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Supporting the Virtual Community: Social Bookmarking as a user-based Classification Scheme in a Knowledge Library

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ABSTRACT

Knowledge libraries hold the promise of widespread access to information available anywhere, anytime, freeing patrons from the geographical and temporal boundaries that currently exist. The classification of materials and subsequent searching of knowledge library content is an overall problem with many complex parts. Relevant classification is important for optimal information retrieval. This is especially important for the virtual communities that exist with extended organizations. Rooted in the virtual community and digital library literature, this paper develops a theory for improving the information classification and retrieval process of knowledge libraries that support virtual communities by applying social bookmarking techniques.

INTRODUCTION

In recent years, the intense competitive environment of the global economy has pressed business strategists to improve methods used to run widespread, globalized organizations. The creation of virtual communities to connect internal and external customers, project teams, internal client and services together, supported by communication technology has become a key strategy for many organizations (Zhu, Coulson, & Rohm, 2004). However, leveraging off of the intellectual repositories of information within organizations has become problematic and somewhat inefficient. Users often use the communication media supporting the virtual community or project teams to share links, exchange documents and gather data in disparate locations or, even worse, via e-mail. This leaves data, and often times valuable knowledge, distributed in multiple communications systems throughout the community (Rothaermel & Sugiyama, 2001). In the knowledge management literature, there have been examinations of Electronic Performance Support Systems (EPSS) as facilitators of knowledge management (McManus & Snyder, 2003) as well as an examination of the time dimension for document retrieval in a knowledge warehouse (Kalczynski, 2005). Social networks are a relatively new phenomenon that have been examined in relation to transaction cost economics and resources of a business (Bhatt, Gupta, & Sharma, 2007) as well as proposed in the management of a digital city (Lea, Yu, & Kannan, 2007). This paper details a potential technique to aid in solving this problem would be the use of knowledge libraries with a dynamic form of bookmarking to unify the data and make the knowledge searches more efficient for the purpose of the virtual community.

Knowledge libraries hold the promise of widespread access to information available anywhere, anytime, freeing virtual communities from the geographical and temporal boundaries that currently exist. As a method to unify information, knowledge libraries can allow widespread access to the valuable information that is currently contained within the organizations physical of computerized records. This vision for organizational libraries takes the services currently available to virtual communities to another level, with features such as individual word and sentence search and delivery of information directly to the user (Lesk, 1997).This increased access to material and powerful searching coupled with preservation approaches that far exceed current techniques creates a vision for the future of virtual communities that is compelling and technically realistic.

The tools to create this vision of the future are currently available. The Internet provides a delivery mechanism to convey content regardless of the geographical location of the user. Imaging technology for digitizing older material is improving and will continue to advance. As advancements in technology appear, storage becomes less expensive. The barriers to connection of existing knowledge libraries goes beyond the creation and maintenance of a single instance of a knowledge library, extending to issues of interoperability, data rights, development of a global infrastructure, ensuring open access to materials that is not dependent on a proprietary technology that may not be available in the future and classification of materials within a knowledge library collection (Borgman, 1999).

DIFFICULTY IN CLASSIFYING A KNOWLEDGE LIBRARY

The classification of materials and subsequent searching of knowledge library within a virtual community's content is an overall problem with many complex parts. The related classification issues range from metadata schemes and mapping common elements across disparate collections and libraries to the automation of the classification of new objects added to the collection. The correlation of relevancy of the metadata information to the object's content and its influence on the usefulness to the user when searched is a problem when creating knowledge libraries. Knowledge library collections can contain materials with a broad topic base or a more focused topic base, depending on the needs of the virtual user communities it was created to serve. Searching a knowledge library, like any search process, returns results that are only as good as the metadata scheme and search algorithm utilized.

There are many metadata schemes for use in classifying library objects and collections, with the current leading scheme being the Dublin Core metadata element set (Dekkers & Weibel, 2003). This lack of a universally accepted metadata standard creates an interoperability problem between individual libraries. Moreover, within any given standard, there is a lack of consistent understanding of the semantics, content rules, and syntax when putting the standard into use (Caplan, 2003). The content of two knowledge libraries using the same metadata standard may still have inconsistencies if they are combined.

Another problem with classification of knowledge library materials is the trade off between manual classification and automated classification. While manual classification may be preferred, as it will most likely yield better results, employing people to manually classify the large amounts of new materials makes it unwieldy and uneconomical. While automated

classification of new materials may be cost effective, there is the risk of misclassification or missing a relevant cross-classification.

The creators of a knowledge library and the users of the same knowledge library may have different conceptions about the material contained in the library. These differences could lead to the knowledge library's contents being classified in a way that does not provide an optimal search mechanism for the users of the library.

One possible enhancement to current classification and searching methods in a knowledge library that supports a virtual community is the addition of social bookmarking techniques. Social bookmarking places a portion of the responsibility of classifying resources into the hands of the system users. In social bookmarking, users "tag" resources and bookmark them as being useful. A tag is a keyword or phrase that is used to classify objects (usually web pages) into subject categories. Items with identical tags are linked together as being similar or falling under the same category (Mathes, 2004). Resources are ranked in usefulness by the number of users who bookmark them under different tags. With social bookmarking, the classification of resources in a collection goes beyond simple keyword and subject matching, extending the search process to include the usefulness of the resource as categorized by the recommender.

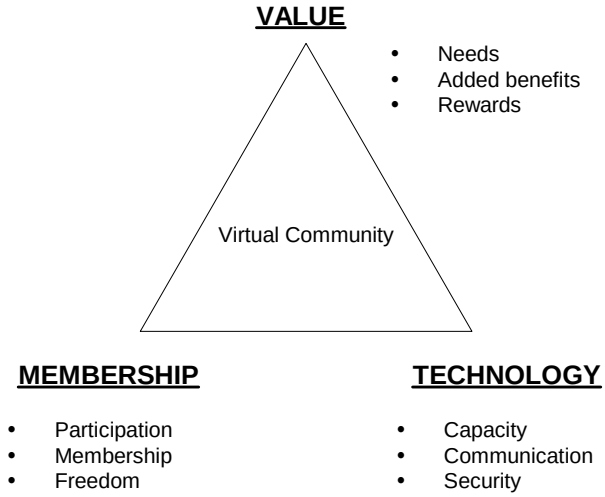
Therefore, this paper seeks to develop a theory for improving the information classification and retrieval process of knowledge libraries that support virtual communities by applying social bookmarking techniques. We will first define a virtual community and its relevant elements. We will then review the knowledge library literature to help map knowledge libraries as supporting element for virtual communities. Finally we will examine how social bookmarking techniques could provide support, flexibility and efficiency to a virtual community.

ELEMENTS OF A VIRTUAL COMMUNITY

A virtual community is defined as a social system where values are observed through member participation in an environment where technology plays a vital role (Zhu, et al., 2004). Therefore value, membership and technology could be thought as three distinct, but interrelated dimensions of a virtual community.

In 2004, Zhu, Coulson and Rohm developed a framework of a virtual community of e-commerce. The framework identified three distinct yet interrelated elements of a virtual community: Value, Membership, and Technology. Figure 1 is a visual presentation of what constitutes as dimensions of a virtual community, and the factors that affect the quality within each dimension.

Figure 1: Dimensions of a Virtual Community.



In business terms, value is observed when the participants are mutually rewarded in the process of the project or transaction within the community. This includes needs being met, as the most important factor within our value system in a virtual community it serves as the initial connection between potential members and the virtual community. If needs are what brings potential members into a virtual community of e-commerce, added benefits will play an impactful role in motivating the members and sustaining their subsequent activities within the community. Members can influence or reward virtual communities by contributing to the community's knowledge repositories by giving feedback on information within the system, or participating in discussions to better the qualities of virtual community services, and to help other members. It is through this reciprocal rewarding process, and the resulting value that virtual communities are sustained.

Membership

Membership in a virtual community within an organization is often assigned by a project type or other team based interaction. Once becoming a member, the contribution of a member to its group is determined by how much positive influence that individual has on the group. Participation is a key element of membership in a virtual community. It is through participation and interaction in virtual communities that members become embedded in the online community (Rothaermel & Sugiyama, 2001). A virtual community can offer a feeling of protection. Social psychology research has demonstrated that people invest part of themselves to be part of a community to create common symbols so that they can communicate better with other members, and form boundaries so that they can be protected and feel emotionally safe (McMillan & Chavis, 1986). Finally, the degree of freedom one has in deciding whether and how they want to be affiliated with the virtual community.

Technology

Of all the dimensions, technology is probably the most researched. Early research examined the topic of media selection with theories such as information richness theory (Daft & Lengel, 1986)

and social theories of media selection and use (Markus, 1994).While this line of research has examined the elements of media selection, the number of tools and technologies available to help create and maintain our virtual communities has expanded rapidly. Technology offers us tools to enrich our online activities and is thus a vital component of our dimensional framework of virtual communities of e-commerce, which consists of capacity, communication and security. A major issue today is not just media selection, but how to sort through the massive quantities of information available in our networks to effectively support our virtual communities.

THE ROLE OF KNOWLEDGE LIBRARIES IN A VIRTUAL COMMUNITY

Technology

Knowledge libraries provide for development, organization, access, annotation and storage, and deal both with information in digital form as well as digital management of information residing on physical media (Griffin, 1998). One could easily argue that a knowledge library is a technology that manages the elements of capacity, communication and security that support a virtual community. While multiple knowledge libraries could contribute to redundancy issues that could affect capacity, given the cost of storage, this is not likely a huge cause for concern. However, when we examine the other elements of value and membership, the relationship requires further exploration.

Value

In order for something to add perceived value to a virtual community, it must support the needs of the community, and provide benefits and rewards. As a repository of activities, a knowledge library provides a way to store the history, findings and the developmental process of the virtual community. This is likely the major benefit to the community. The reward is likely involved in the discourse that goes into the contribution to the knowledge library and finding a solution to the problem or meeting the stated objectives. However, once the project is completed and the community reforms, what will become of the library? Is it available to others throughout the organization in a meaningful form? This is where social bookmarking could add to the systems of values and rewards that could result in sustained value by allowing easy searching based on tags imbedded in earlier works.

Membership

While in the midst of a project or virtual community related assignment within an organization, members often contribute as part of the process. The knowledge library supports this process by providing a mechanism, but does not overtly support the notion “that people invest part of themselves to be part of a community to create common symbols so that they can communicate better with other members.” Merely assigning teams and asking for input into various library technologies does not support a common method for defining the level of participation. Informal communications, editorial remarks and the like are not often associated with knowledge repositories within an organization and could very well be ignored. Unless a mechanism is established to promote membership within the knowledge library, the strength of the virtual community is weakened. Social bookmarking, tagging or editorial elements could assist in this regard.

THE IMPACT OF SOCIAL BOOKMARKING ON KNOWLEDGE LIBRARIES

Social bookmarking, like previous technologies that have sprung from advances in Internet technology, was applied prior to being formally researched. The earliest application of social bookmarkings appears to be in the web based application called del.icio.us (http://del.icio.us/), which is a social bookmark manager for web pages. Del.icio.us allows for bookmarking of web pages by individuals, with the assumption that the more people that "tag" a website as useful for a given use, the more useful it is. Other social bookmarking websites include Kaboodle (http://www.kaboodle.com/), Flickr (http://flickr.com/) for storing and bookmarking images, and Simpy (http://www.simpy.com/).

Social bookmarking, with its potential for better ranking and classification of resources, is by definition only as good as its users. The misuse or misunderstanding of tags when applied to resources can cause misidentification of tagged resources and can possibly erode the quality of searching for other users. If a user tags a resource for Persian cats under the tag "Persian cats" but does not add a tag for the more general keyword of "cats" there is the possibility that this resource will be missed by a searching user. Browsing of tagged resources can help to alleviate this issue by allowing the searching user to browse through the tags, possibly finding keywords they did not think of (Mathes, 2004).

Another possible issue with utilizing tags that are user created is the possibility of personal bias in how the resources are tagged. This type of bias may be intentionally or unintentionally applied to the tagging and classification of the resources. Academic use of a social bookmarking tool carries the assumption is that there will be a higher level of cooperation and general camaraderie among the users of the system than may be present in a more general user population. This problem may be avoided by not allowing anonymous tagging of resources, tying the recommendation to user, and therefore the reputation of the user to the quality of their tagging of resources.

Alternative solutions improve searching and classification of materials in a knowledge library include a two layer knowledge library model that supports two type of user searching, tactical cognitive searching and strategic cognitive searching. Tactical cognitive searching is categorized as "traditional" searching where the user looks for documents relevant to his information needs. Strategic cognitive searching is described as intelligent answers to a users questions that are supported by references from materials contained within the knowledge library (Feng, Jeusfeld, & Hoppenbrouwers, 2005). This two tier architecture is designed to support question answering as a supplement function to traditional search and retrieve. Social bookmarking within the knowledge library realm is a functionality that can be seen as complementary to this two tier architecture. Both solutions strive to add supporting layers of search capability that supplement the traditional keyword search.

One notable experiment in social bookmarking involves a tool called Unalog (http://unalog.com/), a web based social bookmarking tool which has an institution specific implementation called Links. Links was implemented at Yale University as a social bookmarking tool to support the needs of campus users in a manner that is easy to use and fits with other existing campus services (Chudnov, Barnett, Prasad, & Wilcox, 2005). Links appears to be a closed version of Unalog, with integration of the Links into the existing university

architecture only so far as to allow easy migration of existing user account information and to identify Links as affiliated with the university and therefore trustworthy. Links does not appear to have been integrated into the existing library infrastructure to enhance existing search functions, but was initiated as a tool for social sharing of web links, with no explicit ties to the digital resources of the Yale University library. Users noted that the system was useful with over 100 users participating and collectively created over 500 links that were shared both publicly and privately (Chudnov, et al., 2005).

Another experiment in social bookmarking as a resource organizing tool was the creation and deployment of a proprietary social bookmarking system called Dogear. This system was created as an enterprise-wide tool for use by IBM employees within the organization's Intranet. It was envisioned to improve information sharing among different levels of employees as well as employees working together in project teams. Dogear was created to work with existing research and production systems within IBM, leading to adoption of the system by sophisticated and novice users. Preliminary use of the system indicates that there is an increasing number of tags with over fifty percent of the users utilizing or "clicking" on the resources available (Millen, Feinberg, & Kerr, 2006).

CONCLUSION

Knowledge libraries hold the potential to aid organizational groups by providing a unified place for group data to be stored and accessed. In utilizing a knowledge library, there is concern about the classification scheme of the stored data, which has a direct effect on the usefulness of the search capabilities of the tool. If users cannot find what they are looking for, they may abandon the tool. Social bookmarking within the knowledge library sphere has the potential to enhance the existing search of materials contained in a knowledge library. Social bookmarking is classification of materials that is done by humans, who have not only an understanding of the content of the material, but also the *usefulness* of the material. Through social bookmarking the content of the material is classified by humans, who understand the material versus software that is programmed to determine the meaning of the material (Wikipedia Contributors, 2008). This paper makes a case for the use of social bookmarking within knowledge libraries as a support tool for virtual communities.

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