

Design of a Web2.0-based Knowledge Management Platform

Weijun Wang, Rui Xiong, Jing Sun

*Department of Information Management, HuaZhong Normal University,
Wuhan 430079, China*

wangwj@mail.ccnu.edu.cn, rayze1228@126.com, daneyrong@163.com

Abstract: Knowledge Management Platform plays an important role in helping spread knowledge of individuals or groups across organizations. Many current knowledge management platforms met with deficiencies of poor tacit knowledge exploitation, slow knowledge update, limited knowledge sharing and weak user participation. This paper attempts to find solutions to those problems by integrating Web2.0 with knowledge management, and design a Web2.0-based Knowledge Management Platform. A Web2.0-based knowledge management model is put forth, and the framework and technology architecture of our platform has also been researched.

1 Introduction

Knowledge and the capability to create and utilize knowledge has become the most important source of a company's sustainable competitive advantage. The major obstacle to classical knowledge management approach is that knowledge workers hesitate to release their tacit knowledge and give up sharing autonomy [1]. Researches about constructing Knowledge Management Platform or System generally emphasized much on the "technologies" employed by organizations to better retain and utilize organizational knowledge [2, 3], while less attention was paid to user participation which also plays a key role in supporting knowledge sharing within and between organizations. Actually, knowledge is inextricably bound up with human cognition and social factors [4], reusing, diffusing and maintaining knowledge should be a participatory activity of all the involved people [5].

Web2.0 is characterized by being user-centered, harnessing collective intelligence and social network formation. We believe Web2.0 is a return of human and social factors, but these undoubted significant factors are nearly at risk of being

neglected by the building of KM Platform. Thus, there arises a demand on the integration of recent knowledge management (KM) with ideas of Web2.0.

The objective of this paper is to analyze how to integrate the ideas, methods and technologies of Web2.0 with the building of KM Platform, and propose a framework and technology architecture for designing a Web2.0-based KM Platform capable of promoting knowledge communication, sharing and tacit knowledge exploitation.

2 Knowledge Management Model Based on Web2.0

2.1 Web2.0 Applications in KM

Blog, Wiki, Social Bookmark, SNS, RSS, Instant Messenger and Forums are all typical applications of Web2.0. As shown in Figure 1, we based on Nonaka's SECI model [6, 7], explain how Web2.0 can influence on the conversion between tacit and explicit knowledge, especially its efficacy on the promotion of making tacit knowledge explicit.

| | |
|--|--|
| <p>Tacit to Tacit (Socialization) Eg: IM(Instant Messenger), Forums</p> | <p>Tacit to Explicit (Externalization) Eg: Blog, Wiki, SN(Social Network)</p> |
| <p>Explicit to Tacit (Internalization) Eg: Learning from others' Blog, Wikis...</p> | <p>Explicit to Explicit (Combination) Eg: Social Bookmark, Folksonomy</p> |

Fig. 1 Web2.0-based Conversion of Knowledge between Tacit and Explicit Forms

- **Socialization:** Socialization is the process of converting new tacit knowledge through shared experiences. Traditionally, it is achieved by apprenticeship and informal meetings, which has specified restrictions with certain time and people. While in Web2.0, this process can be realized by discussing through IM or Forums, in which experiences are described and shared without limits.

- **Externalization:** Tacit knowledge is difficult to be articulated into explicit knowledge. But Web2.0 can provide a brand new approach for the conversion. For example, blog provides every user with a personal space to freely publish their ideas, experiences, reflections etc., and viewers can make comments and evaluations; Wiki provides a collaborative workspace to generate, accumulate, and perfect knowledge. Through the way of self-expression like telling a story on Blogs and collaboration work on Wikis, some proportion of a person's tacit knowledge may be captured in explicit form. Meanwhile, enhanced trust can be forged in Social Network, which will benignly promote this process.

- **Internalization:** In order to better understand, internalize and act on information, individuals should embody explicit knowledge into tacit knowledge. By reading others' Blogs or Wikis about their jobs and the organization, and reflecting upon them, people can internalize the explicit knowledge written in them to enrich their tacit knowledge base. We believe "learning by reading" can help viewers re-experience what others previously learned, and get the opportunity to create new knowledge by combining their existing tacit knowledge with the knowledge of others, and finally put them into practice.

- **Combination:** The information self-organization mechanism in Web2.0 can help combine existing explicit knowledge into a more complex and systematic set. Social Bookmark is an online activity that allows users to save and categorize a personal collection of bookmarks and share them with others [8], and Folksonomy is a collaboratively generated, open-ended labeling system that enables users to categorize content by tags.

Other Web2.0 applications are also useful in knowledge conversion and utilization. Take RSS (Really Simple Syndication) for example, it enables recipients to decide which RSS feeds they want delivered, so as to keep received messages on target [10].

2.2 Web2.0-based Knowledge Management Model

As shown in figure 2, under the participation architecture of Web2.0, individual user can write blogs, edit wikis, establish Social Bookmarks, join Forums etc. In the interaction process, individuals will be connected through various social familiarities ranging from common interests to collaboration group to form a SN (Social Network) like project teams or other collaboration groups. These individuals and SNs will ultimately build up a tremendous virtual knowledge community.

In the knowledge community, every user is considered as an important knowledge body, contextual factors including generalized trust, pro-sharing norms will motivate more people participate in the creation, sharing and communication of knowledge. Moreover, people keep learning from each other during the interaction processes, the utilization and innovation of knowledge can also be achieved in assembly. In all, the interactive potential of Web2.0 applications is huge to develop.

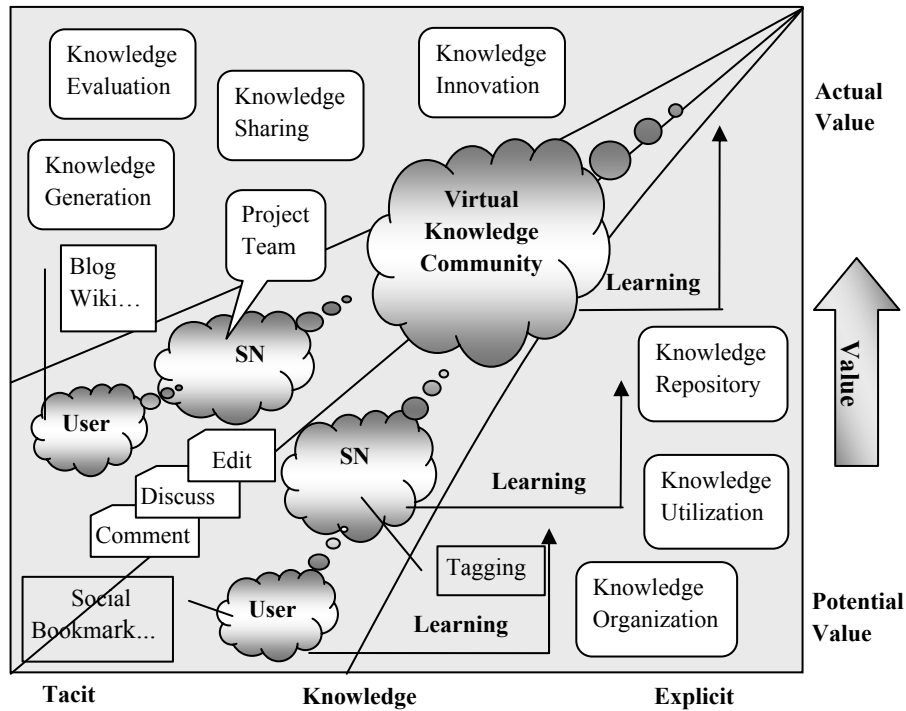


Fig. 2 Web2.0-based Knowledge Management Model

3 Design of Platform

3.1 Deficiencies of traditional KM Platform

Deficiencies of traditional KM Platform can be concluded as follows:

- (1) Lack in effective ways to develop and utilize tacit knowledge hidden in the minds of users;
- (2) It is difficult to integrate those highly decentralized knowledge embodied by ordinary staff, customers or partners. The knowledge creation, update and maintenance work of system only relies on a small number of experts, executives and technicians.
- (3) Only pay attention to formal, final intellectual achievements, but neglects the learning and innovation process;
- (4) Lack of interactivity and flexibility, users passively participate, and their personalized knowledge needs are difficult to be met.

3.2 Platform Framework

In this paper, we are not going to establish a complete set of KM Platform, but to focus on how to integrate Web2.0 with KM Platform in order to take full advantage of Web2.0, and make up deficiencies of traditional KM Platform. Based on theoretical background discussed above, the framework for a Web2.0-based Knowledge Management Platform is depicted in Figure 3.

(1) Users: The system users cover a wide range, including internal employees of different management layer, specialized knowledge management personnel and external customers, suppliers, dealers, etc. Among them, members of the enterprise are the main knowledge contributors, but customers, business partners can also provide many valuable and worth digging information.

(2) Knowledge Portal: Knowledge Portal is the entrance to the platform. On Knowledge Portal, information and knowledge are centralized expressed in an easily understandable way. Internal and external users get access to the portal separately via Internet and Intranet. They can make RSS/Keywords subscription to customize their Personalized Knowledge Page (PKP) so as to meet their individual demands.

(3) Knowledge Application : It is composed of four parts - content module, interactive module, Knowledge Assessment Module and search engine:

- Content Module: The content modules integrate Web2.0 applications such as Blog, Wiki, Social Bookmark, Forum, IM and other information resources from both inside and outside of enterprises into the platform.

- Interactive Module: It refers to collaboration & communication functionalities on the platform. We can complete project cooperation with Wiki, real-time communication with IM, views exchange with Blog, group discussion with Forums.

- Knowledge Assessment Module: The platform lets people identify, rate, and rank the information that's important to them, and a Knowledge Assessment Module is used to record the knowledge contribution of every user. If a person gets the highest rank, he or she will receive an organization reward as well as the intrinsic knowledge self-efficacy and enjoyment in helping others. This can motivate other knowledge workers to contribute more.

- Search Engine Module: The rich information resources on Web2.0-based KM Platform are mostly in text format, a full-text search engine is required to help users find the information they need.

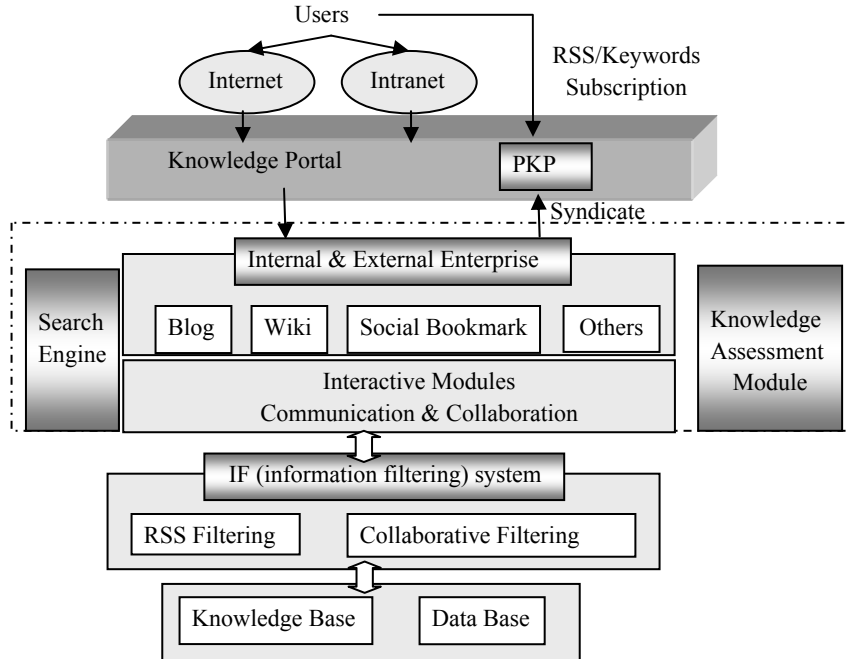


Fig. 3 Framework of a Web2.0-based Knowledge Management Platform

(4) Information Filtering(IF): The goal of our Information Filtering is to screen out irrelevant data from incoming streams of data items in accord with a user's profile. As shown from Foltz and Dumais' study [12], filtering did improve if more than one technique is integrated. Thus, we want to apply two filtering techniques according to features of Web2.0:

- RSS Filtering: RSS can simulate real time information delivery using automated client pull technology. Since RSS is XML-based format, while most current Web information still uses HTML instead of XML, a information mediator is needed to download RSS feeds available on the network and also translate certain HTML sources into RSS format. Then, those RSS document can be classified into database for browsing and retrieval, and users can make RSS/Keywords subscription, receive information directly.

- Collaborative Filtering: Collaborative filtering automates human recommendations on the basis of its being relevant to other users having similar tastes (habits) [13]. It can predict users' potential information needs from a more comprehensive "user model". The platform compares the URLs that users have visited, their bookmark folders, or tags they have established, to identify similar users, and recommend relevant information to certain users.

(5) Knowledge Storage: Knowledge Storage is the "memory" of enterprise's data, information and knowledge. It mainly consists of database and knowledge base.

4 System Technology Architecture

In order to implement the system framework proposed above, and achieve the objective of providing the right knowledge or information to the right person at the right time, we establish technology architecture composed of five parts, as is shown in Figure 4.

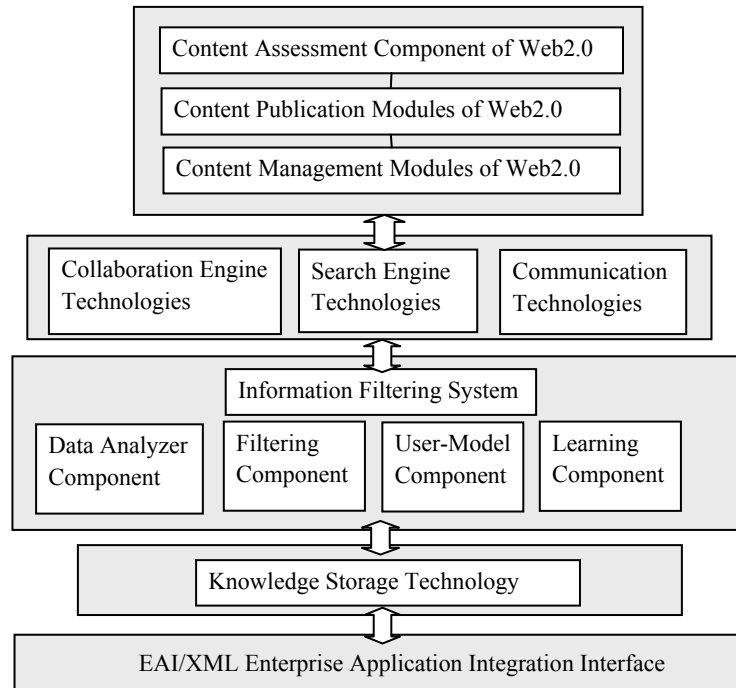


Fig. 4 Technology Architecture of a Web2.0-based KM Platform

(1) Content: The Content Assessment Component support functionalities of quantity counting and quality evaluation of staff's knowledge contribution; the Content Publication and Management Modules of Web2.0 are supported by typical technologies and application standards of Web2.0 like Ajax, Mash-up, REST, Tagging, these new Web2.0 capabilities bring about enhanced interactivity and responsiveness, in-line editing, intuitive drag-and-drop, and intelligent page refresh[14];

(2) Applications Support: The Collaboration and Communication Engines are web2.0-based application that enables project teams to eliminate face-to-face work, enhance user feedback functionalities, and streamline the process for creating, storing, editing, approving, sharing and communicating of Web2.0 contents.

(3) IF System: The generic model of RSS filtering and collaborative filtering system include four basic components: a data-analyzer component, a filtering component, a user-model component and a learning component [15]. It is designed to integrate and classify a lot of dynamic information, improve users' efficiency to access information resources they need [16].

(4) Storage Technologies & Integration Interface: Knowledge Storage technologies support the access, retrieval of data, information and knowledge; to avoid the emergence of “isolated islands of information”, we can use the EAI/XML-based data standards to link heterogeneous systems, applications and data sources of the enterprise, so that seamlessly sharing and exchange of data among the whole enterprise’s ERP, CRM, SCM and database systems can be achieved[17].

5 Conclusions

In this paper, we use Nonaka’s model to explain how Web2.0 promote the conversion between knowledge in explicit and tacit forms, and put forth a Web2.0-based Knowledge Management Model. Based on the objectives of fully taking advantage of Web2.0 to make up deficiencies of traditional KM Platform, we design a Web2.0-based KM Platform; propose its framework and supportive technology architecture. The core advantage of our platform is its powerful user interaction, which drives the creation, organization, communication and sharing of knowledge in enterprise.

However, the platform still needs constant improvement. From our perspectives, current Web2.0 pages still lack of semantic description, which cause problems with information reuse and structured access [18]. To further reveal the semantic links between contents will be our major research goals in the future.

Acknowledgments

This research was supported by the National Social Science Foundation of China under Grant 06BTQ019.

References

1. H.L. Yang, H.C. Ho, “Emergent standard of knowledge management: Hybrid peer-to-peer knowledge management”, *Computer Standards & Interfaces* 29,413–422 (2007).
2. M. Alavi and D.E. Leidner, “Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues”, *MIS Quarterly* 25(1), 107-136 (2001).
3. S.M. Richardson, J.F. Courtney, and J.D. Haynes, “Theoretical principles for knowledge management system design: Application to pediatric bipolar disorder”, *Decision Support Systems* 42(3), 1321–1337(2006).
4. J.C. Thomas, W.A. Kellogg, and T. Erickson, “The knowledge management puzzle: Human and social factors in knowledge management”. <http://www.research.ibm.com/journal/sj/404/thomas.html>
5. J. Euzenat, “Corporate memory through cooperative creation of knowledge bases and hyper-documents”. <http://www.inrialpes.fr/sherpa/papers/euzenat96b/euzenat96b.html>.

6. I. Nonaka, "The Knowledge Creating Company," *Harvard Business Review* 69, 96–104 (1991).
7. I. Nonaka and H. Takeuchi, *The Knowledge Creating Company*, Oxford University Press, Oxford, UK (1995).
8. N. Wang, "Tacit Knowledge Management Strategy of Virtual Enterprise under the Web2.0 environment", *Information Studies: Theory & Application*, 30(2) (2007)
9. Definition of Social Bookmarking, http://en.wikipedia.org/wiki/Social_bookmarking.
10. G. Gruman, "Really Simple Syndication (RSS): as a Knowledge Management Tool". http://www.cio.com/article/24442/Really_Simple_Syndication_RSS_as_a_Knowledge_Management_Tool.
11. A. Kankanhalli, B. C.Y. Tan, "Contributing Knowledge to Electronic Knowledge Repositories: An Empirical Investigation". <http://www.iscs.nus.edu.sg/~atreysi/papers/EKRcontrib.pdf>.
12. P. W. Foltz and S. T. Dumais, "Personalized information delivery: An analysis of information filtering methods". *Communications of the ACM* 35(12), 51-60 (1992).
13. P. Maes and R. Kozierok, "Learning interface agents". *Proceedings of AAAI*, 459-465 (1993).
14. WebSphere Portal's Web 2.0 Makeover, <http://www-03.ibm.com/developerworks/blogs/page/Turbo?tag=web2.0>
15. U. Hanani, B. Shapira and P. Shoval, "Information Filtering: Overview of Issues, Research and Systems". *User Modeling and User-Adapted Interaction* 11, 203-259 (2001)
16. D. Oard, "Information Filtering", <http://www.glue.umd.edu/~oard>.
17. B. Ma, "The Building of a Portal-based Enterprise Knowledge Management System", *China Management Informationization*, 11, 13-16 (2006).
18. H. L. Kim, "Toward the semantic web2.0", http://www.blogweb.co.kr/wp-content/uploads/2006/11/haklae_SKK_SW2.0_20061027.pdf.