

## Information Sharing and Patterns of Social Interaction in an Enterprise Social Bookmarking Service

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### Abstract

*In this paper, we explore how a social bookmarking service is used to support knowledge sharing in a large enterprise. While there has been considerable interest in social bookmarking and collaborative tagging systems in recent years, very little is known about their actual usage. In this paper, we present the results of a field study of a social bookmarking service that has been deployed in a large enterprise. We present new quantitative data on how a corporate social bookmarking system was used, through in-depth analysis of the bookmark and tag data. We specifically explore the patterns of information sharing and social interaction for a twelve month period of time across three groups within a large enterprise. We discuss how the results of our investigation can be used to better support communities of practice with social bookmarking services.*

### 1. Introduction

Social bookmarking services have dramatically changed the way people find and re-find information on the internet, and have demonstrated the power of online collaboration and the wisdom of crowds. There are several important aspects of these social bookmarking services that support collaboration. First, users store bookmarks in a shared site, instead of storing them on private desktops. Not only can users access their bookmarks anywhere, but so can everyone else. By reading bookmarks saved by others, users can discover new sources of information that might be missed by search engines as well as get a general sense of other peoples' interests. Second, social bookmarking leverages the popular social software phenomenon of collaborative tagging. Users can apply tags or keywords to the bookmarks that they save, and then later search by tags to find bookmarks relevant to their interests. Collaborative tagging allows users to have much greater flexibility and adaptability in organizing

information when compared to formal classification systems [10]. Collaborative tagging is a grass roots approach by which a folksonomy for shared bookmarks is created [19].

Over the last few years, there has been a tremendous growth in social bookmarking applications, of which the most prominent example is del.icio.us. Today, there are dozens of similar social bookmarking sites (see [11]). While internet social bookmarking services are of great benefit for publicly accessible web resources, there has been relatively little research to date on the benefits of social bookmarking for large enterprises or organizations. Some have claimed that social bookmarking applications are a logical extension of knowledge management solutions for enterprises [3]. Millen et al [15] have reported a study of the *dogear* social bookmarking system, which was specifically designed for large enterprises. They observed sustained high levels of use and reported user benefits of improved awareness of corporate information resources, improved awareness of the interests and expertise of corporate colleagues, and better management of personal bookmarks. More recent work has shown the benefits of enterprise social bookmarking in social or exploratory search tasks [16]. Damianos et al. [4] reported the results of a ten month field study of the *onomi* social bookmarking application in a large enterprise. The tool was shown valuable in a corporate environment for sharing content, promoting information discovery, supporting communities and social networks, and facilitating expertise location in a general sense.

However, for a large-scale enterprise, multiple business units and matrix reporting structures have increased the challenges and complexity of information sharing. Large enterprises have increasing difficulty finding and reusing knowledge. Sometimes, even determining whether the knowledge exists within the enterprise can be difficult [9].

Recently, several social bookmarking sites have emerged that support specialized content. One example is Connotea.org, which is used by medical researchers and clinicians to track medical references. Academics use CiteULike.org to share, store and organize academic papers. These specialized social bookmarking sites seem to be targeted at supporting specific communities of practice.

These emerging community-oriented social bookmarking applications motivated us to consider whether different functional divisions within a large enterprise might have different patterns of use and unique requirements for a social bookmarking service. (See Figure 1). For example, are the kinds of resources bookmarked for a corporate headquarters (CHQ) organization similar or different from those in a research and development group? To date, there has been little research investigating how a social bookmarking system is used by different groups within a corporate environment.

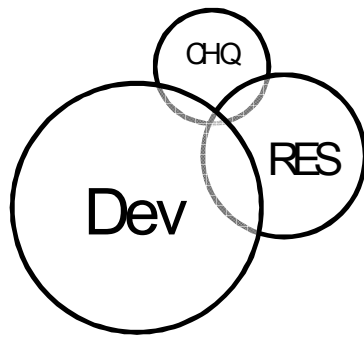


Figure 1. Conceptual diagram of social bookmarking behaviors.

There are several usage patterns that could vary among groups within an organization. For example, the distribution of intranet versus web resources that are bookmarked could vary, signaling a greater interest in the external environment versus internal corporate resources. Groups could also differ in the use of public versus private bookmarks. Groups with a preponderance of public bookmarks may have more experienced collaborators and/or use information resources that are more general in nature and less likely to contain sensitive or confidential content. On the other hand, a work group with a larger number of private bookmarks might be more heavily engaged in sensitive business matters or need to access corporate confidential information. Corporate groups might also differ in significant ways in the number and nature of bookmarks that are held in common within the group

(i.e. a large number of overlapping bookmarks) and the degree to which information is shared between groups.

In this paper, we hope to answer the following questions. Are there similar or different bookmarking patterns for different functional organizations in an enterprise? Are there similar or different tagging behaviors for different organizations in an enterprise? And finally, do bookmarking and tagging patterns change over time?

## 2. Related Work

As mentioned above, one of the major innovations in social bookmarking services is the widespread adoption of user-generated keywords (or social tags) that are provided as annotations to the bookmark content. The collection of tags within a specific system or application defines what has become known as a folksonomy. Users can share their tags for specific resources and each tag serves as a link to additional resources tagged the same way by others. So the nature of the tags and the act of tagging itself becomes a social or even collaborative activity [20]. Researchers have endeavored to understand why people tag [1] and how tagging system works to support information sharing and social networking [14]. Important recent work has shown that tag choice is influenced by past personal history as well as community-tag histories [18]. Several studies have investigated how bookmarks and tags evolve over time for del.icio.us, the large public internet social bookmarking service [8, 13].

Others have investigated social tagging behavior for specific kinds of web resources. One recent study investigated tagging of internet video, identifying specific tag clusters associated with specific kinds of resources [17]. In a study investigating the motivation behind tagging photos in a public photo-sharing site (flickr), researchers found that tags are used to help organize photos, to signal to others what the photos are about, and to help others find these photos [1]. In an enterprise directory project, Farrell et al have proposed tagging people and co-workers [5] and John et al have explored tags as a way to identify experts [12]. However, none of these recent studies looked at whether or not a distinctive tagging folksonomy will emerge from different groups (i.e., different groups having distinct tagging patterns).

Like other forms of social software, social bookmarking services are faced with the same challenge of maintaining continued participation. Their success, in general, requires participation to reach critical mass to provide value to users and to ensure a sustainable level of contribution and vibrant interaction. There are several current research efforts

focused on understanding how specific online behavior drives social interaction (see for example [2]). Beenen et al. have reported some of the initial results of this line of research by showing how social psychology concepts and theory can be used to inform design interventions that alleviate the problem of under contribution in an online movie recommender community [2]. One unanswered question is whether various groups have similar or distinct patterns of adoption for the many kinds of social software.

This work differs from the earlier work reported by researchers about the *dogear* social bookmarking service by examining, in detail, organizational use of the service [15-16]. This organizational analysis is new work with a longer term goal of trying to understand how to design social bookmarking applications that are tuned to the needs of groups and communities of practice within a large organization.

### 3. Method

To answer our research questions, we performed a field study of an enterprise social bookmarking service deployed in a large multi-national company. The system shares a number of features with other common bookmarking systems (e.g., del.icio.us). First, individuals may create personal collections of bookmarks and instantly share their bookmarks with others. Second, one or more keyword or collaborative tag may be explicitly entered by the user for each bookmark. These tags allow the individual user to organize and display their collection with labels that are meaningful to them. Also, as with other social bookmarking services, the one under study here supports various subscription services, which allows users to monitor the bookmarks of specific individuals.

The bookmarking service that we studied here differs from popular consumer bookmarking services in several ways. Rather than allow the use of pseudonyms, the bookmarking tool requires the use of real names and authentication with a corporate directory. Names are clickable, which allows users to look-up additional information about other people in various corporate databases (e.g., the corporate online directory and the enterprise intranet). A second distinguishing characteristic is that this bookmarking service was designed to work behind a corporate firewall. This allows intranet resources to be bookmarked and shared among coworkers (e.g., human resource links, team or project resources, etc.). A more detailed description of the social bookmarking system under study in this paper can be found in earlier published work [15-16].

The enterprise bookmarking service was launched for a pilot test (friendly trial) in March, 2005. A small group of highly motivated and committed users quickly formed. A more formal field trial within the corporate intranet began in July of 2005 as part of a new technology incubation program, and announcements about the service availability were made on several intranet web sites. Additional buzz about the availability of the service was created through word of mouth and as a result of significant discussion of the service on the corporate intranet blogs.

Our understanding of information sharing and social interaction in the enterprise bookmarking service was informed by earlier reported logfile analysis and end-user interviews [15-16]. The results presented here are based on new analysis of the primary bookmark data files from July, 2005 through July 2006. The following data were included in the bookmark files for each bookmark: URL, resource title, end-user annotation of the resource (which is optionally provided), end-user name, public/private and web/intranet indicators, tags associated with the resource, and a time and date stamp. The user name was matched to a corporate directory to obtain the organization and primary geography of each end user. By July 2006, the system contained over 100,000 bookmarks and 250,000 tags created by over 1600 active end-users.

To make better sense of organizational differences in a large enterprise, we narrowed our sample down to include three major organizations: The *Corporate Headquarters group* (CHQ) includes employees performing corporate functions such as human resources, corporate strategy, and corporate information technology (CIO functions). The *Research division* provides basic research and advanced technology exploration. The *Software Development Group* (SWG) performs all aspects of designing and developing software applications and tools for large corporate customers. These three groups serve different functions and each has a stable number of people using the bookmarking system.

During the one year under study, 567 individuals created at least one bookmark using the bookmarking service. CHQ has 69, Research has 69 and SWG has 429 people who created at least one bookmark in the system. These end users created 12,239 bookmarks, of which 92% were public and 8% were private. Because we were interested in understanding the bookmark behaviors supported by this application, we excluded bookmarks that were imported from browser bookmark files (i.e., Internet Explorer and Firefox browser bookmarks) and external bookmarking applications.

## 4. Results

To understand how different groups use a social bookmarking service, we explored differences in both bookmarking and tagging behavior. We examined bookmarking behavior along several dimensions. First, we looked at differences in bookmarking and tagging behavior as a function of whether the source content was found on the public internet or on the corporate intranet (behind a corporate firewall with restricted access). Second, we examined privacy differences by looking at whether bookmarks were shared with colleagues (i.e., a public bookmark) or private and visible only to the creator of the bookmark. Third, we looked at differences in bookmarking behavior over time. To do this, we divided our data into three four-month periods. And finally, as we were especially interested in bookmarking similarities and differences across difference work communities, we examined the bookmarking behavior for three specific groups: corporate headquarters, a research group, and members of the software development organization.

### 4.1 Bookmarking Behavior

During the year of this field trial, there has been a consistently strong growth in number of new bookmarks created (which has also continued beyond the analysis period reported in this paper). In Figure 2, the total number of bookmarks created over the first year is seen for each of the three groups. All three groups show continued growth across the 12 months of the field trial. This has been highlighted by a linear trend line in Figure 2 for each of the groups.

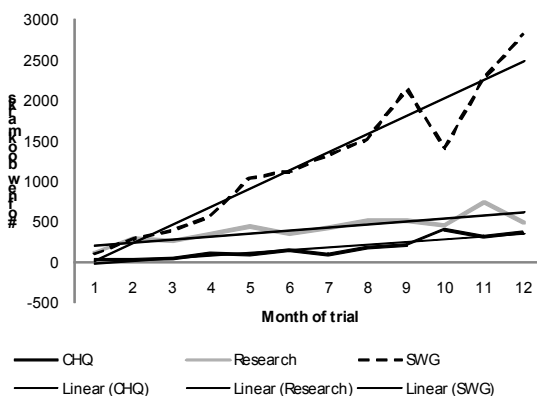


Figure 2. Growth in new bookmarks over time.

A very similar pattern of growth is seen in Figure 3, where we show the number of unique bookmark contributors per month of the trial compared with the cumulative number of users for each group. Again, a sustained positive growth in number of active

participants can be seen, although the growth is smaller for both the RES and CHQ groups. In all three groups, the number of unique bookmark contributors seems to stabilize at about 50% of users who have previously been to the site. The tag growth during the field trial period shows very similar patterns (not shown).

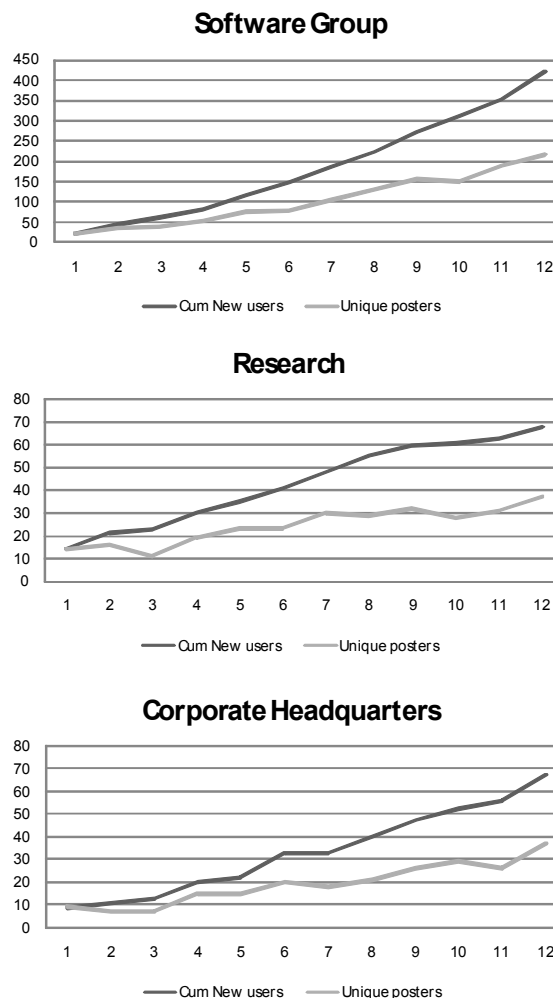


Figure 3. - Number of unique bookmark contributors per month for each of groups.

If we look in more detail at the percentage of bookmarks that were created from either the internet or intranet, we can see some interesting differences. As can be seen in Figure 4, the research group seems to be considerably more focused on internet (external) resources, which is understandable given the focus on a larger professional/scientific community. The software and headquarters group are more focused on intranet resources. We speculate that this might be due to an increased emphasis on work functions such as corporate communications and human resources for the

corporate headquarters group and for intranet-based tools and information in support of software development.

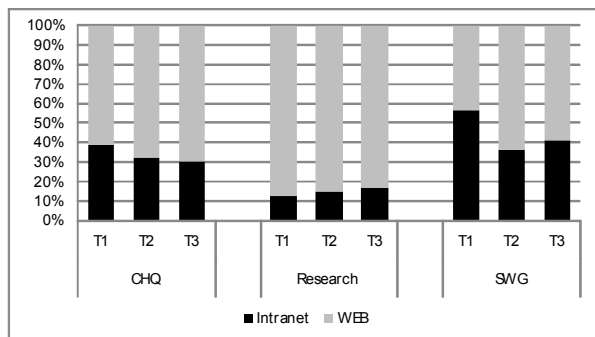


Figure 4. Proportion of web versus intranet bookmarks over time for three groups.

We examined the distribution of public versus private bookmarks and found a consistent bias for public bookmarks (92-98% public bookmarks versus 2-8% private bookmarks). This difference was consistent over time and across groups as can be seen in Figure 5, which shows the average percentage for each of three four-month periods). In many respects, this is a very favorable result for a social bookmarking service, as the value to coworkers is in the ability to be able to share information and learn from what others have already discovered.

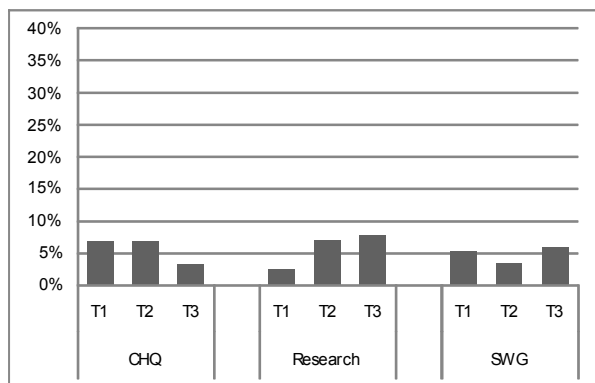


Figure 5. Percentage private bookmarks over time for three groups.

One measure of the degree of common interests across the organization can be found in the number of bookmarks that a group holds in common. To assess the heterogeneity of interest within the three corporate groups, we looked at the percentage of URLs that had been bookmarked by more than one person. We decided to measure general or approximate URL overlap, and so we truncated each URL so that up to three address segments were analyzed (i.e., up to three

“/”). While this arguably inflates our measure of overlapping URLs, we think that this approach reasonably reflects generally shared interests by the bookmarkers. This approach may also be problematic for comparisons between intranet and web bookmarks as the URL naming conventions for the intranet are under the control of the enterprise and likely standardized in some way. Nevertheless, this approach will give us a sense of the differences between groups.

In Figure 6, we show the results of bookmarks in common *within an organization* for both the web and the intranet for each of the three groups. For all three groups, the percentage of URLs shared for intranet resources is greater than for WEB resources. The percentage of overlapping bookmarks is highest within SWG, providing some evidence of a common practice and shared information interest.

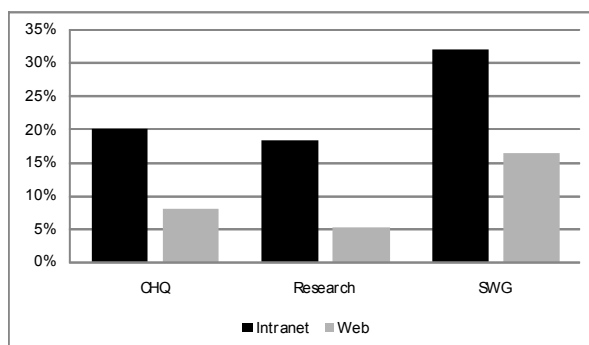


Figure 6 - Percentage of URLs bookmarked by more than one person for each of three groups.

To gain a deeper understanding of the topical interests of the three groups we examined the top 15 bookmarks within each organization. For intranet URLs, we found that there are eleven URLs out of the fifteen that are in common across the three organizations. They roughly fall into these categories: tools, HR-related sites, news, and corporate directory.

The results are considerably different for web URLs. Out of the top 15 web URLs, only two are shared by all of the three organizations. CHQ and SWG both bookmarked many URLs in *developertools*, which is a web site supporting software development with forums and related information. The research group is significantly more focused on content and information services. Table 1 lists the kinds of top web resources bookmarked by each of the three groups.

**Table 1 - Most frequent types of URLs bookmarked for each of three groups.**

CHQ	<ul style="list-style-type: none"> <li>• developertools (e.g., java, web, opensource)</li> <li>• industry news/press (e.g., oreilly, tech blogs)</li> </ul>
Research	<ul style="list-style-type: none"> <li>• Professional publications (e.g., IEEE, citeseer)</li> <li>• Industry news/press (e.g., blogs, oreilly, forums), business tech news</li> </ul>
SWG	<ul style="list-style-type: none"> <li>• developertools (e.g., java, xml, webservices)</li> <li>• Industry news/press (e.g., blogs, oreilly, wired)</li> </ul>

### 4.2 Tagging Behavior

To understand whether tags are applied differently to different kinds of bookmarks, we looked at the average number of tags applied to WEB versus intranet bookmarks as well as public versus private bookmarks. As can be seen in Figure 7, there are generally more tags applied to intranet bookmarks although there are some differences in this behavior across the three groups. We were surprised to find that more tags were applied to intranet resources. There are several possible explanations. One is that there is considerable overlap and redundancy among intranet resources and tags are used to provide a better description (or classification) of the content. A second is that internal resources are tagged with extra work-related tags that might be informative to colleagues such as project or organization names. A third would be that intranet resources are frequently tagged by the authors/owner of the site in an effort to promote visibility of the resource.

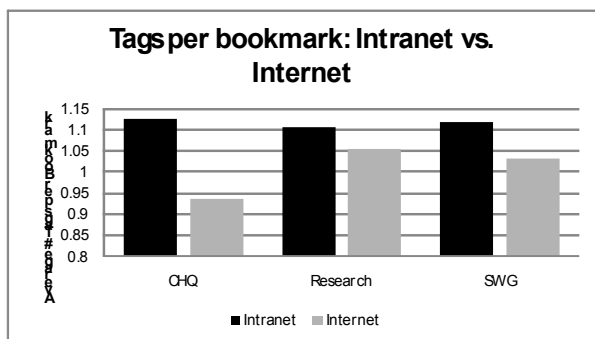


Figure 7 - Average number of tags per bookmark for each of three groups.

The differences in tagging behavior for public versus private bookmarks can be seen in Figure 8. There are significantly more tags applied to public bookmarks than private ones. Some possible

explanations for this include less need for tags on private bookmarks as these bookmarks are more salient or they are personal and need less description. Tags have also been shown to be useful as navigational links for social browsing [16]. Since there is no benefit to others of tagging private bookmarks, user may feel less motivated to provide very many.

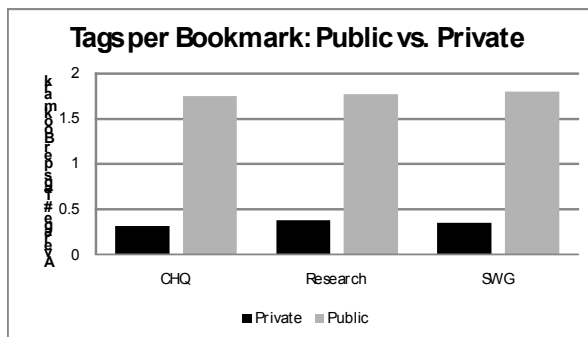


Figure 8 - Average number of tags for public versus private bookmarks for three groups.

### 4.3. Similarity of Tag Vocabularies

Another measure of the degree of shared interests across the organization is the similarity of the vocabulary that is used when users tag information resources. We compared the numbers of tags used by more than one person within each organization. In Figure 9, we show the results of tags used in common within an organization for each of the three groups. The percentage of tag overlap (reuse) ranges from 30-50% which is higher than the URL overlap reported above. The relatively high degree of tag reuse for the research group (web) and SWG shows a tag vocabulary (folksonomy) that is moderately consistent in use among the group members.

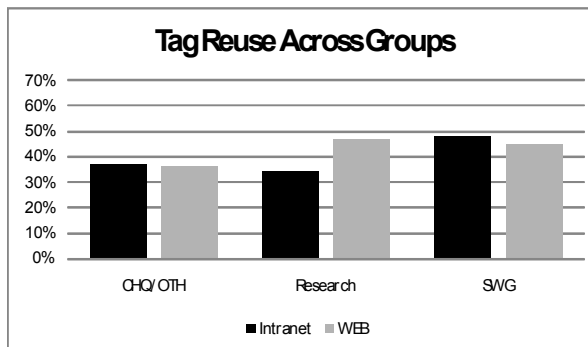


Figure 9 - Percentage of tags used by more than one person for each of three groups.

To better understand and compare the degree of vocabulary overlap across the different groups, we

calculated a measure of similarity that has been used to assess search term similarity [6]. For this analysis we used the top 100 tags for each of the groups as we think these tags would be good indicators of the core interests within the group. Altogether, the top 100 tags accounted for about 1/3 of the total tag use. A tag similarity score is computed for two groups as the tags in common (intersection) divided by the total number of distinct tags (tag union). The similarity results are presented separately in Table 2 for both web and intranet tags. These similarity scores are reasonably high and indicate that the kinds of tags used are similar across the groups.

Table 2- Tag similarity scores for internet (web) and intranet for each of three groups

	Intranet ( $\cap/U$ )		Web ( $\cap/U$ )	
	CHQ/RES	0.419	70/167	0.442
CHQ/SWG	0.476	91/191	0.442	76/172
RES/SWG	0.432	76/176	0.454	79/174

Another way to look at tag similarity is to more carefully examine the specific tags that are most frequently used within the social bookmarking system. In general, there is great overlap in the top 100 tags across the three organizations. Moreover, the tag overlap exists for both intranet and web resources.

We examined the the top 100 tags used by each organization and coded them according to Golder & Huberman's [8] tagging scheme for bookmark tags. We were a little surprised that we were able to classify almost all 100 of the most frequently used tags into three of their coding categories: topics, content type and owner (see Tables 3 and 4) The most used intranet tags includes the enterprise's name, the enterprise portal home page, blogs, and wiki, while the most common internet resource tags include web2.0, java, and google.

While the majority of top 100 tags were common among the three groups, the unique tags were helpful in identifying interests specific to a particular group. For each of the tag coding categories we have listed a few of the *distinctive* tags used by each particular group. These unique tags reveal that the three groups have their own distinct interests as shown in the two tables. CHQ pays attention to general business topic and areas, Research looks at content and information source; SWG looks at specific domains in software development, like test, documentation.

Table 3 - Examples of distinctive tags for coding categories for intranet resources.

Tags_Intranet	Topic	Content	Owner
CHQ <i>e.g.</i> <i>n</i>	Productivity, enterprise, usability 25	Market intelligence, utilities, summit 66	CIO, global 8
RES <i>e.g.</i> <i>n</i>	UAM, ODW 27	Howto, forum, faq, it-info, patents 65	UE research 7
SWG <i>e.g.</i> <i>n</i>	Test, Project management 31	Documentation, support 60	SWG, Hursley 9

Table 4 - Examples of distinctive tags for coding categories for internet (web) resources

Tags_Web	Topic	Content	Owner
CHQ <i>e.g.</i> <i>n</i>	Adoption, ontology, enterprise2.0 28	Syndication, extention, education 62	Google 8
RES <i>e.g.</i> <i>n</i>	Virtual worlds, HCI, mobile, graphics, fun 26	3d, articles, paper, CDE, 66	Google, Microsoft 8
SWG <i>e.g.</i> <i>n</i>	Photography, language, framework 30	Office, DITA, tutorial 61	Google 8

## 5. Discussion

In this paper, we have investigated the use of a social bookmarking application within a large enterprise for the first full year of operation. We have specifically focused on how three major organizations (corporate headquarters, research, and software development) are bookmarking and tagging within an enterprise.

In general, there are more similarities than differences in bookmarking use across the three groups that we analyzed. As we observed, there is a steady increase in the number of bookmarks created by members of each of the three groups over the field trial period (see Figure 2). One interesting difference is in the distribution of internal (intranet) versus external (web) bookmarks. The Research division shows a consistently higher percentage of web bookmarks when compared to the other two groups (Figure 4). We think that this result matches the primary roles that the three organizations play in the enterprise. The

Research division is responsible for staying informed about trends and advances in various scientific and technology areas. This could arguably lead to browsing and bookmarking behavior that is more externally focused, with a continuous need to scan diverse information source in search of new ideas and sources of inspiration and innovation. In contrast, the headquarters and software development group have a considerable number of intranet information resources, which are often visible to corporate users via organizational specific information portals.

One similarity in bookmarking use is the stable distribution of public versus private bookmarks made by the three groups. We found that there is no dramatic change of the percentages of public versus private bookmarks, and private bookmarks always account for a very minor proportion in the three time periods of the first year. While we interpret these results to show that the amount of information considered private “to individuals” is relatively small and similar across groups, we do not rule out the possibility that private collections of bookmarks for organizations or teams might be useful.

Social bookmarking leverages the generally self-interested action of bookmarking and makes it valuable to a group. So it matters considerably whether the bookmarks created are shared by group across members and whether shared interests are discernable. Our analysis showed relatively small number of overlapping bookmarks within a group: CHQ and Research both have fewer than 20% and SWG has fewer than 30% shared bookmarks. The larger number of shared bookmarks within SWG could be a result of more heterogeneous work practices and shared interests around the specific product lines and markets.

Another noteworthy finding is that the percentage of URLs shared for intranet resources is greater than for Web resources for all three groups (see Figure 6). An examination of the most frequently bookmarked intranet resources shows considerable overlap of general purpose sites such as corporate news, wikis, and HR resources. For web URLs, the degree of sharing decreases. The top fifteen internet URLs within each group show that they have quite diverse interests as only two are shared across the three groups. Our summary of the top 15 web bookmarks for each group reveals some interesting differences. The research group has several bookmarks for professional information sites, which is consistent with the work practices of a research group. In contrast, CHQ and SWG have a considerable number of top bookmarks for software developer tools and technologies. For SWG users, this is strong evidence that social bookmarking is being used to find and refine job-

related information (i.e. software development tools and information).

Tagging is the one of the most important features of social bookmark services and is a tool to organize objects for the purposes of both refining and discovery [19]. Tagging, when combined with search technology, becomes a powerful tool to discover interesting Web objects. The results presented above contribute to our understanding of tagging behavior in social bookmarking systems. One interesting result is that the average number of tags applied to Intranet sites was greater than web resources across all three groups. We speculate that intranet resources are additionally tagged with group identifiers both as a signal to others about the relevance of the information and as a memory aid when revisiting tagged content. Our detailed tag analysis of the top 100 tags (Tables 3 & 4) provides support for this explanation as organizational tags are commonly found (e.g., Hursley, SWG, CIO).

Tagging a resource is no longer primarily a self-serving activity for the organization of personal information, but also a social act that impacts the entire community of visitors to the website [20]. Therefore, the nature of the tags and the act of tagging itself becomes a social or even collaborative activity. Our field data confirms that tagging is a social activity. We found public bookmarks have significantly more tags than private bookmarks (Figure 5). Private bookmarks are both fewer in numbers and not intended to be shared. This lessons the need for tags to provide topic or content markers and/or to provide subsequent support for bookmark browsing or searching.

In addition to the number of shared URLs, tagging vocabulary is another important way to measure shared interests among organizations. We’ve examined all the tags that are shared within each group and found a reasonably high percentage of tags reused within a group (30-50% - Figure 9). This suggests that there are a common set of interests *within* each of the organization that we studied.

We were somewhat surprised at the result of the similarity scores for the top 100 tags collections. If these frequently used tags are good indicators of a community’s interests, then there is a high degree of common interests across the three groups. Our detailed analysis of the top 100 tags confirms this for both intranet and internet tags. That is, the patterns of tag use are similar across the three groups and fall into three common categories: what the bookmarked resource is about (topic), what kind of resource is it (content) and who owns it (owner).

Nevertheless, a closer look at the few distinctive tags within the top 100 helps to identify some unique characteristics of the three groups. Each of the three groups has some relatively specialized tag vocabulary.



Intranet examples include *enterprise* for CHQ, *UAM* (a project name) for Research and *test* for SWG. Specialized tags for internet resources are even more descriptive of the kind of work that each group performs: CHQ tags sites as *market intelligence and summit*; Research tags *howto, faq, and patents* and SWG tags *documentation and support*. Not surprising, each group uses an organization referent as a resource tag. Tags for web resources show current topical interests and vividly displays the differences among the groups. During this time period CHQ was tagging a lot of sites with the terms *enterprise2.0 and ontology*, Research was tracking *virtual world and graphics* and SWG was tagging *language and framework*.

## 6. Implications for design and future work

One of the primary benefits of an enterprise social bookmarking application is that is the very act of creating a bookmark is an explicit indicator of the utility or value of the internet and intranet information resource. Other indicators of the value of specific bookmarked resources are the number of times (frequency) that a URL is bookmarked or copied.

Another clue about the potential information utility of a bookmark is by association with a specific person (possibly an expert), or with a specific group (which may have a reputation for knowledge in a particular area or domain). To date, there is little group-level support for social bookmarking applications. There are either system-wide public bookmarks (and associated tags) or there are private bookmarks (and tags). Our analysis of bookmarks by groups in this paper suggests that groups within an enterprise may have different goals or desired use of bookmarking. For example, CHQ appears to be using bookmarks to keep track of interesting technology trends or changes in the marketplace. There is some evidence that researchers are using bookmarking to get back to primary professional information resource, and SWG is using bookmarks to help keep track of resources helpful in support of the development process of tools.

We sense that there may be an important need for collections of bookmarks in support of specific organization or communities of practice. For example, it should be possible to create smaller collections of bookmarks that are associated with specific groups, teams or communities. When a member of a group visits the social bookmarking site, there may be announcements of new bookmarks that have been created by members of a particular group, or specific ways to browse organizational subsets of the bookmark collection.

The bookmark search could be tuned based on the bookmark collections of specific groups, with different page rankings determined by the importance of a bookmarked resource to a specific community. Search researchers have already shown promising results with community enhanced search tools [6,7]. Perhaps even more important, when the social bookmarking application is integrated with more general search tools (e.g., enterprise search), the community-vetted resources can be surfaced and exploited. For example, the results of an enterprise search could indicate what the top three bookmarked resources were from a specific group. It is also easy to imagine that a community-oriented bookmarking application could be used to find coworkers in the same organization with similar interests, or to specifically find an expert on a topic in a different organization.

While we have observed that there is a lot of overlap between groups for frequently used tags, there were some tags that are more closely identified with specific groups. We could imagine a community bookmarking application to have community-specific tag recommendations or a listing of the most frequently used tags for a community. Tags that identify the organization of the tagger (e.g., CIO, research) could be automatically appended to each of the bookmarks and subsequently used to “tag browse” the bookmark collection.

In the work presented in this paper, we have investigated bookmarking behavior for members of formally defined organizations within the company. Another, perhaps more powerful, approach would be to identify self-forming communities based on information traces in the application. Communities of interest can be inferred using social network analysis of tag terms or bookmarks held in common. Much work needs to be done to determine the optimal way to infer these kinds of community relationships.

Alternately, communities of interest can be identified using the articulated social networks that are supported by the bookmarking application. For example, the del.icio.us bookmarking application allows members to subscribe to others, which is generally considered to be an explicit articulation of shared interests. It is possible then to view bookmark collections using these social networks. These informal communities are likely extremely good at identifying emerging trends and new technologies.

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