

SemKnow: A semantic knowledge management system for scholarly repositories

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Abstract—Knowledge sharing (KS) is an important component of knowledge management. Through KS, the creation and dissemination of new knowledge is made possible. The authors propose SemKnow semantic knowledge management system to enhance the functionality of scholarly repositories. Repositories are commonly used by academic institutions to manage the research work of their scholars and enhance visibility among peers. Previous research done by the authors was used to identify the factors influencing knowledge sharing among postgraduate student at one of the research intensive university in Malaysia. This paper proposes a KMS tool for enhancing knowledge sharing using the semantic web.

Keywords: *Semantic web; knowledge management; knowledge sharing.*

I. INTRODUCTION

The competitive advantage of an academic institution is dependent on the knowledge embodied within the minds of its staff. This knowledge is one of the main factors in predicting organizational effectiveness [1]. Knowledge is defined in this context as the experience and understanding of an individual which is then translated into a meaningful form that is applied by the individual to carry out a task [2]. It is distinguishable from data for the fact that it is in processed form. The primary driver of an academic institutions value is knowledge, thereby making knowledge a valuable resource [1][3]. An effective dissemination of knowledge is vital to the progress of the organization [3]. In an academic environment, dissemination of knowledge among scholars is a challenge. However, KS is necessary because it serves as the channel in which knowledge held within an expert is transferred to the organization and its peers [3]. Thus, to support efficient dissemination of knowledge, a semantic web technology that aims to provide machine readable data is chosen to be a key enabler. It provides support for domain specific metadata which can interfaced over heterogeneous resources. This results in enhanced knowledge access through utilization of the ontology [4].

The aim of this paper is to illustrate the use of the semantic web as a viable technology for solving practical issues in a research environment.

II. THEORETICAL BACKGROUND

A. Scholars (Faculty and Postgraduate students)

Scholars in higher learning institution have to collaborate with their peers for academic pursuits. They tend to produce new knowledge on a regular basis. In the case of the University of Malaya postgraduate students, publication and contribution to new knowledge (in the form of journals and conference proceedings) are prerequisites for obtaining a postgraduate degree. As a result, the institution provides them with the technological infrastructure needed to facilitate the dissemination of knowledge. However, due to the nature of Institutional Repositories (IR) tool used, it creates a tendency to place more emphasis on individual pursuits rather than on collaboration with peers [4]. This leads to an exclusive view of knowledge, and reluctance to engage in knowledge sharing activity [3][5]. Thus, a support for knowledge sharing among scholars is beneficial to the institution. Our study shows that the presence of a reward or motivation has an impact on the willingness and attitude of the respondents for carrying out knowledge sharing activity.

B. Semantic Web

The semantic web is concerned with meanings and relationships between concepts. The main aims of the semantic web are integration and interaction over heterogeneous resources and generation and utilization of large scale meta-data. The increase resources have led to a discrepancy between what the users request and what is returned to them during a search, due to the current indexing technologies [6].

In this context, the semantic web technologies are used to enhance the knowledge access for the user. This feature supports the aims of the institution: visibility and knowledge sharing.

III. FACTORS INFLUENCING KNOWLEDGE SHARING IN AN ACADEMIC ENVIRONMENT

Previous studies by the authors reveal that intrinsic rewards such as enhanced reputation are sought after by the respondents. Students are depositors to the IR, which is regards as a KS tool. It enhanced their reputation via citations and references. Therefore, the semantic knowledge sharing tool is proposed. This tool allows efficient management of the documents within the repository. It allows publication of the

contents of the repository to external parties thereby allowing the users to enjoy the intrinsic rewards found to ensure continued KS in the institution.

IV. SEMKNOW

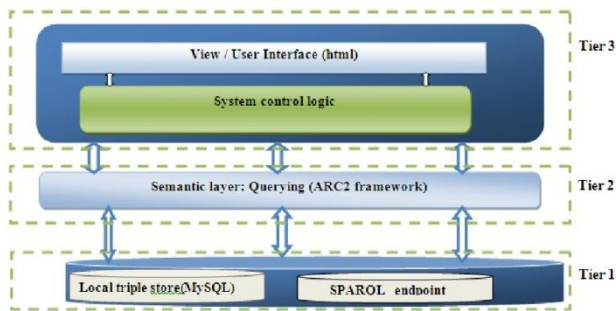


Figure 1. SemKnow framework

Figure 1 illustrates the conceptual framework of the system which is composed of three tiers. The first tier is the data tier consisting of the local store and the endpoint interface.

A local store in which to store the ontology for larger scale data access and manipulation. The second tier consists of the php scripts for accessing the data held within the local store. The third tier is the control and view layer, which allows conditional access to the different facets of the system. The secondary ontology was developed based on the classification scheme by ACM. The primary ontology is adapted from Dublin Core metadata element set, as well as from the rdfs and rdf model to define commonly used elements in its vocabulary. The ontology has two main classes, the document class and the research category class.

The research category class serves as a listing of the different sub-classes within the computer science field. The document class serves as a listing of the different types of research documents generated by the faculty of computer Science University of Malaya. These two classes are related to each other via the Object properties SEMKNOW:hasDocs, and SEMKNOW:isOfSubject. This is to enable the relationships between the resources held within the two classes to be inferred through a Sparql query.

The system has three important functions:

Knowledge communication/publication: This allows the resources held within the local store to be accessed by external parties. This fulfils an important function for the institution as a research university, because it allows visibility of research work [7]. The system also has a forum section, which allow users to share knowledge among their peers. The system also contains an unpublished articles class (in the ontology) which allow users to upload their unpublished work and received comments from peers.

Knowledge annotation: the system uses a predefined ontology to annotate the contents of the system. This leads to a more effective search [4][5][7].

Tagging: Tagging is very popular in the current web 2.0 community and the addition of a tag-based browsing feature

will ensure that the usability of the system is enhanced [7].The system is developed using ARC2 php semantic web framework. The querying and inference of the system is done using SPARQL querying language against a MySQL local store.

V. CONCLUSION

Semantic web technology was explored in this study and is proven as a viable technology for knowledge management. Key features such as machine-readability, heterogeneous data source processing and annotation features are in line with the requirements to enhance the visibility and research process of researchers.

The system fulfills the knowledge management needs of the researcher at the university. The main factor driving continuous KS at University of Malaya are the intrinsic factors such as recognition. Thus, the use of this system supports the knowledge management goals of the institution. In summary, SemKnow serves as a practical example of the application of semantic web technologies. The proposed tool, SemKnow is believed to be useful in achieving the research aims of the institution by allowing knowledge sharing. The next step in this study is to assess the usability and performance of the proposed system using Technology Acceptance Model.

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