KNOWLEDGE DISSEMINATION TOOLS

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ABSTRACT

This paper reviews several types of knowledge dissemination tools. Initially, the definitions of knowledge and knowledge dissemination are explained in detail. This paper highlights the importance of knowledge dissemination in developing knowledge community. Secondly, the suggested ICT tools for knowledge dissemination will be presented. The suggested ICT tools for knowledge dissemination are RSS feeds, phone text messaging (SMS), internet telephone, and intelligent agents. These tools are then analyzed into categories according to its technology strategy and mobility aspects. These will help in understanding the usage and the purpose of the tools. These ICT tools were compared in order to demonstrate their suitability with the respect to the context. In conclusion, this paper shows that ICT has high potential to support knowledge expansion process effectively.

1. INTRODUCTION

Knowledge is information that is organized, synthesized, or summarized to enhance comprehension, awareness, or understanding (Bergeron 2003). To differentiate knowledge from information, knowledge is also known as actionable information (Tiwana 2003). Therefore information needs to be disseminated in order to make them actionable.

There are three types of knowledge. They are tacit (know how), implicit and explicit (know what) knowledge. Below are the definitions from different authors.

Table 1 Tacit, Implicit and Explicit Knowledge Definitions.

Authors	Tacit Knowledge	Implicit Knowledge	Explicit Knowledge
(Bergeron 2003)	Knowledge that is ingrained at a sub-conscious level and therefore difficult to explain to others.	Like tacit knowledge, typically is controlled by expert. However, it can be extracted from the expert through a process termed knowledge engineering.	Knowledge that easily conveyed from someone proficient at a task to someone else through written or verbal communica-tions.
(Rao 2005)	Likely the property of firm such as transaction data, work products, research notes, e-mails and others	The knowledge that is implicit in communities and relationships is often accessible only in a social context	Knowledge that cannot be codified and remains the property of the knowledge workers such as experience, expertise, reputation and others.

2. KNOWLEDGE DISSEMINATION

To disseminate information or knowledge means to distribute it so that it reaches the masses or organizations (2003). Dissemination is generally seen as a measure through which the results are brought into the awareness of certain target groups (Suurla, Markkula et al. 1999). According to both of these definitions, it is obvious that dissemination is to distribute or diffuse any information or knowledge to other party for their usage.

In knowledge management, knowledge dissemination process supports the knowledge sharing process. Knowledge in the form of topics can be discussed in knowledge sharing platforms and disseminated using

dissemination tools. These tools will create awareness of knowledge to the target users. This process will enhance the knowledge sharing processes.

Users who are interested in the topics will be attracted to share their knowledge and visit the knowledge sharing platform. After sharing the knowledge, new knowledge will be produced. This knowledge then once again will go back to the knowledge dissemination tools in order to distribute updates to the target users. And this cycle will be repeated many times. This action shows that knowledge dissemination and knowledge sharing processes need and support each other. Figure 1 (a) visualized the process how knowledge dissemination work together within knowledge sharing process.

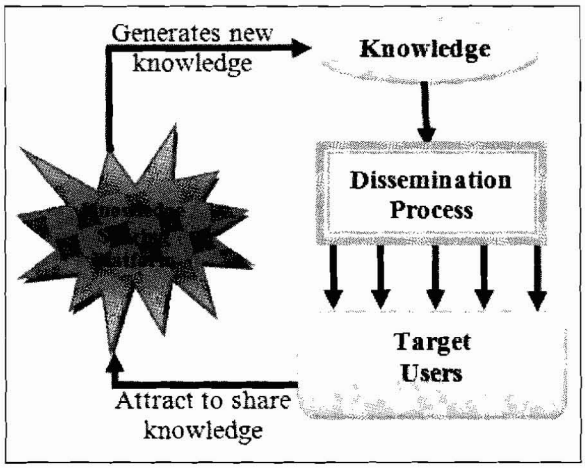

Fig. 1 (a) How knowledge dissemination work together within knowledge sharing process.

Knowledge dissemination is a process where knowledge or actionable information is distributed to others for some attentions. There are several reasons that explain the benefit of knowledge dissemination whether in the society or in the organization surrounding. For example:

- Product advertisements (Shelly and Vermaat 2008).
- To enlighten the society due to some issues
- To acknowledge community in new ideas
- To inform updates of news or websites
- Event announcements (Shelly and Vermaat 2008).
- Job vacancies (Shelly and Vermaat 2008).

Knowledge need to be disseminated in order to build knowledge society. Knowledge society is about creating, sharing, and using knowledge to bring prosperity and sense of well-being to its people (Al-Hawamdeh and Hart 2002). Government who need to acknowledge the citizen about new economic strategy needs to find the way to disseminate the knowledge to them effectively. Knowledge dissemination encourages knowledge sharing processes while knowledge sharing processes occurred in knowledge society. Therefore knowledge dissemination processes are needed in building knowledge society.

3. ICT TOOLS

The success of knowledge dissemination depends on the level of previous knowledge held by the audience and the effectiveness of the channels available to share the knowledge (Debowski 2006). Information and communication technologies (ICT) are one set of major forces that has moved knowledge management front and centre. These technologies have made it possible for people to share enormous amounts of information unconstrained by the boundaries of geography and time (Bukowitz and Williams 1999).

Internet is one of the medium for communication. It is a tool that may be used as knowledge disseminator. People use the internet as knowledge disseminator because internet is:

- Fast and efficient
- Readily available
- Easy to update
- Cater for wide audience groups
- Easily accessible for users anytime anywhere
- Lower cost compared to conventional dissemination process.

This paper analyzed the knowledge dissemination tools 2 aspects; technology strategy, and mobility. In technology strategy, there are two strategy catered for knowledge dissemination. They are push and pull technology.

Push technology automatically delivers data to the user based on pre-defined information profiles or filters(Shelly and Vermaat 2008). Push technology is a process of a web server sending content to a computer at regular intervals, such as current sport scores or weather reports (Shelly and Vermaat 2008). Users of push technology may obtain leads from the information received and then search for more in-depth information (Powis-Dow 2006). This shows that using push technologies, user will take an action due to the disseminated information. In simple words, push technologies will disseminate knowledge or action information straight to the target users. This action will cause target users who are interested in the knowledge to do some action in order to know more about the knowledge.

Pull technology is a process where the target users request information from the web server (Shelly and Vermaat 2008). This shows that the users are interested in the information or knowledge available at certain sites. The target users may notice the knowledge in the specific sites before visiting them. For example, most of the book lovers know that Amazon.com sells book. Therefore they will go straight to Amazon.com to know more about the products available.

Mobility comes from the word mobile which means to describe something large that can be moved easily from place to place(2003). This paper will discuss some of the relavant dissemination ICT tools. They are RSS feeds, phone text messaging (SMS), internet telephone, and intelligent agents.

3.1 RSS Feeds

Rather than conventional mails, electronic mails (e-mails) are now more popular among the internet users. It is not just because they are fast but they also free. This is one of the suitable ways to disseminate knowledge through the internet. E-mail is the transmission of messages and files via a computer network (Shelly and Vermaat 2008). Several knowledge dissemination tools using e-mails as their medium to pass the knowledge to the end users such as RSS feeds.

RSS feeds stands for really simple syndication. RSS is a specification that content aggregators use to distribute content to subscribers (Shelly and Vermaat 2008). A content aggregator is a business that gathers and organizes web content and then distributes, or feeds, the content including news, music videos and pictures to subscribers for free or fee (Shelly and Vermaat 2008).

RSS is obviously using push technology to distribute the information and knowledge to the target users. RSS is considered static because this tool did not move from one place to another.

Figure 1 (b) shows the suggested knowledge dissemination mechanism using RSS feeds. Knowledge contributors will adapt RSS feeds machine to their websites, blogs or portals. This machine then will disseminate the updates of these sites to all the target audience. Therefore an RSS feed is suitable for knowledge content dissemination in any website, blogs or portals.

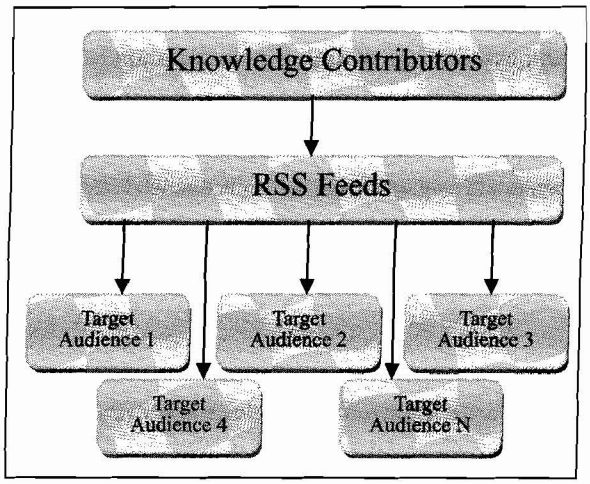

Fig. 1 (b) RSS feed mechanism for knowledge dissemination process.

3.2 Phone Text Messaging (SMS)

Other than the internet, mobile application such as phone text messaging or short message services (SMS) are also had been a trend in disseminating information and knowledge. Information or knowledge passed within this medium may be formal or informal. In Malaysia itself, total subscriptions for cellular phones draws a very large numbers within the year 2007 and 2008 (Malaysia 2008). Figure 1 (c) shows the statistics of cellular phones subscribers in Malaysia.

The reasons why SMS is one of the suitable tools for knowledge dissemination are (Guthery; and Cronin 1999):

- The world wide availability and popularity of an inexpensive SMS
- The evolution of Subscriber Identity Module (SIM) in phone into a standardized and secure application platform for the next-generation networks.
- The demand for applications that let people uses their mobile phones for more than just talking.

Telefon Selular di Malaysia
Cellular Phones in Malaysia

Tahun	Suku	Pasca bayar ('000)	Pra bayar ('000)	Jumlah langganan ('000)	Kadar Pertumbuhan (%)	Kadar Penembusan (%)
2007	1	3,392	17,427	20,819	7.0	77.0
	2	3,485	17,734	21,219	1.9	78.2
	3	3,689	18,380	22,069	4.0	80.8
	4	3,905	19,442	23,347	5.8	85.1
2008	1	4,137	20,116	24,253	3.9	87.9
	2	4,451	20,635	25,086	3.4	90.6

Year	Quarter	Postpaid ('000)	Prepaid ('000)	Total subscriptions ('000)	Rate of Growth (%)	Penetration Rate (%)

Fig. 1 (c) Statistic of cellular phones in Malaysia (Malaysia 2008).

Figure 1 (d) shows the suggested mechanism of SMS for knowledge dissemination purpose. Initially knowledge contributors such as the government or any other service provider, send their knowledge to SMS server. Then SMS will be posted to GSM modem in order to submit them to the users. From GSM modem, SMS is submitted to SMS Center (SMS-C) so that the SMS will be delivered to the target user's mobile. Therefore, knowledge dissemination processes are able to be done using SMS technology.

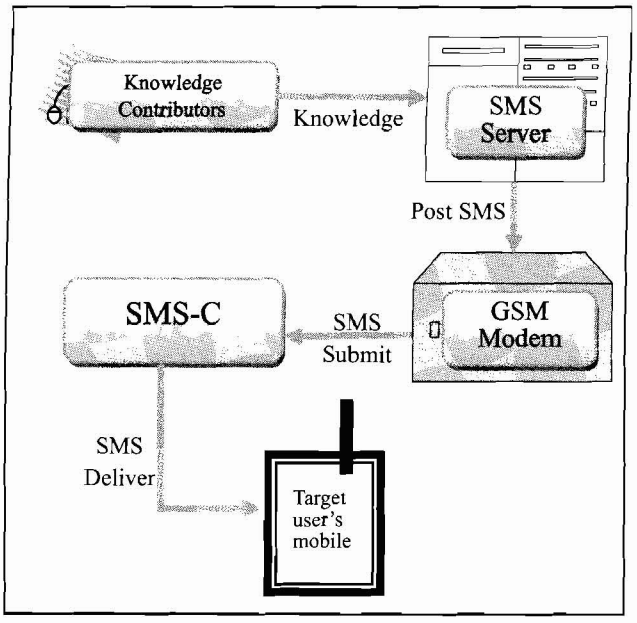

Fig. 1 (d) Suggested mechanism of SMS for knowledge dissemination purpose.

Although the mechanism to send SMS seems to be static, users will received their message anywhere they are. Therefore SMS is considered mobile. The technology strategy for SMS is pull technology. Message sent

through SMS is considered using pull technology.

3.3 Internet Telephone

The most common way of the telephone system is analog. The inexpensive analog technology has many advantages such as it is simple and keeps the end-to-end delay of voice transmission very low because the signal propagates along the wire almost at the speed of light (Hersent;, Petit; et al. 2005).

Conversation may be the fastest way to spread out knowledge. Although analog phone have many advantages, there are still many drawbacks such as(Hersent;, Petit; et al. 2005):

- Unless you use manual switchboards, analog switches require a lot of electromechanical gear, which is expensive to buy and maintain
- Parasitic noise adds up at all stages of the transmission because is no way to differentiate the signal from the noise and the signal cannot be cleaned

Internet telephone not only allows the users to talk more, but it also let users to get connected throughout the word without any geographical barriers. Since knowledge is better to be explained by the knowledge contributors, internet telephone is one of the solutions.

Internet telephone is mobile if users who access them are using wireless internet connection. But it may be static if users only access them through local area network. This tool is using both pull and push technology. It allows service provider to call the target users and push the knowledge to them and the target users also may get interested and started to dig more about the disseminated knowledge from the net.

3.4 Intelligent Agents

Intelligent agent is defined as an object or entity that understands their position in an environment through sensor and reacts to the environment through effectors(Russel and Norvig 2003). In computer science, intelligent agent may be in form of software, system or other object that are applicable to the computer or internet environment. In order to make any applications to be intelligent or expert, there must be some knowledge features added in them.

The characteristic of intelligent agents makes them suitable for knowledge dissemination tools. As listed in table 2. are the characteristic of intelligent agents (Kasabov and Kozma 1998) and the reasons why they are suitable for knowledge dissemination processes.

Table 2 Characteristic of intelligent agents and the reasons why they are suitable for knowledge dissemination processes.

Characteristic of Intelligent Agents (Kasabov and Kozma 1998)	Reasons why it Suits Knowledge Dissemination Processes
Learn and improve through interaction with the environment	Knowledge dissemination processes required an interaction between one site to another in order to do knowledge or information collecting or to disseminate the knowledge and information.
Adapt online and in real time	In order to crawl in the web, adaption of online and real time is important for knowledge dissemination tools in terms of distributing knowledge to all target users at the right so that it may escape from online traffic.
Learn quickly from large amounts of data	As a knowledge dissemination tools, an agent shall know whether the knowledge that they pick is suitable for the target users or not.
Accommodate real-time problem solving rules incrementally	If the knowledge that the agent found are new, they shall know whether it is suitable for them to cater or not.

To show the mechanism of knowledge dissemination in intelligent agent, figure 1 (e) are the modified models of intelligent agent mechanism adopted from the models of goal-based intelligent agents by Russels and Norvig.

First the sensors of the agent sense the knowledge in the environment. The agent then has to know what environment are they in by referring to the state of the environment. Agent has to suit themselves in the environment. To know the consequences if any action is taken in the environment, agent have to know how the world evolves. Knowledge dissemination agents shall know that the knowledge is created or updated in the website that they visited.

The agent has to know what they should do when they visit a website. In dissemination, the agent has to collect the information or knowledge in websites. To gather the knowledge or information in certain website, the agent shall not destroy nor change the contents.

After gathering the knowledge and information, the agent shall know the goal for their actions. In this case, the goal for the agent is to disseminate knowledge gathered to target users. Then the agent will send the message to their reactors to react according to the goal. Reactors will get back to the environment and disseminate the knowledge. Intelligent agents are suitable for knowledge dissemination processes since it may perform these processes in the internet environment.

Intelligent agent may be used for many purposes. In knowledge dissemination, it may be used as a tool to crawl in the web to collect and distribute them to the target users. The intelligent agent may also be used as a tool to pick which knowledge available that the target

users prefer the most before they disseminate it to them. In this case, intelligent agent is using both pull and push technology. First, user need to initiate the knowledge area in the intelligent agent interface (pull technology). Then the intelligent agent passed back knowledge retrieval for the target user.

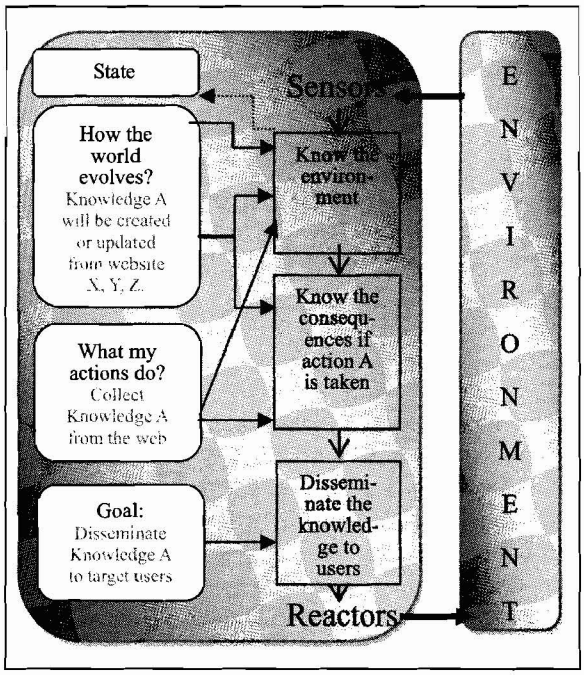

Fig. 1 (e) Suggested mechanism of SMS for knowledge dissemination purpose.

Just like internet telephone, intelligent agent is mobile if users who access them are using wireless internet connection. But it may be static if users only access them through local area network.

CONCLUSION

There are varieties of ways to perform knowledge dissemination processes using ICT. However each of the ICT tools may have their strengths and weaknesses. It depends on the contents and structures of the knowledge that need to be disseminated.

The service provider shall know what are the contents and structures of knowledge that they want to disseminate. Then they may choose the most appropriate tool in order to disseminate their information or knowledge. Therefore, this paper provides a comparison between tools by looking at four categories; pull technology, push technology, mobility, and level of collaboration.

Table 3 Comparison between tools by looking at four categories; pull technology, push technology, mobility, and level of collaboration.

Tools	Pull technology	Push technology	Mobility
RSS		X	Yes (using wireless internet)
SMS	X	X	Yes
Internet telephone	X		Yes (using wireless internet)
Intelligent agents		X	Yes (may crawl through-out the internet)

Knowledge communities have many choice of knowledge source. Therefore the knowledge providers have to choose the suitable tools to disseminate the knowledge effctively.

In the future, intelligent agent tools shall have better capability to directly involve the target users so that the knowledge will be disseminated to the targeted person in a timely manner.

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