



# An Examination on New Features of Exploiting Intangible Knowledge

Ping Lan

School of Management, University of Alaska Fairbanks, PO Box 775-6080, Fairbanks, AK, 99775, USA, Tel: (1-907)-474 7688;  
Fax: (1-907)-474, Email: [ffpl@uaf.edu](mailto:ffpl@uaf.edu)

## ABSTRACT

*This article takes a platform-dependent approach to examine the features of exploiting intangible or tacit knowledge on the current digital platform. It highlights three characteristics based on combining several knowledge generation channels between tacit and explicit knowledge. It also argues that to release the power of the current digital platform for exploiting tacit knowledge, several challenges have to be dealt with in order to reduce leakage of tacit knowledge and increasing the efficiency of the knowledge transformation process.*

## 1 INTRODUCTION

The core of human beings' development is the generation of knowledge. Being the first link in the knowledge transformation chain, tapping tacit or intangible knowledge has been a key component in knowledge generation (Arrow 1962, Rosenberg 1982, Nonaka 1991). It has shown increasing importance in modern creative activities (Mullaney et al. 2003).

Much has been written on dealing with intangible knowledge. One stream is to study the learning mechanisms and reveal how tacit knowledge is acquired (Arrow 1962, Rosenberg 1982). Another stream is to examine the paths of knowledge transformation, particularly between tacit and explicit knowledge (Nonaka 1991, Thomke 2001). The third stream deals with the synergy of intangible knowledge from different actors in an innovation process (Von Hippel 2001). However, most of these studies use a platform-independent approach. They do not pay special attention to the platform on which knowledge generation is conducted.

The importance of studying the status and practices of dealing with tacit or intangible knowledge on the current digital platform is reflected in the following two aspects. Firstly, current innovation is much more closely tied to its conducting platform both in contents and delivery (Quinn et al. 1996, Kogut et al. 1999, Thomke 2001). It is difficult to manage an innovation without an understanding of its foundation. Secondly, current innovation breaks the boundaries of traditional creative activities, which raises new challenges to formulating business strategies and managing innovations (Kerstetter et al 2003).

Given the background, the features of exploiting intangible or tacit knowledge by using the current digital platform are set as the theme of this examination. It aims to find out how ICT has changed practices in handling intangible knowledge among traditional knowledge generation channels or circuits.

## 2. KNOWLEDGE TYPES AND KNOWLEDGE GENERATION CIRCUITS

According to the process of materializing human concepts, knowledge can be roughly divided into three types: soft form, hard form and medium-form (Lan 1996). Soft form knowledge refers to people's skills and experiences acquired in fulfilling various tasks. Soft form knowledge includes intuitions, unarticulated mental models, human brainpower and creativity. It is still accommodated by the human body. Therefore, it is entirely intangible with characteristics including personalized, context-specific, and not-so-easy-to-communicate with others. It can only be transferred through people's movement and contact. When an individual person die, knowledge in that person will disappear.

Hard form knowledge refers to different man-made materials and equipment. It is the sum of all existing tangible assets such as factories,

cars and computers. This part of knowledge is an entirely embedded human creation and serves as a tool to carry out certain tasks. Contrasting with soft form knowledge, hard form knowledge is tangible and usually can be moved and used independently. It is often called hardware and can be regarded as materialized knowledge. Once hard form knowledge is formed, its productive capacity cannot be altered by subsequent learning (Arrow 1962).

Medium-form knowledge, lies between soft form and hard form mainly in the form of design, written documents and other media of materializing human concepts. This type of knowledge is a meaningful set of information articulated in clear language including numbers or diagrams and carried in media other than the human body. Differing from soft form knowledge, medium-form knowledge is no longer embedded in the human body and can be transferred separately. Differing from hard form knowledge, it cannot be effectively functional without further transforming into or being combined with hard form knowledge, and it can be changed easily to incorporate subsequent learning results. Other terms such as explicit knowledge, intellectual property and medium ware are also used to describe this type of knowledge.

The information technology (IT) industry itself provides the best illustration of the three forms of knowledge. Computer hardware is undoubtedly hard form knowledge. Computer software is medium-form knowledge. Soft form knowledge consists of various skills that are required to develop software, operate and maintain computer or network systems, and make decisions related to the development and employment of IT technology.

Nonaka (1991) points out that there are four circuits linking soft form or tacit knowledge and medium-form or explicit knowledge: socialization, articulation, internalization and combination. Socialization is the channel for distributing soft form knowledge among people. It means that an individual shares tacit knowledge directly with another. An individual obtains soft form knowledge through observation, imitation, and practice. During this process, the learner is socialized into the craft. However, socialization is a rather limited form of knowledge creation, since this process does not offer much help for the both transferor and transferee to gain systematic insight into their craft knowledge.

Combination is the channel for creating new medium-form knowledge from other medium-form knowledge. It means that an individual or a team generates new medium-form knowledge by combining discrete pieces of medium-form knowledge into a new whole. Nonaka (1991) argues that although this process synthesizes information from many different sources, the combination itself does not really extend the existing knowledge base for an organization.

Articulation is the channel for generating medium-form knowledge from soft form knowledge. It means that an individual articulates or embeds his tacit knowledge on certain topic into explicit knowledge. After this conversion, tacit knowledge can be communicated to a large number of audiences. Since soft form knowledge includes mental models and beliefs in addition to know-how, converting tacit knowledge into explicit knowledge usually triggers a process of articulating one's version of the world into what it is and what it should be, which includes much more information in organizing rather than proprietary know-how.

Internalization is the channel for obtaining new soft form knowledge from medium-form knowledge. It means that an individual uses explicit knowledge to broaden, extend and reframe his tacit knowledge. Since explicit knowledge can be shared in a large scope such as an organization or a community, internalization can be conducted simultaneously among different individuals. Articulation and internalization are the critical circuits of knowledge generation, because both of them need the active involvement of personal commitment.

### 3. DIGITAL PLATFORM: TECHNOLOGIES, APPLICATIONS AND STIMULI

Synthesizing the previous research on the structure of the current digital platform, the current digital platform can be observed from three dimensions: a unique technological foundation, special usages and interactive stimuli.

The current technological foundation consists of several sets of technologies such as digitizing technology, networking technology, and authoring technology. Digitizing technology originated from the development of computers, and extended to software engineering and digital information handling. The development of digitizing technologies, on one hand, dramatically increases computing power. On the other hand, it offers possibilities for shifting business operation from a materials-based paradigm to an information-based paradigm. Networking technologies result from the convergence of telecommunication technology and electronic technology. The development of networking technologies enables information exchange to enjoy unimaginable freedom, judged by bandwidth, connectivity, accessibility, and diversity. This freedom is based on universal protocols for information exchange, and a layered operating structure. Authoring technology is a collection of various tools associated with the development of the Internet, particularly with World Wide Web. The development of authoring technologies provides solutions for changing interactions between an organization and its stakeholders by adding a virtual dimension, so that mass creation and decoupling of the front-end and back-end of an operation can be realized.

The new technology capacities display a spectrum of applications. Within this spectrum, three usages are pervasive: digital messaging, digital transaction and digital integration. All of them are information oriented and can be measured mainly by indicators such as scalability, reliability, hosting, storage and security. Digital messaging is mainly reflected in accelerated information flows through the Internet. Digital transaction is characterized by electronic payments and related information flows. It involves financial institutions and countless businesses and individuals. Digital integration is reflected in structuring and restructuring activities, functions and organizations which happen at different levels. The vertical integration shows the changes of linkages along a value chain. The horizontal integration shows the convergence of traditionally separated activities, such as cultural activities and commercial activities (Mitchell et al. 2003).

The realization of technological capacities and pervasive employment of these capacities bring new realities to the world such as virtuality, intelligence and globalization. Virtuality means that products, services or delivery of these objects are not confined to their physical dimensions or material existence. Intelligence means that the operations of many activities can be conducted in a distributed, synchronized or flexible way through capturing, retrieving, conveying, creating, processing, and distributing information. Globalization is one of the network externalities exhibited. It means that the operational reach of an interface in the digital platform is without boundaries in the world. Global connection and unified networking protocols or standards make information distribution spontaneous. These faceless, stateless and round-the-clock interactions, on one hand, are forces for homogeneity or scale economy by linking scattered niches. On the other hand, they are catalysts for creating or increasing conflicts by releasing various intrusions.

## 4. THREE CHARACTERISTICS OF EXPLORING INTANGIBLE KNOWLEDGE ON THE CURRENT DIGITAL PLATFORM

By combining the traditional knowledge generation paths discussed in section two and digital stimuli discussed in section three, several characteristics of tapping intangible knowledge can be observed. They are a fast conversion of knowledge from tacit to explicit state, a large scale gathering of explicit knowledge and easy sharing of both tacit and explicit knowledge, and some new management practices in handling intangible knowledge.

### 4.1 A fast conversion of knowledge from tacit to explicit state

On the current digital platform, a mass and fast transformation of tacit knowledge to explicit knowledge occurs due to easy publishing media such as websites and web logs or blogs. Firstly, the conversion happens across a spectrum of creative activities: science creativity, engineering creativity, economic creativity and cultural creativity (Mitchell et al. 2003). The Internet encourages innovation at the edges by users, allowing a relatively unrestricted set of applications to run over it. These factors have generated a pattern of innovation in Internet technologies, which opens up many intriguing possibilities for creative work cross any boundary (CSTB 2001).

Secondly, the conversion is closely tied to easy publishing tools. Based on authoring technology, a website can be built as a simple or comprehensive virtual interface between an individual or an organisation and its stakeholders or environment. It allows media to be distributed at low cost without any special organizational support, and the content can be viewed from anywhere in the world. It is quite flexible, offering the capability to publish text, images, sound and video, and to organize the presentation of material in creative ways (Mitchell et al. 2003). Web logs, commonly called blogs, are a form of hyperlinked online journal that has become an increasingly popular way to distribute and collect information on the Web.

Thirdly, the conversion directly facilitates the knowledge articulation process. As a general rule, ideas cannot be used if they are forgotten. Cognitive psychologists have shown that the biggest hurdle to solving problems often is not ignorance. It is that people cannot put their fingers on the necessary information at the right time, even if they have already learned it. Organizational memories are even tougher to maintain. Companies lose what they learn when people leave (Hargadon and Sutton 2000). The mass and fast conversion of knowledge from tacit to explicit facilitated by online publishing tools overcome some of the above barriers. Since the fact that the ability of virtually anyone to publish on the Web enables producers of explicit or medium-form knowledge to contact audiences more directly, user-provided content plays an important role in stimulating the articulation, thus offering a unique market for innovators. The easy publishing offers not only opportunities for individuals and organizations to present tacit knowledge, but also media for displaying and keeping the knowledge in new combinations.

### 4.2 A proliferated process for obtaining intangible knowledge

The survey finds that the generation of intangible knowledge itself is proliferated on the current digital platform. It is mainly reflected in the facts that a large scale gathering of explicit knowledge facilitates knowledge combination and internalization, and a cost-effective sharing of both tacit and explicit knowledge leads to cross-boundary socialization.

Firstly, diversified and large scale collection of explicit or medium form knowledge through deploying database and other internet technologies offers much more opportunities and a better environment for creating tacit or soft form knowledge. This interaction offers easy accessing, intelligent data sorting and convenient link tracing for innovators and the public, which creates a different environment for knowledge internalization or generating more ideas. Along with this trend is the booming of data centers. The exploitation of these facilities could redirect innovations.

Secondly, easy access to the collection of explicit knowledge helps individuals and grassroots organizations to become innovators. The internet incubates the idea of a "creative class". People are thinking to take the advantage of a shift from "the information economy" to "the creative economy" (Mitchell et al. 2003). The current digital platform for supporting creative work take many forms, including archives, portals, and virtual displays.

Thirdly, the application of software tools in dealing with the large scale gathering of explicit knowledge directly affects the combination channel and internalization channel of knowledge generation (Quinn et al 1996, Thomke 2001). By deploying software tools, new explicit knowledge is generated through combining discrete pieces of knowledge into a new whole. At the same time, the knowledge base for an individual or an organization is enlarged due to the fact that more tacit knowledge can be generated from broadening, extending and reframing the foundation of tacit knowledge.

Fourthly, cross-region, cross-functional and cross-disciplinary communication through convenient exchange of ideas and documents enables the socialization process to happen virtually in any form without much restriction. Development of these cost-effective communication tools push socialization of knowledge generation into a new terra. Socialization on the current digital platform emphasizes that human resources can be obtained through the broadening of individual skill sets and through collaborations.

#### 4.3 Emerging new practices for managing intangible knowledge

The survey also finds that more innovative strategies or measures are formulated or used to deal with various issues related to intangible knowledge. There are several developments on the current digital platform, including distributed organization of innovation activities, redefined intellectual property rights and mixed measures for dealing with innovative individuals. All of them do not change the mechanisms of knowledge generation, but they break the traditional division of creative activities.

Firstly, a distributed delivery and organization of innovation activities is getting popular. Although different people use different terms to describe it, current innovation shows a distributed nature, which means that innovation is open and decentralized to a much higher degree.

Secondly, there is a trend to redefine intellectual property rights in the distributed innovation background. Between the new copyleft (in an open innovative effort such as Linux, individuals can freely access to intellectual property in the pool and are required to share their development openly) and traditional copyright, there is a mixed model-communities of creation. In such an "emergent self-organization", intellectual property is closed to outsiders of the community and it is open to insiders (Sawhney et al. 2000).

Thirdly, there are mixed measures for dealing with innovative individuals. On one hand, more incentives such as a higher salary, more flexibility, options and stock are tied to recruit and retain human capital, due to the increase of bargain power of innovative personnel (Martin and Moldoveanu 2003). On the other hand, more measures are used to squeeze or distill individual intangible knowledge into corporate knowledge pool.

#### 5. CONCLUSION

Development of computing and software industry, combined with the invention of the Internet, makes knowledge to display a clear triple structure at the current stage: soft form or intangible knowledge, medium-form or explicit knowledge, and hard form knowledge. Several knowledge generation circuits exist between the three types of knowledge. The major advances of knowledge generation are reflected in creating a new production platform. The current digital platform is a product of innovation in ICT. It shows different usages and possesses unique features.

The current digital platform not only absorbs the outputs of knowledge advancing, but also changes the activities of generating knowledge. Three features of tapping tacit or soft form knowledge on the new digital platform can be identified. Firstly, there is a mass and fast

conversion of knowledge from tacit to explicit state. Secondly, there is a large scale gathering of explicit knowledge and easy sharing of both tacit and explicit knowledge. Thirdly, some new management practices in handling intangible knowledge are emerging.

However, the exploration in this article is still a descriptive one. It does not go to the depth and scope of answering the questions such as how do we measure the linkage between online conversion of knowledge and innovativeness? What are best practices in managing human capital in terms of generating intangible knowledge? It is apparent that these questions are important for increasing the innovativeness of creative activities.

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