

Knowledge Management for the IT Staff

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1 Introduction

One reads copious literature about how developers are constantly striving to create new and innovative electronic learning products for use in educational settings in both the public and private sectors. This paper considers an approach that can be taken to help facilitate learning and knowledge sharing among IT (Information Technology) workers such as programmers, software engineers and web developers. The approach will take the form of a proposed

knowledge management portal that will help IT workers share knowledge and collaborate in a more efficient and productive manner. IT workers are of steadily increasing value to firms and organizations in today's service based economy, whether the software products they build and maintain are used to support the firm's activities or actually serve as the deliverable product that the firm sells in the marketplace.[7]

2 Review of Literature

Effective and efficient IT workers are integral to the success of most modern firms. It is essential that a firm's knowledge management system facilitate rich and frequent collaborations between tech staff. Collaboration is often one of the most productive and rewarding part of IT work. A study of students in an IT-related discipline (computer science) demonstrated that students had more confidence in and enjoyed their work more when they were able to enjoy the benefits of collaboration.[10] Continuing evidence of this collaboration abounds in the many successful open-source software projects like Perl¹ and PHP² programming languages, where programmers collaborate with other by sharing program source code to extend the languages and also share solutions and help debug programs via on-line message forums.

2.1 The IT Workforce

An organization's IT workforce can be defined as being "Composed of organizational employees endeavoring to design, build, test, maintain, and operate organizational applications and infrastructure." [7] The desire to support efficient and collaborative IT work is important to firms. A study by Bailey[2] and Stefaniak of what types of skills IT firms value in prospective employees listed the following collaborative skill areas as being highly desirable:

1. Ability to read, understand, and modify programs written by others
2. Team work skills (long term)
3. Ability to give an receive constructive criticism
4. Inter-team communication

¹<http://www.perl.org>

²<http://www.php.net>

Why do firms place a high value on having IT workers that possess such skills? The ability to communicate one's knowledge to others is key in an industry with such a high turnover.[9] An effective KM tool that could harvest and reuse organizational knowledge is highly desirable, especially in a highly mobile and transient group like IT workers.[9] It is important for firms to be able to capture the intellectual value of IT workers, so that it may be reused even after an employee leaves a firm. Such organization knowledge is valuable and a e-learning system that helps capture this knowledge and better share it throughout the organization.[9]

2.2 Work Habits of IT Workers

A potential e-learning and knowledge management system must be aware of the work habits and practices of typical IT workers. Once they've been trained workers often spend much of their time searching for a solution to a particular problem via on-line documentation or querying their co-workers on the topic. Most of these activities involve searching text records of postings to newsgroups both those maintained inside and outside of the organizations, tech forums, or through verbal communication to friends or co-workers via text-chat like AOL Instant Messenger. This process can be time-consuming and produce varying results. A single knowledge portal that could frame and direct these types of activities could help boost the productivity of time spent on these activities.[8]

IT workers generally develop strong social circles for collaboration with peers who work on similar tasks. This type of community of practice generally doesn't hold geographic bounds with workers in constant communication via email, text-chat or other forms of messaging. This types of activities will only become more ubiquitous as communication become easier in an increasingly networked world.[3] Access to a firm's tacit and explicit knowledge resources though a portal could become even more important as the possibility of employees being in constant communication with each other increases.[5]

2.3 IT Workers and Knowledge Management

Two of the most important aspects to consider in a proposed a KM system for IT workers are the concepts of knowledge sharing and ubiquitous computing. It is key for IT workers to be able to share knowledge. IT workers should be able to plug into the community of workers at their organization and have access to other individuals, previous project histories, archives of

mailing lists, in short all of the available knowledge “objects” that reside within an organization.

The concept of knowledge sharing within a community of practice seems to be quite important when thinking about the methods IT workers typically use to go about learning. An ideal KM system should help advance this community and make it easier for a worker to assimilate him or herself into the organization and get acquainted with the available knowledge resources. A system that supports such a community would greatly enhance the organization’s ability to share knowledge.[1] In particular such a system could be customized to special needs of IT workers. Needs that include the ability to share and co-edit program source code, easy access to technical forums both inside and outside of the organization, and the ability to instant message and engage in real-time collaboration with remote workers.

These types of activities will become even more prevalent as technology continues to advance and ubiquitous computing devices continue to develop. Ubiquitous computing is the notion that networked information and communication is becoming available to users everywhere as the ability to plug into the network from almost any location increases with the develop of new wireless computing devices.[3] This type of constant connection and availability has important implications for KM systems and IT workers that will utilize them.

As the workforces of organizations become further distributed tools that will be able to support developing ubiquitous computing technologies will be important. Future KM systems should be built with support for ubiquitous computing devices in mind. They also should be built with consideration as to how an ubiquitous computing environment can be used to facilitate communication and collaboration within a group or community of practice. Particularly, KM systems for IT workers should utilize ubiquitous technologies such PDAs, cell phones, and tablet PCs to provide better support for asynchronous and synchronous communication between workers.[4]

A KM system that can be responsive to both the knowledge sharing needs of IT workers and the increasingly wide variety of technologies that enable such sharing could be extremely useful in advancing the goals of knowledge management as described by Clarie McInerney:

Knowledge management is an effort to increase useful knowledge within the organization. Ways to do this include encouraging communication, offering opportunities to learn, and promoting the sharing of appropriate knowledge artifacts.[6]

3 An IT Knowledge Portal

The proposed system could service the needs of a mid-sized corporation that has IT staff members distributed across several locations. As this is a proposed system several assumptions will be made:

1. Company documents of all types are available in digital format
2. Accurate and up-to-date meta-data is available for company resources and employees
3. The organization has the resources and expertise to provide access to and support for ubiquitous computing devices
4. The bandwidth available to the system can adequately support system resource intensive activities such as real-time video streaming and application sharing

The system can best described as a knowledge portal and will likely require one full-time employee to manage, update and maintain once it has been installed and properly tested. This could vary depending on the size of the organization. The system will be comprised of a single, customizable portal that each staff member uses as a gateway to access the KM system. It is essential that this portal be able to deliver information services across multiple computing platforms (Linux, Mac, Windows), and be viewable on multiple computing devices such as wireless web devices like cell phones and PDAs, and be able to be adaptable to whatever new devices may be developed in the future. Appropriate storage formats for the *Knowledge Objects* stored within the system will be chosen, see section 4 for details.

A knowledge object can be defined as any occurrence in the company's technical history that can be recorded and be of possible use at a later time. These objects could include postings to a tech newsgroup, a chat session on a particular topic, a pre-recorded memo for the department manager, a project history report, or a computer program with appropriate documentation.

The system will enable workers to engage with each other and with the stored 'knowledge objects in the system. In particular it will enable the following activities partly inspired by Alvai's[1] and Tiwana's article on KM integration for virtual teams:

- Peer-to-Peer Information Sharing
- Real-time program code sharing and communication

- Access to stored knowledge objects
- Frequent and automated updates for fast changing technical information
- Database enabled searching for employees and knowledge objects

4 Portal Specifics

The KM system will allow firms to move beyond text-based messaging services and reliance upon textual documentation to be the sole resources that can always be counted upon by workers to gain access to and learn about the knowledge objects available to them as a member of the IT department. The system will be divided into six components:

- Interface
- Content Channels
- Communication Channels
- Employee Database
- Document Database
- Multimedia Database

4.1 The Interface

The interface will serve as each worker's entry point to the knowledge portal. It will be customizable allowing the employee to choose the communication and content channels that are important to them. *Communication channels* are messaging programs, such as text-chat and videoconferencing services that allow a worker to interact with formal and informal groups that are created or form within a firm. *Content channels* are items such as RSS³ feeds coming from technology sites that the worker wishes to subscribe to, technical Internet newsgroups, and other text-based resources that are periodically updated that the worker wishes to have easy access to. The interface will also search interfaces that allow the worker to be able to search the knowledge objects of the company through the employee, document and multimedia databases.

³Rich Site Summary <http://web.resource.org/rss/1.0/>

In contrast to the convenient but relatively standard practices described in the previous paragraph the communication channels available through the interface will also provide ways innovative ways for workers to collaborate over the network. Workers to co-edit documents and program code over the network while engaged in synchronous video communication with another employee. This type of virtual collaboration holds a lot of promise for helping workers to effectively share knowledge over the network. These types of high-end services can be well-supported by ubiquitous computing technologies as they develop further decreasing the barriers between employee collaboration.

The interface will also provide means for effective recording of a knowledge event by a worker. For example, if a worker has a text chat session over one of the communication channels that they've selected to use, and they want to save it for future reference the interface provides an easy way to name and tag the record with some keyword/subject description values so that it can easily be retrieved at a later time. The provision of effective recording and tagging functions is important for the system to remain vibrant and usable over time. Now the discussion turns to the consideration of what and how knowledge objects will be stored within the KM system.

4.2 Employee Database

This database contain a record of each worker who has or is currently worked for the firm. Each worker's record is considered a to be knowledge object within the system. A record is kept of the groups, projects, meetings and other knowledge objects that he or she has been associated during his or her term of employment with the firm. Each worker's record contains a description that uses keywords and subject descriptions to denote what the worker's area of expertise is. This aspect allows workers to search out an employee who may have a relevant skill and experience to the worker's question. It also has the benefit of allowing the searcher to see what knowledge objects residing with the system a particular employee has a relationship to.

4.3 Document Database

The document database contains knowledge objects that fit a loose description of a document. These objects could be memos, reports, program documentation, training manuals, and other documents that could have relevant technical information. These objects could also be text-chat sessions that have been archived by a user for future reference using the tagging features

of the interface. Each object is associated with appropriate subject terms and identifiers to enable proper searching through the interface.

4.4 Multimedia Database

The multimedia database contains knowledge objects that are of a non-textual nature. These types of knowledge objects could include video-conferences that have been archived, archived presentations, training materials and lectures, and organization wide broadcasts from executives and managers. Such items are grouped together because of the more rigorous processing necessary for multimedia in a networked environment compared to the processing required by the textual information contained in the document database. Device Support for these types of knowledge objects will continue to improve as bandwidth increases and ubiquitous computing devices gain processing power.

4.5 The Complete System

The chart in figure 1 outlines all the different aspects of the KM portal and their relationships to one another. The top layer with the interface ellipse at the center represents the layer of the system that gives workers access to open content and communication channels, as well as the three knowledge object repositories that reside on the bottom layer of the diagram. Additionally, the worker can use the interface to search and view the knowledge objects that reside in the employee, document, and multimedia databases.

5 System Use Scenario

This section discusses a possible scenario where the knowledge portal that has been proposed in the previous two sections could be of some use to a particular firm. Consider a new employee who has just been assigned to a project involving the updating of a large customer database that the firm makes heavy use of. The employee is a qualified programmer who is familiar with technical documentation, but the scale of the system is large enough that he or she isn't familiar enough with the scope and issues involved to tackle the problem without assistance. The workers is given the following options by the portal to begin learning about the resources the firm has available on the topic:

1. Search the readily available content channels for relevant information about large databases

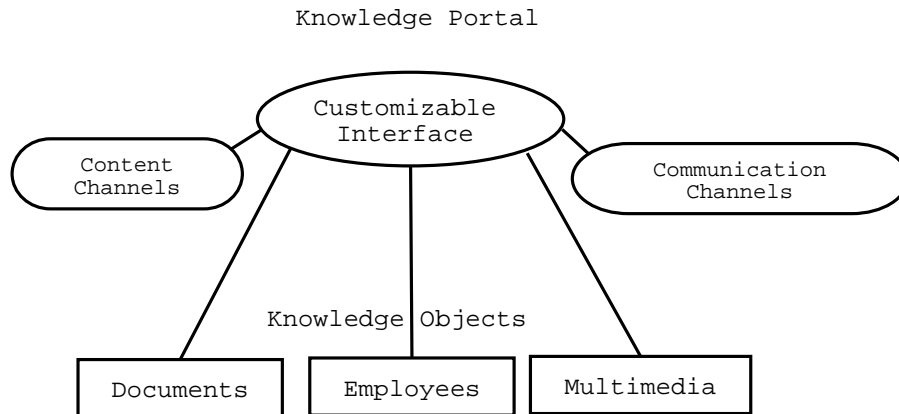


Figure 1: An Outline of the KM Portal

2. Search the employee database for employees who have experience with large databases
3. Search the document database for documents about projects that involved large databases

The employee chooses the second option, search the employee database. This returns two hits. Two employees are marked as having experience with the type of database problem the worker needs to address. Unfortunately the one with the most experience left the company two years ago. However, since the KM portal returns all of the knowledge associated with a worker the new employee is able to locate and read a comprehensive report of a past database project written by the employee and view an archived presentation on the topic that the former employee had prepared and given before leaving.

This experience gives the new employee the proper context and terminology so that he or she can contact and speak intelligibly on the subject with the other employee with expertise on the topic. However this employee is a retired database guru that lives in the mountains of Colorado who only has wireless access to the network and always insists upon using the latest and greatest technologies. The new employee plugs into the communication channels available through the portal interface and gets into contact with the guru. Thankfully the KM system is able to support streaming to wireless devices in the Colorado Mountains and the new employee and guru are put in communication over the web using wireless video-conferencing technology. The two workers are even able to co-edit some program code over

the web using the document sharing features built into the communication channels.

A lot of work would have to go into building a portal with the capabilities to work out a scenario like the one just described, but the result would allow an IT staff to work much more efficiently and take advantage of the collective organizational learning and knowledge that has been accumulated by workers throughout a firm's history. Someone would have to be hired to design, maintain, and monitor the technical aspects of the system. Depending on the size of the firm other workers would have the task of making sure that the knowledge objects are kept properly organized and available. However, as computer technology advances and the ability to do more multimedia and application sharing over the web becomes possible systems such as the one proposed may not seem very far-fetched.

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