and its further representation to assist users with complex decision making (Miah, Kerr, Gammack, 2009; Ceccaroni et al. 2004; Dzemydiene and Kažemikaitiene, 2005). With regards to academic records and oral history management, ontologies can improve the understanding of academics and students regarding the content of the knowledge repository and facilitate common vocabularies and consistencies to make informed choices. Moreover, the use of a

common and unified domain ontology can improve the decision making process where most of the users' decisions are dependent on the output of EDRMS as a source of reference.

The motivation of the study was limited to a comprehensive literature review that may provide an overview of various issues of the ERM applications. At the same time, it was important to highlight the potential benefits of ontology as one of the prominent SW technologies within the current literature that can be of paramount to address the issues of ERM applications. As such, the discussion presented in this paper could be a study foundation for developing a suitable ontology based solution for effective records management.

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