Virtual Communities of Practice: Design for Collaboration and Knowledge Creation

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Virtual communities: design for collaboration and knowledge creation

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ABSTRACT: This paper addresses the newly emerging paradigm of knowledge dissemination and collaboration in Online Communities. The authors present the results of a pilot study of thirty existing community portals, including information about the portal architecture, functionality, and design details. The paper discusses the functionality of different elements of virtual community spaces such as the discussion forum, digital repository, e-learning resources and collaborative tools that are utilized by various online communities, including engineering and scientific online communities. The authors devote a significant amount of attention to the investigation of design functionality, collaborative tools and practices that support member participation and knowledge sharing. Knowledge sharing in virtual enterprises and communities of practice is facing major challenges due to a failure to align their incentives system with the objective of creating value through knowledge sharing. Special design considerations to encourage member participation and knowledge sharing in the online professional communities are discussed.

1 INRODUCTION

Communities of practice are communities of professionals and others who share knowledge and resources (Wengler, 1998). Hildreth et al. (2000, p.35) defines a community of practice as the community which has "a common set of interests to do something in common, is concerned with motivation, is self-generating, is self-selecting, is not necessarily co-located, and has a common set of interests motivated to a pattern of work not directed to it". The key to a successful knowledge dissemination strategy is to channel the knowledge to the communities of practice and at the same time provide means for information exchange and peer-to-peer collaboration (Wengler, 2000).

An online community has to satisfy three main objectives. It has to supply content to the user, it has to encourage members to participate in the community by contributing, and it has to facilitate communication and interaction between them (Pickles, 2003). In the design of a virtual community space some functionality should be provided to "push" content to members. "There are a multitude of techniques for pushing content to and from members but the aim is for members to generate as much content between them as possible" (Pickles, 2003). These "push" functionality features include Knowledge Repository, News, Workshops/E-learning modules, Classifieds and Job offerings.

Other features serve a means of "pulling" content from members of online communities. Such "pull" features include the Forum, Member directories, Member reviews, Polls and Surveys, Online and Offline events, as well as, providing Topic Experts services to the users. The rest of the Portal features should be designed to encourage member participation and collaboration. These features include online conferencing, Forums, Chat rooms and Conferences, as well as live meetings.

The Knowledge portal model for online community of practice is presented in Figure 1 (Kondratova and Goldfarb, 2003). Within this model, the Knowledge Portal site provides, for scientists, practitioners and private companies, free access to the Discussion Forum and to the Virtual Laboratory, as well as to the Digital Repository of research and scientific information. The proposed Knowledge Portal model enables basic community of practice portal requirements. These include a conversation space for online discussions on a variety of topics, as well as, a facility for posing questions to the community (Discussion Forum), a shared workspace for synchronous electronic collaboration, discussion or meeting (Virtual Laboratory), and a document repository to be used as a knowledge base (Repository) (USAID, 2004).
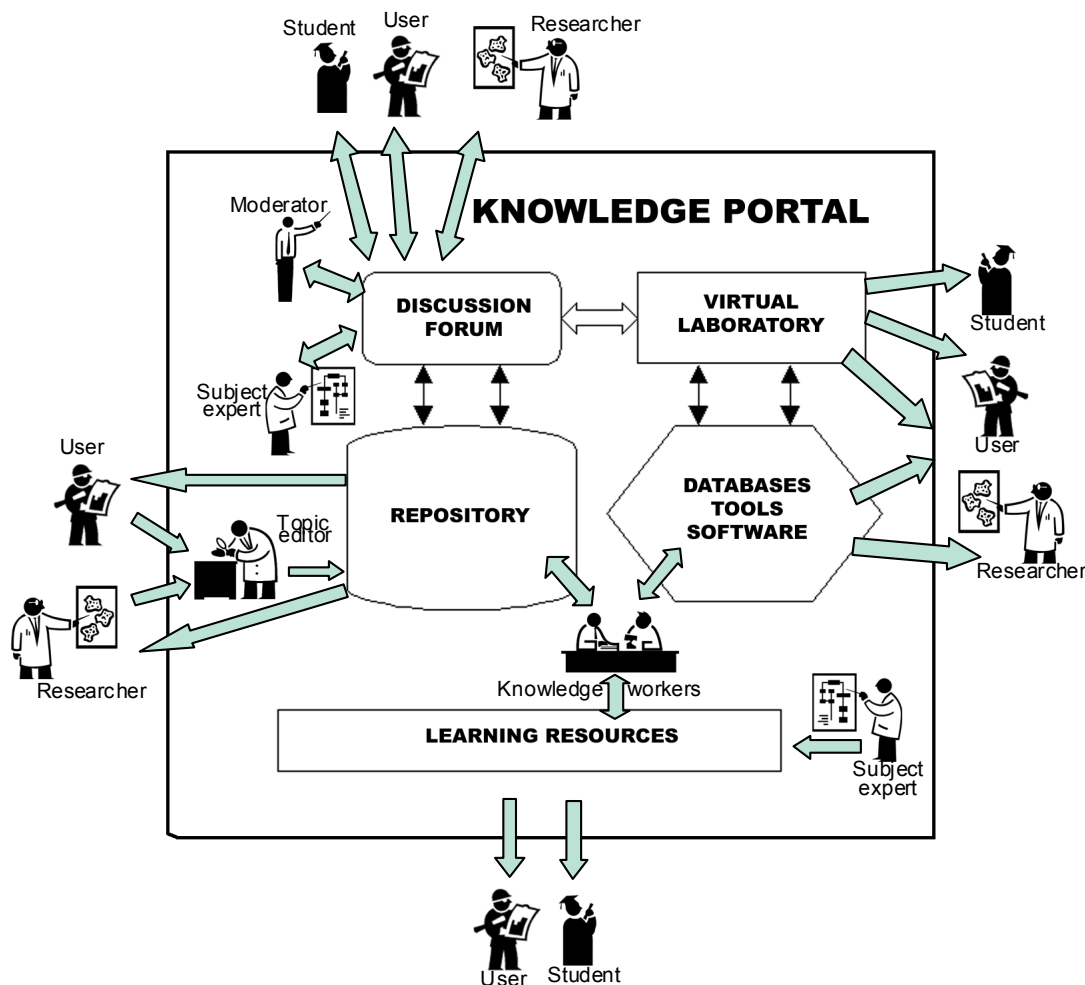
Figure 1: Knowledge Portal: users and players interactions

By providing a Forum for discussions and Learning Resources for reference, the Knowledge Portal creates the opportunity for all members of the community of practice to directly and actively participate in the knowledge creation and scientific dissemination process. The Virtual Laboratory, as part of the Knowledge Portal, enables joint research work on common documents, databases, projects, and contains domain-specific software tools, like, for example, UNESCO's Electronic Support for Cooperative Scientific Research Project (UNESCO, 2004).

In order for a Discussion Forum, within the Knowledge Portal, to be a place where scientific discussion, knowledge sharing and exchange will happen and new knowledge will be created, the Discussion Forum must be supported by a comprehensive digital knowledge Repository. The participating research organizations, private companies, and industry practitioners can submit artifacts (raw data, research results, photographs, reports and preprint papers) into this Repository. A peer review process of submissions, by content experts from the user community, should be undertaken to assure the quality of submissions, as it is done in the OneFish online scientific community (oneFish, 2004).

The processing of knowledge in the repository into value-added products for the industry could be done by "knowledge workers" as in the SciX portal (Gudnason et al., 2002). Knowledge workers are the new actors in the value chain of the electronic publishing process. The concept of value added services is quite important; it brings up a new model of electronic publishing, which is totally different from the old paper-based publishing model by virtue of facilitating new knowledge creation and aiding in technology transfer to the industry. To achieve this, the virtual community needs to attract highly skilled content experts as "knowledge workers" that are able to extract information contained in different research studies and aggregate it into new knowledge. Value adding could also be achieved by involving virtual community members into joint creation of new knowledge by participating in the creation of a common document, knowledgebase, or in general a "knowledge artifact". This process brings a stimulating quality into the life of the virtual community of practice (Hildredth et al, 2000).

The Knowledge Portal model is a model of the future professional community of practice. To investigate the design and functionality of existing professional community of practice portals and the implementation of the above-mentioned features of the

Knowledge Portal, a pilot research study was conducted as described in the following sections.

2 STUDY ON DESIGN FUNCTIONALITY OF ONLINE COMMUNITIES

This research study involved the evaluation of different online community portals, by collecting and analyzing information about the design features and functionality of 30 community portal websites. The following community portal types were studied:

1 Business
2 Government and Organizational
3 Professional
4 Social

Business community portals are also known as commerce communities. In order to provide information about their product or service companies tend to create these types of portals for the community of users. The business rational for creating this type of community is that "Informed customers may be picky, but they can also be devoted customers." (Powazek, 2002, p. 219). It has also been noted, that "people who participate in online communities are more likely to buy from the same site" (Powazek, 2002, p. 228). By providing a place for their consumers to meet, companies get a chance to get client feedback, learn about areas of improvement, learn about the demographics of their clients, about their needs and wants, and establish a loyal clientele, etc. A total of six business community portals were evaluated in this study.

Government and organizational community portals are normally created and run by the government or an organization. Their purpose is educational and informative to the government/organization employees and to the general public. In addition, organizational communities frequently accentuate the importance of their initiative and try to recruit volunteers online. A total of four government/organizational community portals were studied.

Professional communities – also known as communities of practice – are communities of professionals who share knowledge and resources (Preece and Maloney-Krichmar, 2000). These communities usually have a common goal to achieve as their main purpose. The main purpose of these communities is knowledge creation and knowledge communication (Lueg, 2004). A total of eleven professional community portals, representing the most interest to this research study, were tested.

Social community (also known as communities of interest) portals were tested as well. The purpose of these communities is to bring together people with similar interests, hobbies, such as gardening, golf, computers, cooking, etc. These communities can also bring together people of the same religion, ethnic background, or demographic, for example teen forums, seniors' communities, etc. (Preece and Maloney – Krichmar, 2002). A total of nine social community portals were evaluated in this study.

3 PORTAL STUDY PROCEDURE

The virtual community portals were tested according to 80 different criteria arranged into the following categories, as suggested by USAID Knowledge Management for Communities of Practice Functional Requirements Matrix (USAID, 2004):

1 Content: the knowledge repository and articles published on the site
2 Discussion Forum functionality
3 Features: chat, news, e-newsletters, workshops, events, web-conferencing
4 Tools and learning modules
5 Search functionality
6 Membership: Access to knowledge, tools, and collaboration by members and guests, how open this community was to outsiders, member directory
7 Topic Experts as well as Moderator capabilities for forum and content submissions.

The portal study template is shown in Figure 2. Study results for each online community portal were entered directly into the study template forms in the relational database. At the end of this research project, the study reports were produced for each portal category. The summary of the findings for the Community Portal study for different categories of portals is presented in Figures 3 and 4.

4 PORTAL STUDY FINDINGS

The techniques used to improve member engagement and participation in online communities, in the order of increasingly stimulating effect on member participation, range from "Pushing" content to members (content generated by community Manager) to "Pulling" content from members (most of the content generated by members) and to peer-peer content generation when content is generated by members for other members, as for example in special interest groups, or sub-communities (Pickles, 2003).

On this scale, as follows from Figure 3, business communities were mostly at the level of "pushing" content to members, with very little opportunity provided for members to contribute their own content (only through forum discussions) and with little opportunity for engagement. It is interesting to note that the Discussion Forums for online business

communities were quite sophisticated, with multiple features used and, seemingly, constituted the "heart" of the portal. In addition, only business community portals were extensively utilizing the option of sending updates by email, again giving an indication of the predominantly content "push" mode of the portal.

Government and organizational online communities that were studied also seemed to be designed to disseminate content mostly in the "push" mode, with little opportunity for community members to contribute content into the repository (less than 25%).

Figure 2. Community portal study template

However, some member feedback was accepted in the form of document ranking (more than 75 % of portals had this functionality). In addition, polls and the survey option were quite popular with Government/Organizational portals indicating desire to receive user's feedback and collect members' opinion. It is interesting to note that the "Topic Expert" option was used by Government and Organizational portals the most, so was the option to create sub-communities. However, these sub-communities did not constitute special interests groups created by members for peer-to-peer collaboration and content creation, as mentioned earlier, but rather were organized for administrative and content management purposes.

We found that Professional community portals encouraged the submission of documents and articles by members in to the repository the most, thus acting in both, the "pull" and the "push" content modes. It is interesting to note that the option to rank articles was not available for the Professional community portals studied. On the contrary, the option to comment on articles was quite popular - about half of the Professional community portals had this option.

Other common features of the Professional community portals, found in more than half of the portals we studied, were as following: the portal repository was moderated and the members had the option to submit and categorize content in the repository. The search option for the professional community portals was mostly well developed and quite comprehensive and, among others, included options to search people, forum postings and documents in the repository.

Member directories were available for seven out of eleven Professional community portals studied, with comprehensive member profiles that included the total number of documents submitted by the author and a picture or avatar of the member. "Topic Expert" functionality was also quite popular with the Professional community portals, where the Expert directory and information on the field of expertise of the expert were found in more than half of the portals evaluated. According to Hildredth et al (2000), one of the most difficult parts of operating in a distributed environment is to facilitate the evolution of the community and the development of the relationships.
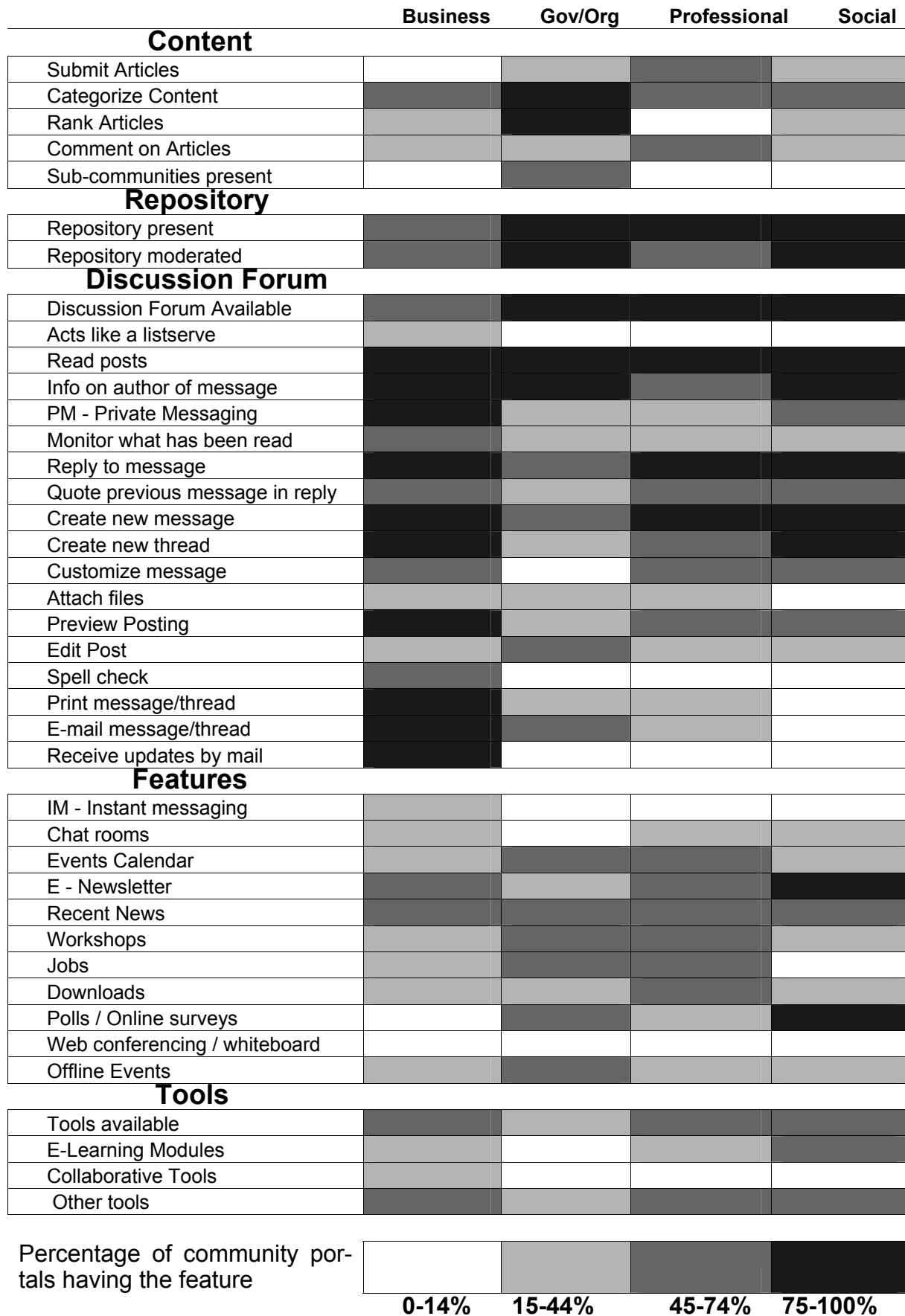
Content

	Business	Gov/Org	Professional	Social
Submit Articles	0-14%	15-44%	45-74%	15-44%
Categorize Content	45-74%	75-100%	45-74%	45-74%
Rank Articles	15-44%	75-100%	0-14%	15-44%
Comment on Articles	15-44%	15-44%	45-74%	15-44%
Sub-communities present	0-14%	45-74%	0-14%	0-14%

Repository

	Business	Gov/Org	Professional	Social
Repository present	45-74%	75-100%	45-74%	75-100%
Repository moderated	45-74%	75-100%	15-44%	75-100%

Discussion Forum

	Business	Gov/Org	Professional	Social
Discussion Forum Available	45-74%	75-100%	75-100%	75-100%
Acts like a listserve	15-44%	0-14%	0-14%	0-14%
Read posts	75-100%	75-100%	75-100%	75-100%
Info on author of message	75-100%	75-100%	45-74%	75-100%
PM - Private Messaging	75-100%	15-44%	15-44%	45-74%
Monitor what has been read	45-74%	15-44%	15-44%	15-44%
Reply to message	75-100%	15-44%	75-100%	75-100%
Quote previous message in reply	45-74%	15-44%	45-74%	45-74%
Create new message	75-100%	15-44%	75-100%	75-100%
Create new thread	75-100%	45-74%	45-74%	75-100%
Customize message	45-74%	0-14%	45-74%	45-74%
Attach files	15-44%	15-44%	15-44%	0-14%
Preview Posting	75-100%	15-44%	45-74%	45-74%
Edit Post	15-44%	45-74%	15-44%	15-44%
Spell check	45-74%	0-14%	0-14%	0-14%
Print message/thread	75-100%	15-44%	15-44%	0-14%
E-mail message/thread	75-100%	45-74%	15-44%	0-14%
Receive updates by mail	75-100%	0-14%	0-14%	0-14%

Features

	Business	Gov/Org	Professional	Social
IM - Instant messaging	15-44%	0-14%	0-14%	0-14%
Chat rooms	15-44%	0-14%	15-44%	15-44%
Events Calendar	15-44%	45-74%	45-74%	15-44%
E - Newsletter	45-74%	15-44%	45-74%	75-100%
Recent News	45-74%	45-74%	45-74%	45-74%
Workshops	15-44%	45-74%	45-74%	15-44%
Jobs	15-44%	45-74%	45-74%	0-14%
Downloads	15-44%	15-44%	45-74%	45-74%
Polls / Online surveys	0-14%	45-74%	15-44%	75-100%
Web conferencing / whiteboard	0-14%	0-14%	0-14%	0-14%
Offline Events	15-44%	45-74%	15-44%	15-44%

Tools

	Business	Gov/Org	Professional	Social
Tools available	45-74%	15-44%	45-74%	45-74%
E-Learning Modules	15-44%	0-14%	15-44%	45-74%
Collaborative Tools	15-44%	0-14%	0-14%	0-14%
Other tools	45-74%	15-44%	45-74%	45-74%

Percentage of community portals having the feature

0-14%	15-44%	45-74%	75-100%

Figure 3. Content, Repository, Discussion Forum, Features and Tools for online communities

	Business	Gov/Org	Professional	Social
Search				
Search advanced				
Search general				
Search people				
Search postings				
Search articles				
Membership				
Member directory				
Member profile				
Total # of articles by member				
Picture / avatar				
Custom e-mail address				
Personal Webspace				
Show online / offline status				
Roles				
Experts				
Experts present				
Expert directory				
Field of expertise specified				
Expert ranking				

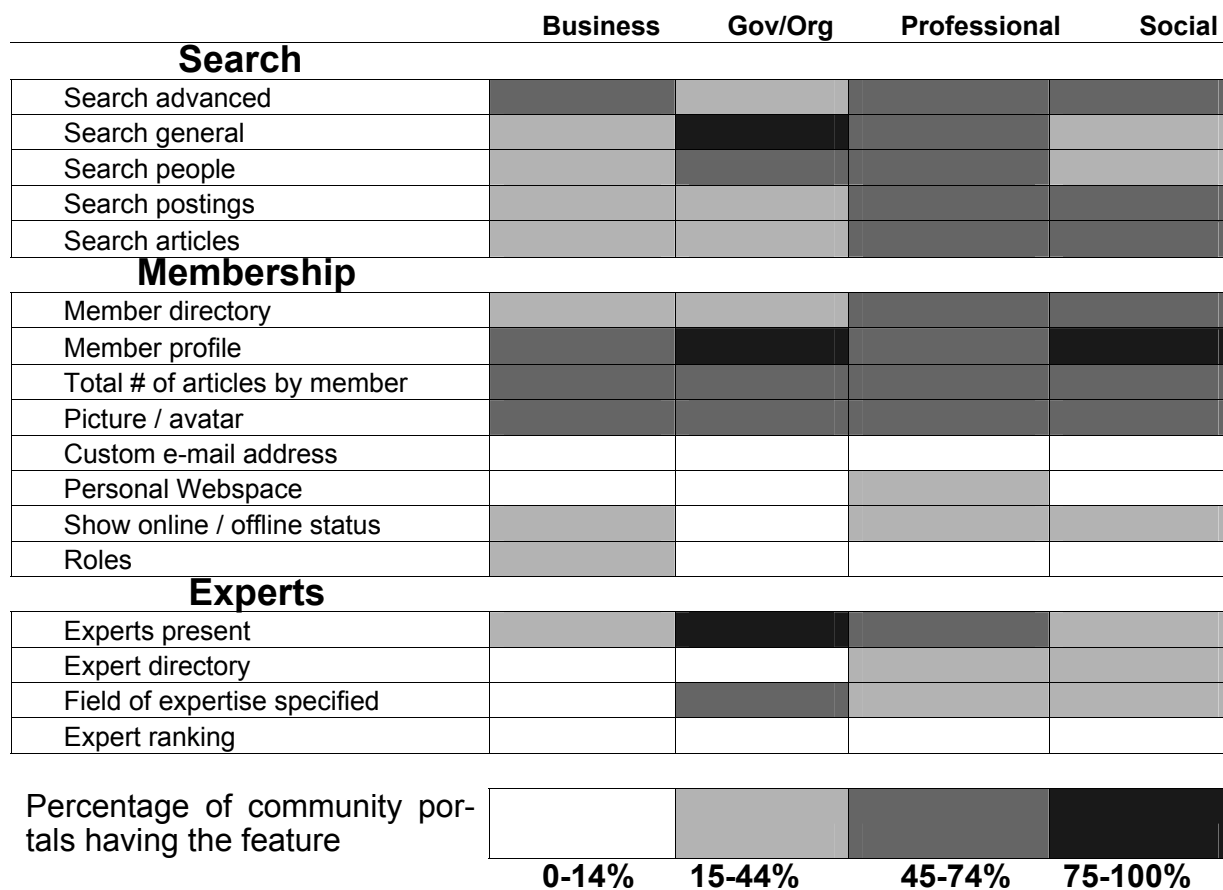| Percentage of community portals having the feature	0-14%	15-44%	45-74%	75-100%

Figure 4. Search, Membership and Expert options for online communities studied

The case study conducted by Hildredth et al. (2000) confirmed the importance of maintaining face-to-face contacts for community building. Thus, offline events conducted by the community of practice can potentially become quite important for online community building.

As shown by our study, offline events were popular with less than half of the Professional portals studied, revealing the missed opportunity for professional communities to maintain face-to-face contacts alongside with online contacts, as it is done much more frequently in government/organizational communities.

Online Professional communities, out of all portal types studied, had the largest number of popular "feature" options available, including an events calendar, e-newsletter, recent news, workshops, job advertisements and software downloads. In addition to this, only members of online Professional communities had personal web space allocated for them. However, we found that "blogging" -'the art of using a personal web space for recording your own thoughts, ideas and experiences' (Pickles, 2003) was not very popular for the professional communities portals, even though community members had some personal space available to record their thoughts.

Most of the social community portals had moderated repositories and well developed discussion forums. Surprisingly, out of all portal types studied, social community portals had the largest number of learning resources available (this might be the result of the majority of social portals studied being seniors' portals). In contrast to this, less than half of Professional portals had online learning materials available for community members.

Portal features not used by any of the communities were: the web conferencing/whiteboard option, providing a custom email address to the member and the expert ranking option. The functionalities that were used rather rarely: assigning roles to community members, spell checking for the forum and the option to receive updates by email (this was popular only with business communities), as well as the option for the forum to act as a listserve (also popular with business communities only). In addition to this, the option to create sub-communities was only available for government/organizational portals.

5 CONCLUSIONS

Knowledge sharing in virtual organizations and communities of practice is facing major challenges and defeats due to a misalignment between the incentives system and the objective of creating value through knowledge sharing (Kondratova and Goldfarb, 2003). As well, private companies and their employees tend to be inherently hostile to knowledge sharing (Husted and Michailova, 2002). To overcome this knowledge-sharing hostility, some organizations utilize innovative knowledge-sharing tools such as, Xerox Company's "Docushare" tool for document sharing by virtual teams. Olson and Olson (2000) describe the subtle suggested improvement in the shared document repository system design that potentially could increase the adoption of shared information repositories. According to their observations, a simple design change that would make the reading activity of the manager who monitors team contributions to the shared information repository in groupware, visible to the contributing team members, would dramatically increase the level of contributions to the repository. Clearly, there is a need for similar studies and improvements for virtual collaborative spaces on the Internet, that are intended to serve as knowledge creation and sharing spaces not for employees of the individual company, or a group of companies, but by the diverse participants in communities of practice.

Our pilot study is a first attempt to evaluate the use of particular design functionalities for online community spaces in order to influence the level of member participation. As an outcome of this study, we developed a study template and a study procedure for studying community portal functionality; we evaluated the study procedure by conducting a pilot study of different community portals.

The limitation of this study is that some of the Professional and Government/Organizational community portals that were studied had paid membership or membership by request option. Thus, information on the functionally of these types of portals was gathered based on the description of the portal functionality posted to attract new members and was not experienced directly. For our future study program, a procedure that helps to overcome this limitation will be developed. It is planned to test in-depth a large number of professional community portals to draw more precise conclusions on the functionality and design features used in these portals. This will allow the generation of better recommendations on how to improve the design and functionality of Professional community portals to enhance member participation and knowledge sharing for online communities, as well as improve learning opportunities that are currently underutilized.

6 ACKNOWLEDGEMENTS

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