

WEB 2.0 implications on knowledge management

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Abstract

Purpose – The purpose of this paper is to provide an understanding of the WEB 2.0 phenomenon and its implications on knowledge management; thus, in order to learn whether using WEB 2.0 concepts and tools can yield better assimilation of knowledge management in organizations.

Design/methodology/approach – A range of recently published articles regarding WEB 2.0, Enterprise 2.0 and KM 2.0 are examined and critiqued (2005-2007). These are analyzed and compared to knowledge management principles and attributes as known and learned from works defining the sharing of knowledge in organizations (1995-2005). The sources are divided into three basic elements: The Internet (WEB 2.0), the organizational implementation (Enterprise 2.0) and the organizational implementation of knowledge sharing (KM2.0).

Findings – WEB 2.0 is very close in its principles and attributes to knowledge management. WEB 2.0 should affect knowledge management in organizations; yet, it cannot be copied, as differences between the two will not enable organizations to benefit from such. In the first stage, tools can be adopted, and in further stages, deeper aspects such as active users' participation will be followed.

Practical implications – Organizations are encouraged to start using WIKI's and in some cases also blogs. Knowledge Managers should examine if younger employees can serve as knowledge catalysts. WEB 2.0 concepts should be tested as to organization's maturity, to decide if they can be adopted as part of the organizational knowledge sharing.

Originality/value – This paper analyzes an important issue whether better assimilation of knowledge management can exist triggered by the WEB 2.0 phenomenon. It is unique in its broad analysis of the three related terms – WEB 2.0, Enterprise 2.0 and KM2.0.

Keywords Internet, Knowledge management, Worldwide web

Paper type Viewpoint

Introduction

WEB 2.0 is a hot topic. Articles are written, search engines are sending new alerts and adding new types of information (i.e. blogs) and a new spirit is out in the Internet. People, dealing with KM for nearly ten years, find the WEB 2.0 phenomenon fascinating. Did the WEB 2.0 experts crack the code, which the KM community is struggling with, for so many years? How is it that so many people are sharing knowledge so actively, many of them, on a day-to-day basis? What is in it, the WEB 2.0 and how does it affect the organizational Knowledge Management arena? What can be learned and replicated in for KM? Can it benefit from the WEB 2.0 implications? Is the WEB 2.0 a revolution or just a buzz that will pass soon, leaving us with our sharing hope?

This paper explores the WEB 2.0 issue and its implications on KM. It is built from three main sections:

1. WEB 2.0 review.
2. Enterprise 2.0 – The WEB 2.0 reflection in organizations.

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“Analyzing WEB 2.0 there are several popular applications, or application classes, that are well known and in some aspects define the practical aspect of the WEB 2.0 principles.”

3. KM 2.0 – How could or should knowledge management be enhanced in light of the WEB 2.0?

WEB 2.0 review

The phenomenon WEB 2.0 is a result of the following combinations:

- The internet maturity and development over the last decade.
- One billion people around the globe now have access to the internet; mobile devices outnumber desktop computers by a factor of two (Musser and O'Reilly, 2006).
- The software sectors attempt to build a new positive apprehension, after the dot com bubble burst, at fall 2001 (O'Reilly, 2005).

The term itself, as is well known, was phrased by Tim O'Reilly and Media Live International. It was used by producers of technology tradeshows and conferences, first at fall 2004, as a name for a series of conferences held by them. The market yielding to this new wave, adopted the name and ideas, and almost unnoticed WEB 2.0 became the biggest hope of the dot com.

Despite its popularity, not all internet applications are 2.0; most of them are not. But slowly, step-by-step, more WEB 2.0 principles are combined as components of internet solutions, setting the de-facto Internet standards of work.

So what is WEB 2.0?

O'Reilly, in perspective, two years after the term was coined, defines the WEB 2.0 as “the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them” (Musser and O'Reilly, 2006).

This principle of people's influence sounds obvious, just as the term of the internet as a platform. What was the internet up till now; where is the change? These terms are hereby explained, answering the questions, which have arisen, as part of the explanation of core principles of the WEB 2.0 below. Thus, after the following additional definitions. Three definitions suggested by three people, very different and yet each is very accurate:

Singel quotes Mayfield, a CEO of a software WIKI Solutions Company: “Web 1.0 was commerce. WEB 2.0 is people” (Singel, 2005). McLean suggests: “WEB 2.0 is the catch-all descriptor for what is essentially much more dynamic Internet computing” (McLean, 2007). Weinberger defines the phenomenon as an establishment of “open architecture, its lowering of the barriers to publishing, the ease with which people can connect ideas, the increase in available bandwidth and computing power”. Weinberger, as oppose to O'Reilly, does not speak about a revolution, but rather about an evolution of ideas rose in the past (Weinberger, 2007).

As O'Reilly has stated, WEB 2.0 does not have a hard boundary, but rather, a gravitational core (O'Reilly, 2005). The core, a set of principles which are similar but not identical, imply on several aspects of the Internet industry, starting from the way software is developed, through marketing, content development and day-to-day operations. The principles are described in a wide range of papers (O'Reilly, 2005; Wikipedia; etc.).

In this paper, these principles are described, emphasizing those principles, which are connected to knowledge management:

1. *WEB as a platform.* The WEB should be treated as a platform and not as a main application. Just as the telephone is regarded as a channel, while the conversation is the essence, WEB 2.0 applications should be treated as channels only. Trying to set a standard around your application, trying to dominate the conversation, is a misplaced emphasis. Companies that understood and instil the concept of "WEB as platform", selling the channel (services through which people purchase the content), include among others: Amazon, eBay and Napster. Netscape, even though, it seemed to be a channel, tried to dominate via content and standards, and therefore cannot be regarded as a WEB2 implementer (O'Reilly, 2005). While developing the channel, it must be remembered that the implementation is possible through other media, i.e. cellular telephones. "Build applications that reside in the space between devices" (Musser and O'Reilly, 2006).
2. *Services development.* Derived from the definition of the internet as a platform, another principle, which is important enough to be defined as an independent principle can be learned: developing services rather than developing applications. The innovation is in the assembly: One may develop only one service, but assembling it on other services (as detailed in principle six following), gives it an added value.
3. *Active participation of users.* Users are active. Up till now, both in the WEB arena and in the KM world, content managers and content experts took a major part in writing the content, collecting it, organizing it and categorizing it. Users mainly used it. In the WEB 2.0 new world, this concept changes: the user is an active participant and gives added value to the content. It should be understood, that also the WEB 2.0 fans realize the not at all trivial effort in the operation, de-facto, of this concept (see O'Reilly, 2005). Solobak (2007) describes one of the panels in the KM Chicago conference held January 2007. The panel was lead by Elfving and himself. Solobak describes an interesting diagnosis of Elfving made in that panel regarding the various levels of users' participation:
 - *Passive users:* the history of their activity is what is collected, giving an added value. For example: Amazon recommends books based on what readers, with similar profile, have already purchased.
 - *Minimal active users:* users adding content to other people's content (i.e. Tagging) or write content themselves, but as individuals (i.e. Blogs).
 - *Collaborative active users:* users that work together over the net, adding collaborative content. For examples: Wiki, Google's spreadsheet, etc.

Graham speaks about the importance of this principle and its main implication: user democracy (Graham, 2005).

- *The service improves automatically the more it is used (by the people).* As defined above, users are active, and their participation is part of the architecture in which the services are based on. Users' participation influences the net. The service is designed so that it improves the more it is used. This principle can be understood by looking at an example of the Google Search model of ranking. The ranking is heavily influenced, by the number of accesses of all previous users to pages on the results domain of the search. The more people search, the more statistics are gathered, and the quality of this ranking will be higher. The service improves by the same principle also in eBay, Napster, Amazon and many other WEB 2.0 applications. This principle may sound new, but is not so revolutionary. The academic field has always respected researchers according to the number of papers written by them, but more than that, regarding the number of times they were cited by other researchers.
- *Collective intelligence.* In order to primarily understand this principle, a WEB 2.0 well known term, derived from statistics, will first be defined: the LONG TAIL. The term was first defined by Chris Anderson, at the end of 2004, borrowing the term from the statistical distribution field. Anderson resisted the business world investment in the 20 percent of the leading customers/products and ignoring the 80 percent left (according to the Pareto

principle). The 80 percent are the long tail. Each one of the population that purchases only one book – matters; the million companies, each with a small turnover revenue, matter; etc. This market is the long tail. The 80 percent of the population do make a difference and should not be ignored. Their collective significance is huge and should not be overseen. Vice versa; the future of the business world is set in selling to the long tail: Selling small quantities to many individuals and companies.

Hyperlinks are the essential base of the WEB. The link is the fundamental unit of thought. It is called “the Web” for a reason. The link is the foundational element for connecting the entire Web together (Hinchcliffe, 2006). Hyperlinks are those that turn individual pages and sites into being a collective intelligence. Hyperlinks are those driving the network effects and giving the WEB its strength by exactly this feature. Wikipedia is an example of the collective intelligence and the wisdom of the crowd. But, not less interesting, is another example, which is not as trivial: The Blogosphere. The Blogosphere represents a linked world, defined by the bloggers community. If you are part of the community, other bloggers read you more; respect results of you found by the search engines more, etc. The key for dominating the market in the WEB 2.0 arena is dominating the net through its collective intelligence.

- *Content as the core.* Content is core. The supplemented content is a competitive advantage. This principle, also named as “Data is Next Intel inside”, may seem as if it contradicts the services principle, mentioned above. It therefore will be described carefully: In order to give the service a competitive edge, the service will be based on content: It may be based on its own content or manage complementary content, to that which it is based on; Thus, giving the user a new added value, as result of the new data. This principle can be demonstrated by viewing the Google search model, where the added content lies in the indexing and ranking; in Amazon managing much more than the original book catalog; etc.
- *The perpetual beta.* WEB 2.0 is based on services, rather than independent applications, as described above. The services are developed as lightweight modules and are released constantly, almost continuously. The main representative of this approach is Flickr. O’Reilly (2005) quotes Cal Henderson, the lead developer of Flickr, who revealed that they deploy new builds up to every half hour. The users become hidden partners of the quality assurance process. Beta, for those who are not familiar with Software development terms, refers to an early software release to specific groups of customers, before it is generally available to the public.
- *Rich user experience development via small modules.* Software is developed in small modules and is rich user experience oriented. The software uses appropriate protocols and development environments such as SOAP, AJAX and REST. As this article is focused on knowledge management implications, this principle (or even two included within it) will not be further explained in this paper.

Categorizing applications as WEB 2.0 applications is not that easy. An application may comply with two principles and will not comply with others. Will we classify it as a WEB 2.0 application or not? An application can be developed according to these principles, but not marketed or operated as such; etc. Definitions can vary. O’Reilly, as also quoted by Wikipedia, defines four levels of WEB 2.0 applications:

1. “Level 3 applications, the most ‘WEB 2.0’, which could only exist on the Internet, deriving their power from the human connections and network effects WEB 2.0 makes possible, and growing in effectiveness the more people use them. O’Reilly gives as examples: eBay, craigslist, Wikipedia, del.icio.us, Skype, dodgeball, and AdSense.
2. Level 2 applications, which can operate offline but which gain advantages from going online. O’Reilly cited Flickr, which benefits from its shared photo-database and from its community-generated tag database.
3. Level 1 applications, also available offline but which gain features online. O’Reilly pointed to Writely (since 10 October 2006: Google Docs and Spreadsheets, offering group-editing capability online) and iTunes (because of its music-store portion).

4. Level 0 applications would work as well offline. O'Reilly gave the examples of MapQuest, Yahoo! Local, and Google Maps. Mapping applications using contributions from users to advantage can rank as level 2.
5. Non-web applications like e-mail, instant-messaging clients and the telephone". (Wikipedia, 2006).

Analyzing WEB 2.0 there are several popular applications, or application classes, that are well known and in some aspects define the practical aspect of the WEB 2.0 principles described above.

1. *WIKI*. WIKI is a structured website, i.e. collection of pages sharing the same structure using templates. Uniqueness derives from the ease of user participation: To edit existing content, to add content, or even influence the structure of the template. In one word: Democracy. The first WIKI was built in 1994 (WIKIWIKIWEB). The term itself, WIKI, originates from the Hawaii word meaning fast. Most WIKI's are textual, yet rich WIKI's can be observed, including pictures, movies and audio.

WIKI includes the ability to create together and to work- sharing. The templates guide the way people write and the easy use of these templates is what differentiates the WIKI from classical WCM tools. WIKI engines, that enable building websites as defined, can be downloaded free from the net.

The most famous example, and probably the most successful one, is the WIKIPEDIA encyclopedia. Many people categorized the WIKIPEDIA, in its first days, stating that an encyclopedia could not be written by amateurs instead of experts. In many subjects, it has been proven, that the WIKIPEDIA competes, and even superior, when comparing it to the classical encyclopedias. It is accepted that no other encyclopedia is updated as WIKIPEDIA.

WIKI engines enable easy creation of links between terms, pages and titles, enlarging in another dimension of knowledge sharing.

2. *Blogs*. Blog, a term already mentioned above, is a personal diary. These pages written by the users form together a sub-world in the internet (known as "the Blogosphere"). The diaries, some of which are subject oriented, some personal, are all dated. At first glance there is nothing new here. Personal pages were popular also in WEB 1.0, and other formats can be recalled from the past. The innovation yields from:

- Continuity of writing (not one page, rather a full diary).
- Amplification driving from quantity. Until the end of 2006, 76,000,000 (76 million) Blogs were counted worldwide.
- The community of the bloggers, and the importance that their contents receive among other types of information placed in the WEB. Search engines, alerts and other tools that populate information to users, differentiate between the "regular" information and the "blogged" information. It gets respectively high interest and high reliability. The bloggers concern themselves as a community and their contents as a mini WEB, the Blogosphere.

O'Reilly quotes Rich Skrenta who notes that the chronological organization of a Blog "seems like a trivial difference, but it drives an entirely different delivery, advertising and value chain" (O'Reilly, 2005).

The Blog is an abbreviation of the term WEB-log and its roots go far back (1995 as an independent term, but examples exist even earlier). Mass usage is viewed only in the past year or two, along with maturity of the media. We are now probably nearing the peak. The

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number of new Blogs, assumed to be added in 2008, will not reach the amount added in 2006 and 2007. Meantime, RSS (to be described) is one of the key factors driving the success of Blogs (alerting the users when new content is available).

- *RSS*. RSS (Really Simple Syndication) is a relatively new idea from 2000. The person, writing content (site, page) signs to some feeds which relate to the contents included or to the format of writing (i.e. Blog). The reader, using a standard interface, views the contents, automatically filtered by topics of interest. He is updated, via the RSS, regarding new pages or updated ones. These are personalized style sites, enabling the user to see only sports news, funny Blogs or any other type of site that he or she wishes. The RSS is the binding and filtering channel. There are several other protocols similar to RSS, for example ATOM, which are based on the same idea.
- *Tagging*. Users and writers can tag every page read or written, using tags. These tags, whether public or private, are the base for new connections, links between various pieces of content, sharing something in common, via the tags. Unlike the well known world of taxonomy, where tagging is well defined by the organization, tagging in WEB 2.0 is rather personal. Everyone can tag (his or whoever's content) and the tags are also chosen personally and not from a pre-defined set of values. This collection of user defined tags is called: Folksonomy. An example of the tagging concept can be viewed in the Flickr website, a huge picture album, including pictures (public and private). Navigation is driven by tags.
- *Social networking*. All of the applications described above fit the definition of "social networking" and all contribute to building this large net. Yet, the term, as known in the WEB 2.0 world, refers to applications that are targeted to enabling the creation and enlargement of the social networking. The founders of each such application invite their colleagues to join in. Those who do, can continue, and ask their colleagues to join also. Slowly but surely these social networks enlarge. Part of the social network applications are cultural (acquaintances over the WEB), some are business oriented and others, operational (telephone lists). LinkedIn, for example, consists of nine million members, and Myspace is loaded with 40,000 new items every day.

The main matter in question regards this radical change: What caused the trend leading the internet to such outstanding developments?

Musser & O'Reilly try to explain the change according to the enabling technology:

- "One billion people around the globe now have access to the internet.
- Mobile devices outnumber desktop computers by a factor of two.
- Nearly 50 percent of all US internet access is now via always-on broadband connections.

Combine drivers with the fundamental laws of social networks and lessons from the Web's first decade" (Musser and O'Reilly, 2006).

But, above all of these explanations, the main cause is the nature of us as people.

The first WEB 3.0 applications are already here. These deal with an advanced concept: Moving the internet from an unstructured world to a structured one. Software examples include automatic tagging, artificial intelligence and more. Will they succeed as WEB 2.0 did? We will have to be patient. In the meantime the term WEB 4.0 has already been announced and conversations and ideas are already established.

Enterprise 2.0: WEB 2.0 in organizations

The term Enterprise 2.0 symbolizes implementation of the WEB 2.0 infrastructure and/or tools by organizations. Just as ten years ago the term Intranet was phrased, based on Internet, symbolizing the usage of Internet technology inside the organization.

Wikipedia, and part of the analysts, i.e. Spanbauer (in Spanbauer, 2006) focus the Enterprise 2.0 phenomena in knowledge management. Enterprise 2.0 has several aspects,

not all of which are connected with knowledge management. WEB 2.0 used by organizations has to be analyzed via two dimensions:

1. *Technology adoption type:*

- Adoption of the WEB 2.0 software infrastructure: Development in light modules, using SOA, writing code using AJAX, the perpetual Beta, etc.
- Adoption of the WEB 2.0 software applications: WIKI's, TWIKI's (integration of WIKI's), Blogs, Tagging (including Folksonomy) and more. Some analysts regard Enterprise use of Instant Messaging and Search Engines as part of Enterprise 2.0. I doubt it.

2. *User orientation:*

- Adoption for use by and for organization members.
- Adoption for use by organizations facing customers, partners and suppliers. For example, the CEO can write a Blog, explaining considerations

Enterprise 2.0 segments can be summarized by the quadric in Figure 1.

Drawing the line between segments is not always easy, when listening to what analysts say, as most of them do not distinguish between different aspects. This article focuses on application usage inside the organization; hence on knowledge management.

Enterprise 2.0. The facts are clear. There are many organizations that already implement WEB 2.0 applications and tools. In many organizations the applications and tools are entered through specific business units, entering through the back door (Spanbauer, 2006; Hinchcliffe, 2007a). Perhaps, the most outstanding organizations implementing Enterprise 2.0 are IBM and Motorola (Scarff, 2006). Motorola, for example, holds 2,000 WIKI sites and 2,700 Blogs. But these organizations are not alone. Leading organizations such as Northwestern Mutual, Procter & Gamble, Ziba, Ford Motors co, Nike, Milestone Group, GM, Pepsi and XM Radio, all implement WEB 2.0 (Spanbauer, 2006; Hinchcliffe, 2007a; Scarff, 2006, Hoover, 2007). Hinchcliffe is an expert on Enterprise 2.0, and holds a Blog in which he shares his thoughts about it. In the beginning of April 2007 he wrote a piece on how analysts regard the phenomena:

Gartner, for its part, had its own take on things last year with their widely covered hype cycle report on Web 2.0, indicating the things like collective intelligence (ostensibly the core principle of Web 2.0) would be a long term, transformational business strategy that they felt at the time would take at least five to ten years for broad industry uptake. The numbers McKinsey provides from actual business leaders seems to indicate that broad, active interest in collective intelligence is rapidly forming in the offices of many company's CIOs, CTOs, and other executives. McKinsey

Figure 1 Enterprise 2.0 segments

Technology adoption	Knowledge Management	Marketing
	Applications & tools	
System infrastructure	Technology Enhancement	Technology Enhancement
	Users: Organization	Suppliers, Users

cites that fully 48 percent of the nearly 3,000 leading executives surveyed are actively investing in collective intelligence approaches (Hinchcliffe, 2007b).

“Forrester Research says 106 of 119 CIOs from companies with more than 500 employees that it surveyed are using at least one of these Web 2.0 technologies: blogs, wikis, podcasts, RSS, social networking and content tagging” (Framington, 2007). Hoover also has studied WEB 2.0 usage, and he speaks about 50 percent of organizations but agrees that numbers may be higher (Hoover, 2007). Some regard WEB 2.0 in organizations as a hype. McLean interviewed several managers on the subject: “I’ve read quite a bit about Web 2.0, but am frankly very skeptical of the hype growing up around it,” says Charles King, principal analyst with Pund-IT Inc. of Hayward, California, an on-line IT and business analysis web site. “Using the Web as a collaborative development and distribution platform isn’t too farfetched to me, but the rhetoric around how companies intend to capitalize and make a buck on such a nebulous business model is too reminiscent of the good old days of the internet boom for my comfort[1]. I don’t think there’s any reason to be caught up in the hype or to rush ahead in adopting the technologies,” he says. “There’s little evidence, so far anyway, that Web 2.0 technologies will provide big benefits for companies in general” (McLean, 2007).

CIO’s interviewed are worried as to security issues. It may be that, considering the above statements, they are concerned about losing control.

The bottom line is that analysts do not agree how much Enterprise 2.0 is hype or phenomena. Even in organizations that state that they use WEB 2.0 applications and tools, it is not really understood what the actual adoption level is. One may assume that the level is not very high. Young employees use these applications more than elders (Carswell, 2007); it is adopted more in the field than in headquarters; Organizations add it to the set of tools, but most usage is not “production”, rather it is a playground or a specific use by pioneers. According to Hinchcliffe, as from 2007 there is a change in trends: “It’s clear that the conventional wisdom is beginning to shift from the wait-and-see of 2006 to the beginning of the adoption cycle in earnest this year” (Hinchcliffe, 2007b). Yet we should remember that assimilation of both tools and concepts takes time.

Assimilation of tools will be much faster and easier than assimilation of concept. Therefore both the negativists, Gartner and King speaking of hype, and the optimists, speaking about penetration and usage of WEB 2.0 tools in organizations, are right. Assimilation of concept will be driven by several factors:

- Habit of use. The more used, on the level of tools, the easier it is to accept, on the level of concept.
- Internet trends – success of WEB 2.0.
- Knowledge management trends in organizations, which for years are gradually but steadily assimilating the sharing concepts.

Knowledge management 2.0: managing the knowledge in light of WEB 2.0 existence

Knowledge managers, examining the WEB 2.0 phenomena, are somewhat confused: For almost a decade now the field is struggling in organizations wishing to manage their knowledge. Too many passive employees are encountered, whether managers or employees, all understanding the importance of knowledge management, yet not having time or attentiveness to join in. Could it be that now, when work time is taking over vacant hours, and people can be connected by mail or cellular almost 24 hours a day, they will find the time and start sharing? Maybe the sharing is precisely because it is something else and not in a working content. This can teach that people do know and can share; yet, if so, no gain exists for KM from WEB 2.0 at all. But if only partially there is something in the WEB 2.0 tools and concept that can be copied into the organization, as giving a solution to one of the knowledge management gaps, it surely has to be analyzed and understood, so it can be adopted. If so, it can ease the non-trivial process of knowledge management assimilation in organizations.

Knowledge management will be hereby compared to WEB 2.0 in four aspects:

1. Conceptual.
2. Principles.
3. Functional abilities of tools and applications.
4. Organizational culture.

Conceptual

Dave Snowden, views WEB 2.0 as a technology shift. Thus, as opposed to knowledge management: "Knowledge management was a theory or rather a Weltanschauung supported by dysfunctional technology, while social computing is increasingly functional technology with out any clear theory or way of looking at the world" (Snowden, 2007). WEB 2.0 advocates, as to Snowden, ignore the complexity of the people and organizations. We all are complex systems, not flat ones: "Complexity is also the science of uncertainty and with it goes what I call the paradox of control. If you aim to influence, but not design evolution you have more control than if you attempt to design an ideal system" (Snowden, 2007).

In order to social compute the right, multiple channels of sharing must be available: "Social computing is not about selecting a tool based on pre-determined criteria, it is about allowing multiple tools to co-evolve with each other, people and environments so that new patterns of stable interaction form, and destabilise as needed to reform in new and contextually appropriate ways" (Snowden, 2007).

This paper brings in a different concept than this suggested by Snowden. People do analyze specific needs, building specific KM solutions, process and technology fold; but they build them, as a base for enlargement and change. In order to ease assimilation they try starting with something appealing enough, answering the knowledge needs as far as possible. The WEB 2.0 tools, that can be so easily and quickly deployed but yet changed (the perpetual beta), can assist the KM nature of solutions.

Snowden's opinion is loud and clear. WEB 2.0 stands somewhere else than knowledge management, which is more complex, layers based, and therefore with more potential for influencing the change in organizations.

Several analysts share a different view, as their starting point is different: knowledge management is in distress. Knowledge management and knowledge management tools suffer from a poor reputation nowadays. "There's one main problem, says Gartner VP of Research Jeffrey Mann: Users and IT administrators hate them" (Spanbauer, 2006). On this ground, it is understood why analysts are enthusiastic about anything new and different. The author is doubtful. Not all knowledge management tools are alike; Yes, some are big and cumbersome (as Gartner states); but some friendly software tools do exist in this market. The bottom line is that the general impression of knowledge management tools is not too good. Articles can be found on the subject, some even titled "Is knowledge management dead?" (Cardarelli, 2007; Cleaver, 2006). In this vacuum WEB 2.0 tools come in. They seem appealing as they are small, easy to install and cheap: "Recently, a new wave of smaller, lighter and less expensive tools has started to go where the larger KM systems often don't – bringing corporate knowledge back out into daylight" (Spanbauer, 2006). That can explain the sympathy to WEB 2.0, whether as a rescuer of knowledge management: "rebirth of KM is reality" (Cleaver, 2006); or as an assistant (Yeo, 2006; Spanbauer, 2006; Tebbutt, 2007).

Between the criticizers and enthusiasts, some are yet hesitating (McLean, 2007; Dale, 2007; Young, 2007; Carr quoted in McLean, 2007). If WEB 2.0 is hype, why run and foster it as part of organizational knowledge management? Why compare? Knowledge management will only be harmed from the connection.

After comparing the high level, conceptual aspect, hereby are some practical aspects of the comparison.

Principles

In the first section of this article, eight principles were given, defining the WEB 2.0. These principles can be compared to matching principles, known in knowledge management (see Table I).

Analyzing WEB 2.0's principles in a knowledge management perspective draws a simple conclusion: WEB 2.0 principles are very close to knowledge management ones. There are differences, mainly in the centralization, controlled attitude of knowledge management, regarding the uncontrolled, decentralized WEB 2.0; yet, most WEB 2.0 principles are part of the traditional knowledge management core concepts.

Functional abilities of tools and applications

WEB 2.0 applications and tools can be used in organizations as is; furthermore, many of them can be adopted free, or purchased at relatively low prices. In the past year new tools were developed, adjusting WEB 2.0 to the organizational environment and enabling: Adding security mechanisms, adding attached files, and adding connectivity to ERP, CRM and other organizational applications. Examples for such tools include: Koral, Illumio and iUpload (Spanbauer, 2006).

In order to compare WEB 2.0 to knowledge management on the functional level, Table II is a table analyzing components of the WEB 2.0 tools, attributes, and their reference (full or partial) in the classical knowledge management tools. The comparison is based on functional aspects and does not refer to infrastructure or price aspects.

Summing up the attributes comparison analyzed in Table II, most WEB 2.0 tools attributes have roots in knowledge management tools. Many of the features already exist, even though there are gaps between the two. The resemblance is not surprising, as the principles of WEB 2.0 and Knowledge Management are very similar (analyzed in Table I).

Yet, knowledge management should not settle with its classical tools, excusing itself that most attributes already exist. Dave Snowden has stated that "Social computing is not about selecting a tool based on pre-determined criteria, it is about allowing multiple tools to co-evolve with each other, people and environments so that new patterns of stable interaction form, and destabilise as needed to reform in new and contextually appropriate ways" (Snowden, 2007). Because of that, different tools, with similar attributes but different focus, can help knowledge management evolve, probably more than tools which are totally different.

Organizational culture

Carswell states: "I've been talking to a few people struggling with 'KM' in organisations, I'm picking up the message that because the younger generation are using these tools on the Web there will be two points to consider as far as E2 adoption is concerned: 1. They'll expect it to be available, 2. They'll find it natural to use it" (Carswell, 2007). Up till now, there was a focus about users, but did no differentiation between various groups within them. The younger generation find the changes natural and is probably even waiting for the WEB 2.0 tools to be available in the Enterprise. Another aspect to be concerned, while speaking about the youngsters: The younger generation can be the knowledge catalysts we are always seeking for in knowledge management. In their book *Enabling Knowledge Creation*, Von Krogh, Ichijo and Nonaka dedicate a full chapter to one of the five knowledge enablers in organizations: mobilizing knowledge activists, (Von Krogh *et al.*, 2000). The main lesson is that the younger adopt changes faster, not only technology changes, and should be considered as potential role players in the change management effort.

Solobak claims that "just as with knowledge management, WEB 2.0 tools don't attract users because they exist. How do you manufacture 'emotional investment' in the work surrounding that makes use of these applications? (This could be asked of almost any project.) There has to be a reason to use them, along with the trust, interest, participation needed to make them usable. Particularly in the case of 'the power of networks' view of WEB 2.0: there needs to be a network of people participating" (Solobak, 2007). Viewing Solobak, the same cultural

Table I Comparison of WEB 2.0 and KM principles

<i>WEB 2.0 principle</i>	<i>Knowledge management matching principle</i>
1. WEB as a platform	<p>Technology as a platform</p> <p>The knowledge management world is based on four complementary components: culture, process, technology and content. None is independent. In their book, <i>Working Knowledge</i>, Davenport and Prusak emphasize this principle: "It is important to keep in mind their (technology- m.l.) limitations . . . effective knowledge management cannot take place without extensive behavioral, cultural and organizational change" (Davenport and Prusak, 2000). They state that if an organization invests more than third of a knowledge management project in technology, it stops being a knowledge management project and turns into an IT project (Davenport and Prusak, 2000)</p>
2. Services development	<p>WEB services.</p> <p>WEB services, is the most popular way for sharing data and information, context related, in portal window-lets and in the portal professional desktop</p> <p>In the knowledge management world, ones does not care (for ideological reasons) where the information is stored, rather how it is used by us in various knowledge applications. The portal is a broker, via which services present the data, information and knowledge</p>
3. Active participation of users	<p>Active participation of users.</p> <p>Knowledge management deals with sharing the knowledge and preserving it. The knowledge is based on users, and without them, such activities cannot take place. Active participation of users is a necessity</p> <p>Nevertheless, in knowledge management, the users' participation is encouraged by a central team usually convincing people to add content; in many cases, they will even settle with users only using knowledge (built by several key users). Sharing is controlled. In some cases, content added is moderated before published</p> <p>In WEB 2.0, by comparison, activities are decentralized and people add voluntarily</p>
4. The service improves automatically, the more it is used	<p>Partly correct in knowledge management</p> <p>Of course, if people participate more, there is more content, and richer content, adding value to service offered to the user. But, this cannot be compared to the situation of WEB 2.0 applications. In WEB 2.0 the software itself is based on automatic improvement the more it is used</p>
5. Collective intelligence (the long tail)	<p>Knowledge management is based on the collective knowledge of its users. Nonaka and Takeuchi in their book, <i>The Knowledge Creating Company</i>, described the success of the Japanese companies in developing knowledge, based on the Japanese sharing culture which builds the collective organizational new knowledge (Nonaka and Takeuchi, 1995)</p> <p>A major difference between the two has to do with dealing with the LONG TAIL concept. WEB 2.0 sanctifies it, knowledge management ignores it. Knowledge management solutions are based, in many cases, on a mass of 20 percent of the users (content experts), contributing 80 percent of the knowledge</p>
6. Content as the core	<p>Content is one of the four components on which knowledge management stands: culture, processes, technology and content. It does not stand for itself, yet it is part of the core, and no knowledge management solution can take place without a rich content segment</p> <p>A decade ago, when knowledge management was initiated, it was not yet understood that content drives knowledge management. Books and articles written in the 1990s did not emphasize on content. Over time the importance of content was recognized. Organizing content, filtering and processing it, became a central issue, bringing search engines and navigation issues to front stage</p>
7. The perpetual beta	<p>At first glance the concept of perpetual beta may seem irrelevant to knowledge management</p> <p>Knowledge management does not deal with technology, but knowledge management uses technology. Working with a perpetual beta, can serve knowledge management a great deal. One of the knowledge management challenges has to do with understanding this potential. Organizations can design communities of practice, portals and knowledge sites with care and thought, yet only after launch and use, do people realize what more can be added in. Potential is learnt via use. Changes are required frequently, adjusting the technology to the people using it as they and their needs mature. The perpetual beta is certainly a great enabler</p>
8. Rich user experience development via small modules	Irrelevant to knowledge management

Table II Comparison of WEB 2.0 and KM tools and attributes

<i>WEB 2.0 component</i>	<i>Attribute</i>	<i>Relevant attribute in knowledge management</i>	<i>Gaps</i>
WIKI	Structured content pages	Web content management (WCM) tools. These tools are part of the knowledge management toolbox and are used for rich content sites (also inside the organization). Known software tools include among others CMS, Stellent and Interwoven.	WIKI: is known for its user friendly UI; is flexible, both content and structure wise (can be also a disadvantage); includes a high level of connectivity between items (also in free text); deals with homogeny sites (yet this can be settled using TWIKI which integrates several WIKI's together)
Blog	Personal diary, including access to the diary as a whole (not only standalone pages for each date). Enables fast access to new pages, with easy access to history	Can be implemented using a variety of knowledge management tools, whether Enterprise Content Management (ECM) tools or portal style tools The solution provided by Blogs reminds one of another knowledge management tool (physical, not virtual): Storytelling	The innovation of WEB 2.0 depicted in Blogs, is not mainly the idea, but in the way it is implemented: Very simple, very accessible, and therefore, very appealing. Therefore, it is easy to understand that the idea itself can be copied, using various Knowledge Management tools; the question is which will give the same easy, fun like feeling Another special aspect of the Blog is the community evolved – the Blogosphere. This community, acts as a guild, give priority in reading one anothers' Blogs among other WEB items. The Blogosphere also yields special placement in search results and RSS's
RSS	Alerts regarding new content items and changes among existing ones, by categories	Alerts are a known and well used mechanism in Enterprise Content Management tools as well as in Portals. Search engines enable running fixed searched, giving the same results as alerts Another tool informing users about alerts is a common web-let of "what's new" in almost every organizational and professional portal	The gap is mainly in two aspects: The way the information is packaged. Instead of receiving alerts separately from every information resource, information is packaged together The user does not have to point to all sources. Requesting information and knowledge is defined via its categories
Tagging (folksonomy)	Everyone can subjectively tag his or her own information	Tags are provided in several tools: In portals – via navigation menus; In search engines – via filtering attributes; In ECM tools – by both of the above Yet, all these are built as part of taxonomy, either organizational or departmental, trying to be objective (inside the group) as far as possible	In WEB 2.0 each page can be tagged more than once, and not only by the author In WEB 2.0 the tagging is subjective as opposed to knowledge management, where it is objective In WEB 2.0 there are no pre-defined lists of attributes and values defining the "allowed" tags
Social computing	Building social communities over the net	Communities of practice	Most communities on WEB 2.0 are based on personal hobbies and fields of interest. Examples include del.icio.us (bookmarks), youtube (video films) and Flickr (photos) Communities of practice, comparing, are focused on professional issues. In many cases they are complemented by face-to-face gathering, which is rare on WEB 2.0 Both environments give supplementing tools such as sharing files and discussions, all by categories

challenges of knowledge management can be found in WEB 2.0: The need for trust, interest, and partnership.

The question is whether using WEB 2.0 principles and tools, people have learned to give trust and build partnerships? And, how strong does the partnership have to be, in order to survive and give results also when time is so precious? Cleaver points out a very important difference, maybe giving the answer to the question: "While a great social media platform bolsters all functions, the story needed to sell into the different functions needs to lead with each of those departmental concerns, and break those concerns down into how allowing your people to converse, surface notions, collectively plan and collectively refine makes a difference to the VPs goals. Ironically, social media make the biggest impact at the pan-organizational level, for whom only the CEO has prime concern. Organizations make progress where people put their focus" (Cleaver, 2007). It should be remembered that WEB 2.0 focuses on people, while knowledge management focuses on organizations. In order to benefit from the trust that WEB 2.0 has, the focus has to be changed.

Tebbutt continues with a similar thread: "So what's going on here, and what has it got to do with knowledge management? Well, forcing people to encode their knowledge formally is not easy – in fact, it can't be done. But when people are socialising, even in a work context, they are much happier to share their thoughts and their experiences" (Tebbutt, 2007). People have to be able to decide. Altruism exists. It can be adopted more widely in knowledge management. Tebbutt, as Cleaver, puts the change needed for knowledge management on focusing on people: "Again, there's this hint of loosening the reins of corporate or IT control and allowing systems to be focused more to human needs. After all, it's in the humans that the knowledge resides and between them where it adds value to the organization" (Tebbutt, 2007).

Summary

Something is changing. WEB 2.0 is bringing a new wave that should be adopted in knowledge management. A lot can be learned, whether in the distribution of control, in adoption by using the younger or even by adopting tools as is. In the first stage, it will be appropriate to adopt use of tools: WIKI has a good chance to succeed (as already viewed in some organizations) and Blogs could be also used, also carefully, in small chunks, Blogs can succeed where the organization finds an expert, with prestige among others, willing to write, having what to write continuously and knowing how to write. But as Snowden has stated, social computing evolves from the variety of technology together with people and environment. WEB 2.0 tools should be used, enriching the knowledge management tools for the following reasons:

- Because they have their special emphasis (even though not innovative, as analyzed in Table II).
- Because people will be expecting to find them and use them in the organizations.
- Because they hear and smell new and successful, and if this is not the only reason to be using them, it cannot harm knowledge management, vice versa.

Yet, organizations have to be careful. Success will not be triggered by adopting tools. Adopting principles is a more complex task. In most cases, the knowledge management world is not mature enough for loosing control and moving to altruism without any organizational central guidance. In most organizations (at least the 50 or more that I can state that I have experienced working with on knowledge management efforts), it is too soon to let free, and enable people to share where and only when they wish. That is how knowledge management started, a decade ago, and it surely was not enough. It has to be kept in mind that organizations do not have the mass of people as the WEB does, which is a critical factor of its success. In the Internet, it is enough that a minority will share and we will be flooded, feeling as if the whole world is sharing. Folksonomy can succeed in a world where so many people tag, that there will be enough similar tagging to what is wanted by each person, no matter how he or she thinks. The organizational world is much smaller and therefore the rules are different. The world has already experienced this difference at the

beginning of this decade, while trying to copy internet forums to organizational internal discussion groups, which yielded much smaller success. As organizations do not have the mass, the LONG TAIL principle cannot take place in most organizations. Where it does, it surely can and should be adopted.

Something is out there. Something is changing. It is suggested to adopt it smartly; with open eyes – not ignoring it (Semple), not too enthusiastic (Snowden). On the applications level it is recommended to enlarge the existing toolbox adding in WIKI's and Blogs. On the conceptual level, more slowly. Knowledge managers have to continue being clever. If knowledge management is not mature enough to give out control, they have to promise themselves, that like the parent who learns to let his child free when he can cross the road alone, they also will be wise and brave enough to let free, when their organizations will be ready for it. If they do so, everyone will benefit, inside the organization and out in the KM field.

The paper was written in April 2007, and reflects knowledge as to that period.

Note

1. Nicholas Carr – a former executive editor of the *Harvard Business Review*.

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