

Practical Technique for Knowledge Acquisition & Dissemination in Mobile Environment

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ABSTRACT

KM system (KMS) supports, creates, captures, stores and disseminates expertise and knowledge. The idea of mobile KMS is to ensure that the right information is delivered to the right person just in the right time using mobile devices. However, locally, we are not quite familiar with the term mobile KMS (mKM system) since it is still a new area that are still evolving. In this paper, we will share techniques that we are going to use in building our own mKM system with the hope that it can help other organizations that want to develop their own mKM system.

Keywords

mKM system, bioinformatics, mobile devices.

1.0 INTRODUCTION

In this section, we learn about the definitions of few important terms in this research. Among them are knowledge, knowledge management (KM), KM system (KMS), mobile KM (mKM) system and also bioinformatics.

Knowledge is something that came from information processed by using data. It includes experiences, values, insights, and contextual information and helps to evaluate and incorporate new experiences and information. Knowledge originates and is applied by knowledge workers. It would be more useful if it could be shared and used among the community as people use their knowledge in making decisions. During the last several years, many organizations realized they own a vast amount of knowledge and that this knowledge needs to be managed (Satyadas, Harigopal & Cassaigne, 2001). Some of the reasons why knowledge needs to be managed are information overload, technology advancement, increased professional specialization, competition, workforce mobility and turnover and capitalizing on organizational knowledge. Because of the power and importance of knowledge to work collaboratively, there is a need for organizing the knowledge and it is called KM.

KM is a concept where it could be used for creating knowledge repositories, improves knowledge access and sharing as well as to communicate through collaboration, enhancing the knowledge environment and managing knowledge as an asset for an organization. The term KM is one such management approach, and is portrayed in the popular business literature as an innovation with the potential to affect the whole of an organization's business, especially its processes and information systems (Cole, 1998). It also refers to a range of practices used by organizations to identify, create, represent and distribute knowledge for reuse, awareness, and learning across the organizations. KM programs are typically tied to organizational objectives and are intended to lead to the achievement of specific outcomes, such as shared intelligence, improved performance, competitive advantage, or higher levels of innovation.

KMS is a system for managing knowledge in organizations, supporting creation, capture, storage and dissemination of information. It can comprise a part of a KM initiative. The idea of a KMS is to enable employees to have ready access to the organization's based documented of facts, sources of information, and solutions. An example of KMS is Blast, an acronym for basic Local Alignment Search Tool used in bioinformatics domain. Some of the advantages claimed for KM systems are sharing of valuable organizational information, organization can avoid re-inventing the wheel, reducing redundant work, may reduce training time for new employees and retention of Intellectual Property after the employee leaves if such knowledge can be codified (Maier, 2007).

mKM system can be defined as "a management process in the course of which mobile communication techniques in conjunction with mobile devices are employed for the creation, validation, presentation, distribution or application of knowledge" (Derballa & Pousttchi, 2004). Through mKM, we can increase the access to knowledge, regardless of temporal and spatial constraints. Thus, mKM extends KMS by the anytime, anywhere information access metaphor by making KM functionalities available on mobile devices.

Bioinformatics domain seems to be by its nature especially the suitability for applying the system in KM principles and methodology (Morrow and Wilkins, 2004). This is because it usually possesses large volume of biological information infrastructure, its knowledge of the community as well as sharing of knowledge with other biologists. The communities are also desire to acquire knowledge from accessible sources as fast as they could. Therefore, in the bioinformatics industry, KM can be defined as a systematic process that creates, captures, shares, and analyzes knowledge in ways that directly improve performance.

2.0 RELATED WORK

Researches on mKM are still evolving nowadays. We can see quite a few implementations of mKM developed in news journalism domain, repair technicians, and construction sites. However none has been developed for bioinformatics domain. In this section, we will review state-of-the-art mKM systems and bioinformatics domain that involve KMS or mobile environment.

One example of mKM system is NewsMate, which provides mobile and distributed news journalists with easy access to timely information via a PDA (Personal Digital Assistant) with network access using mobile phone. NewsMate supports services such as to-do list that is matched with internal archives, provides information on people with similar tasks then match the task between predefined external sources and they also have SMS (Short Message Service) facility to alert people with overlapping activities (Fagrell, Forsberg, Johannesson, Ljungberg, 2001).

Another example is by Grimm et al. (2005). They propose a reference mKM system which they derived from existing systems and from user requirement within the KM project Mummy. However, this model is simple enough as they don't have their specific focus area. They do say that the key concept of mKM system is the context-aware information processing. This means that the system must have certain knowledge about the user in order to assist them through mobile devices. Mummy project on the other hand is mKM system developed on facility management at construction sites, mobile health care support and video based e-learning. Mummy research focuses on capturing context to enhance intra and inter-individual knowledge transfer processes, such as remembering, reconstruction and communication. It provides support for retrieval and presentation of relevant information in photographic and textual format.

Hou and Yang (2006) combines mKM mechanism with PDA information (user notes, address book and schedule) to know user's interests and availability so that they can provide customized services in the complicated electronic commerce environment. They use profile mining to determine the category of PDA user, volume of

knowledge user can obtain and the characteristics of other users that highly interact with PDA user.

There are few existing KMS in bioinformatics domain such as Kleisli query system, e2e and Blast as mentioned earlier (Srivastava, 2002). Kleisli query system is a system designed for the broad-scale integration problems that have powerful extensible query optimizer and efficient query execution engine. e2e consists of many exploration tools semantically working together across disciplines and across heterogeneous sources. Blast is a web based search tool developed and maintained by National Center for Biotechnology Information (NCBI). In 2002, Riikonen, Boberg, Salakoski and Vihinen developed BioWAP (bioinformatics wireless application protocol) services, a new way of accessing biological databases and bioinformatics applications on the Internet through mobile devices. Although the connections are through mobile devices, there are no KM implementations in BioWAP.

3.0 METHODS OF MOBILE KMS

Knowledge taxonomy for KMS consists of knowledge acquisition, storage, dissemination and application. Here are the definitions for each process:

3.1 Knowledge Acquisition

According to a model by Arthur Andersen and APQC (1996), to acquire knowledge in a mobile environment and to make sure that the knowledge could be acquired from the right people, time and place, these steps are suggested:

- Identify knowledge: Determine sources and type of knowledge
- Collect knowledge: Gather and transform knowledge according to the specifications
- Adapt knowledge: Categorize the knowledge
- Organize knowledge: Prepare and map knowledge into the specific requirements
- Store knowledge: Keep and index the knowledge dynamically

3.2 Knowledge Storage

Knowledge storage is the process where the knowledge is kept in repositories. These can be in form of documents that are organized and categorized to enable future browsing or speedy access of knowledge.

3.3 Knowledge Dissemination

KMS can disseminate knowledge in mobile environment in many ways, depending on whether the communication method is synchronous, asynchronous, or combination of both.

3.4 Knowledge Application

In the process of knowledge application, knowledge generated by KMS in mobile environment will be used by CoPs (Communities of Practices) for problem solving, decision making and learning.

4.0 RESEARCH METHODOLOGY

In order to do this research, we need to get inputs that can help us throughout the process. We get our inputs by employing the following approach; documentation study of previous research and also a questionnaire survey in the Community of Practices (CoPs). We have discussed about previous studies in Related Work section. For the second method, the designing of the questionnaire involves on what are the most relevant element questions that is supposed to be included in mKM system. These elements questions are important to ensure mKM system worked according to its specifications and also we want to know user's requirements and preferences.

Pre-questionnaire has been answered by respondents that involves in research on biological data and herbs plantations and this questionnaire consists of 2 sections. First section is about mobile issues aiming to know how potential user usually works collaboratively with colleague and to know their opinions regarding mobile usage. For this section, we conclude that respondents usually work collaboratively to share info, news and schedule by using email and meeting as a medium. However, mobile plays an important role too as it is an informal medium to share knowledge and SMS is the most popular function in mobile devices. Respondents agree to cooperate if exist a system that uses SMS or MMS (Multimedia Messaging System) to send and receive latest information regarding their interest or work. Types of files that usually they want to share are document files, text files, pdf files and image files.

Second section asks about respondents' expectations on mKM system and its functionalities. At first, we ask if they know about mKM and their opinion on mKM. For those who know about mKM, they all agree that mKM is either important or very important nowadays. According to their answers, in terms of knowledge sharing, storing and searching, mKM do plays an important or very important role. When being ask about their expectations on mKM, most of respondents agrees that mKM should bring more benefits to the community such as easy access to knowledge anytime, anywhere, shortens learning process, helps in decision making, helps respondents for opinion regarding specific issues, develops their ability to solve problems and many more.

5.0 PROPOSED TECHNIQUES FOR MOBILE KMS

In this section, we will discuss about proposed techniques for two of the methods in mobile KMS that are

knowledge acquisition and dissemination since only these two methods will requires mobile devices involvements.

5.1 Knowledge Acquisition



Figure 1: User Registration Menu

User can browse the system through mobile devices or computers but if they want to submit new knowledge, they need to register. During registration, user will have to fill in their personal particulars such as name, email address, phone numbers and pick up their interest regarding herbs plantation, e.g.: spices or vegetables. They can pick more than one interest. After registration, system will then store the data into user database. Based on their interest, user will be put into certain category. For example, if the interests of the user are spices and vegetables, they will be put in the spices user category and vegetables user category.



Figure 2: Knowledge Acquisition Menu

To submit new knowledge, user must go to the knowledge acquisition menu. In here, user must enter the required field, pick the category that most suited the knowledge and may attach related file. After submission, the knowledge will be kept in a temporary database before system administrator will check whether the knowledge is valid or not. After validated, the knowledge will now be stored in permanent database.

5.2 Knowledge Dissemination

After the new knowledge stored in database, the category chosen during knowledge acquisition will determine which user group that the system will invoke. For example, if the new knowledge is under the category Spices, the spices user category must be notified of this new knowledge. Based on their personal details kept earlier, user in the spices user category will receive an alert in the form of SMS through their mobile devices stating that there is a new knowledge in Spices category.

6.0 TECHNICAL DESCRIPTIONS

In this section, we will discuss about the technical details such as the software and languages used for this research and then see how the implementation meets the requirements.

6.1 Network Access

The user should have mobile devices with GPRS (General Packet Radio Service) to get access to system or computer with an internet connection. To send SMS to user, system requires a GSM (Global System for Mobile Communication) modem as a port to connect to the user.

6.2 Mark-up Language

The internal structure is encoded in XHTML (Extensible Hypertext Markup Language), markup language that has the same depth of expression as HTML (Hypertext Markup Language), but also conforms to XML (Extended Markup Language). Because they need to be well-formed, XHTML makes it possible to for the system content to be displayed in mobile devices without any changes or WAP (Wireless Application Protocol) implementations.

6.3 Operating System and Development Platform

The server is implemented in Java on Microsoft Windows 2003 platform. We use Java since it is an open source language that is platform independent, means that we can run Java anywhere. Java is also designed to be secured and with Java codes, we create a program that allows us to send SMS to users.

7.0 CONCLUSION

In this paper, we introduce mKM system and bioinformatics. Then we explore the state-of-the-art mKM system and bioinformatics domain. Based on previous studies and analysis that we've made on pre-questionnaire, we propose a new technique for mKM system particularly in bioinformatics domain focusing on herbs plantation. Hopefully, with agriculture industries being improved rapidly nowadays, more mKM system in other bioinformatics area will be developed and this paper will serve as guidance.

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