Knowledge Spillovers: The Virtual Generation

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Abstract
This paper highlights features of the Web 2.0 and its evolution into Web Societies, the Virtual Generation, or Generation V's, major contrivance for knowledge diffusion (knowledge spillovers). Web 2.0 has set the bases for a highly intensive environment for knowledge creation and collaboration processes, with important implications for the nature of technological change. This work aims to present a documented, exploratory rather than explanatory study, based on descriptive definitions of the evolution of Web Societies and their implications for knowledge dissemination, on which to later base an empirical analysis.

Introduction

Advances in technological and organizational knowledge have been absorbed by firms, whether the new knowledge is created externally or internally, whether the knowledge advances embody new knowledge or combinations of existing knowledge, the absorbent capacity of organizations varies and this affects their ability to produce innovations. Viewed from this perspective the development and objective of this paper is to present a documented explanatory study with the purpose to contribute with some suggestions on how spillovers should be analyzed in a Web2.0 context.

Organizations are creating Web-based environments in which complex societies work and evolve, creating high value content and making it possible for individuals to become more productive (Harris & Knox, 2008).

Knowledge Management (KM) is based on social processes, information management and applications designed to improve their support for human and work processes. At the same time, social technologies are emerging through consumerization[1] and Web 2.0 is consolidating the Web as a new business platform, in addition to an environment for learning and knowledge creation and sharing (Harris & Mann, 2007).

[1] *The consumerization of IT focuses on how enterprises will be affected, and can take advantage of new technologies and models that originate and develop in the consumer space, rather than in the enterprise IT sector. (Harris & Mann, Gartner Group, 2007).*

Extending KM not only to customers, employees and partners but also to other external actors (virtualization) can increase knowledge exchange (Harris & Mann, 2007). However, the relationship between knowledge spillovers and virtualization tools of new technologies in a space context is complex and partially understood due to the fact that knowledge spillovers do not leave a paper trail making them difficult to measure.

1. Literature Review

The objective of this literature review is to develop a framework for further research into the new technologies capabilities, termed social mining and social intelligence (Harris & Knox, 2008) and their implications for knowledge diffusion (knowledge spillovers) and management.

For the purpose of this research (business knowledge) it is important to distinguish three concepts of knowledge according to Karlsson and Manduchi (2001).

a) *Scientific knowledge (scientific principles)*

b) *Engineering knowledge (blueprints, inventions that can be directly used in the production of goods and services)*

c) *Entrepreneurial knowledge (business relevant knowledge about products, business concepts, markets, and customers)*

It is also fundamental to categorize them according to their degrees of rivalry and excludability (Cornes & Sandler, 1986).

Rivalry property: Pure rivalry; its use by one actor precludes its use by another. *Non rivalry;* its use is not limited.

Excludability (Kobayashi & Andersson, 1994); A good is excludable if the owner can prevent others from using it.

One of the key aspects of this classification is that, while private (conventional) goods are rivalrous and excludable, pure public goods are not.

According to this categorization; scientific knowledge is a pure public good. However, it is usually only available to

those with scientific training and legal restrictions (patents) can also be imposed (Karlsson and Manduchi, 2001).

Engineering knowledge could be perceived as a non-rivalrous (different from other economic goods), partially excludable good (protection of new inventions) (Romer 1990).

Entrepreneurial knowledge (learning-by-doing) is viewed as a non-rivalrous, partially excludable good, however it could be limited by trying to preserve "business secrets" (Karlsson and Manduchi, 2001).

The processes to make available these different kinds of knowledge take place in "knowledge networks" (Batten, Kobayashi and Andersson 1989; Kobayashi 1995), where the nodes are represented by human settlements providing different instances of functional regions (Johansson 1997). These nodes include knowledge infrastructure, stocks of knowledge and human capital. The links are the communication channels (Karlsson and Manduchi, 2001).

These environments are inhabited by a society that serves one or more purposes for the owning organization, and for the participants themselves (Harris & Knox, 2008). They deal with multidimensional dynamic content, thereby resulting in the "Generation V".

> *"Generation V describes the behavior of a growing cadre of users and consumers who prefer digital media channels and, through controlled personas, actively involve themselves in online meritocratic global communities, engaging in a conversation with peers rather than a communication."* (Prentice & Sarner, 2008)

Here, new technologies capabilities, termed "social mining" and "social intelligence" could emerge to enable organizations to deeply analyze and exploit all aspects of social content (Harris & Knox, 2008).

According to Gartner Group (2008), social content is formed by three different types of records:

> *Contributed records:* the video, audio, graphics or text created or provided by social system users and participants. The format of this social record is determined by the participant who created it.
>
> *Relationship records:* dynamic records that track key aspects of the ever-changing relationships within the society.
>
> *Metadata:* data about the contributed and relationship records, plus tags or links to related information.

However, through these applications it is not possible to evaluate the character (positive vs. negative, factual vs. speculative) of the content yet, or the background of the participants and the relationships among communities. As these technologies mature, they will enable organizations to understand the dynamics and trends at work in constituent Web societies (Harris & Knox, 2008).

The main idea is that the creation of new knowledge by one organization has positive external effects on the knowledge production activities of other organizations, either because knowledge cannot be kept secret or because patents do not guarantee absolute protection from imitation (Karlsson and Manduchi, 2001).

Griliches (1992) defines knowledge spillovers *as "working on similar things and hence benefiting much from each other´s research"*.

A second category of knowledge spillover originates from production activities (Udayagiri & Shculer, 1999). Knowledge spillovers are not tied to direct compensation. This externality is due to the fact that protection of proprietary knowledge is not complete. (Arrow 1962; Romer 1986; Smolny 1999).

In addition there is evidence that information and knowledge networks that enhance business efficiency can be widely disseminated geographically (Hansen 2000) due to the type of communication[2]. The "*intellectual-scientific-technological*" regions (Griliches 1991, p.15) become as important as geographic regions, from the point of view of the identification of the spatial extension of spillovers (Olsson & Frey 2000). The greater the spillovers, the closer the relationship which can be expected (Karlsson 1997). Under this schema it is possible to affirm that the benefits of knowledge not only accrue to the main actor, but spills over to other organizations, raising the level of knowledge. The knowledge created is difficult to codify, difficult to patent, facilitating its accessibility (Karlsson and Manduchi, 2001).

2. Knowledge Spillovers in Virtual Environments

With the arrival of what is commonly known as Web 2.0 or "Social Web", the diffusion of knowledge has found new channels. What is particularly important is the user-

[2] *Knowledge diffusion can be described as a special type of communication related to the diffusion of messages that contain new ideas, concepts and blueprints (Rogers 1983).*

centricity of these communication channels. Knowledge is connected to user identities rather than to other knowledge itself, thus becoming mostly traceable through social communities. However, metadata (information about information) can be used to add standardized machine-readable search tags to the knowledge objects in question, thus making it re-usable and accessible to non-members of a virtual community (i.e. a community held together by means of ICT). According to the aforementioned classification, this effect can be identified as knowledge spillover. However, in a virtualized corporate environment, this effect can also have negative impact. In a service oriented corporate architecture, knowledge spillovers might create an information risk to the organization. (You, 2006). This is especially relevant for "rivalry property" Knowledge.

Considering the ubiquity of relevant data it will technologically be possible to attain empirical evidence about the knowledge diffusion process itself. A more difficult question goes into direction of a taxonomy classifying the outcome of the process. Rather than differentiating between "good" or "bad" knowledge diffusion (which obviously depends on the environment, the point of view of the actors, etc.), it apparently makes sense to keep track of the subject-specific virtual social network emerging in the transition from knowledge spillover to knowledge exchange, as illustrated in figure 1.

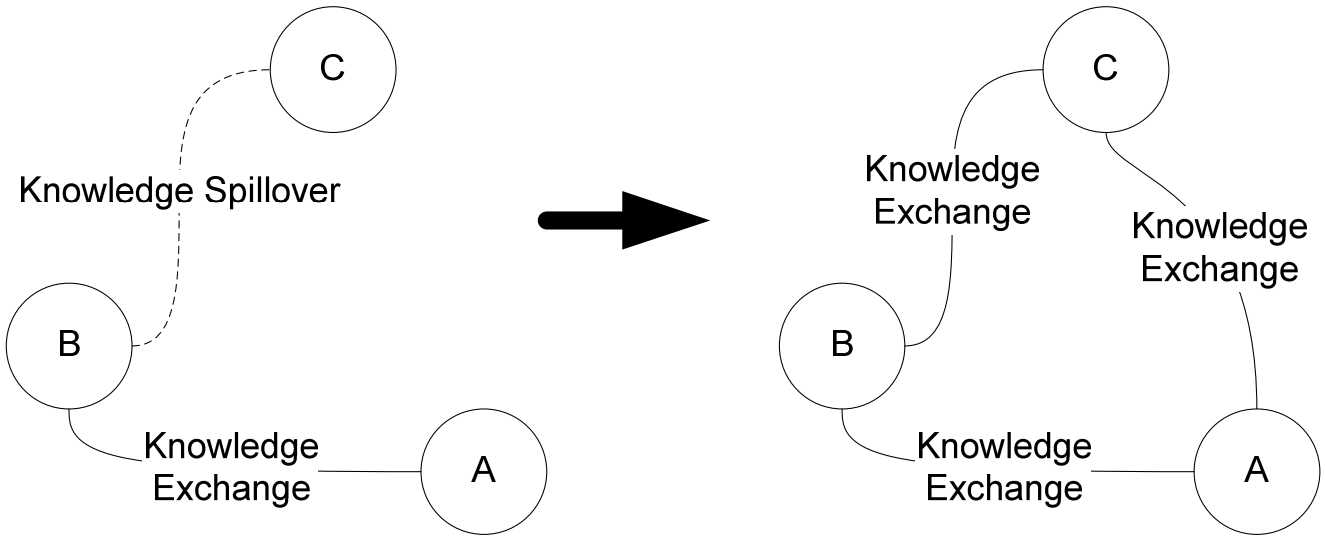

Figure 1: From Knowledge Spillover to Knowledge Exchange

In the illustration, entity A is in a fortified state of knowledge exchange with entity B. Through a knowledge spillover generated by entity B, entity C learns about the trustful knowledge exchange between entity A and B. In the process of reinforcement from knowledge spillover to knowledge exchange (by building trust), entity C becomes "socially authorized" to gradually build up an equally trustful knowledge exchange with entity A directly. For example in organizational learning, this transition process can have a very positive impact on interdisciplinary team building. In the world of Web 2.0 the process becomes transparent and traceable. It is important to stress the fact, though, that potential intellectual property right issues need to be addressed and resolved first. In an open-content/open-courseware environment the process described is least problematic.

3. Summary

Social technologies (Web 2.0 and Consumerization) will help to consolidate the Web as a tool for interactivity and exchange of knowledge. Knowledge in itself does not contribute to economic growth (Fischer and Fröhlich 2001). It has to be incorporated into the production of goods and services in a context where organizations are tied into various kinds of networks (input-output relations), especially knowledge spillovers and their interdependencies creating value for other organizations (Storper 1997). However, it is critical to examine further literature on how knowledge spillovers behave in a spatial context of properly defined functional regions.

The scenario presented of new and dynamic behaviors and tendencies within Web societies and environments spurs the interest for a more in depth study to understand how organizations develop insights into the ways online societies form and function and how social engineering would drive or motivate the behaviors and trends of its society in a desired direction (Harris & Knox, 2008).

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