

WEB 2.0 and its Impact on Knowledge and Business Organizations

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Abstract

Today, information overload and the lack of systems that enable locating employees with the right knowledge or skills are common challenges that large organisations face. This makes knowledge workers to re-invent the wheel and have problems to retrieve information from both internal and external resources. In addition, information is dynamically changing and ownership of data is moving from corporations to the individuals. However, there is a set of web based tools that may cause a major progress in the way people collaborate and share their knowledge. This article aims to analyse the impact of 'Web 2.0' on organisational knowledge strategies. A comprehensive literature review was done to present the academic background followed by a review of current 'Web 2.0' technologies and assessment of their strengths and weaknesses. As the framework of this study is oriented to business applications, the characteristics of the involved segments and tools were reviewed from an organisational point of view. Moreover, the 'Enterprise 2.0' paradigm does not only imply tools but also changes the way people collaborate, the way the work is done

(processes) and finally impacts on other technologies. Finally, gaps in the literature in this area are outlined.

1. BACKGROUND

The dawn of communications, networks and internet access brought larger speed and agility, knowledge sharing, collaboration, lower costs and better satisfaction through client and provider addition and self-services. “In its normal evolution technology shifted from supporting functional systems to process oriented systems. This helped to lead a technology-enabled revolution dominated by the perceived efficiencies of process re-engineering” (Mohamed et al., 2006). The use of the Web as a platform was a practice started in the middle 90s as it also started to be common the use of blogs and wikis (Figure 1). Nevertheless, it was later in 2004 when O'Reilly coined the phrase ‘Web 2.0’ to refer a “second-generation of Web based communities and hosted services” that enhanced the user experience and, according to O'Reilly (2006), attempted to recognize the conventions for accomplishment on that innovative platform. Figure 3 shows the timeframe of terms around internet technologies and segments appearing from early 90s. Several experts on the Internet evolution, naming Berners-Lee (2006) and Shaw (2005), expressed concerns about the suitability of the term itself, which could create confusion by its '2.0' tag that attempted to think of an update of the World Wide Web technologies having been most of them used from many years ago.

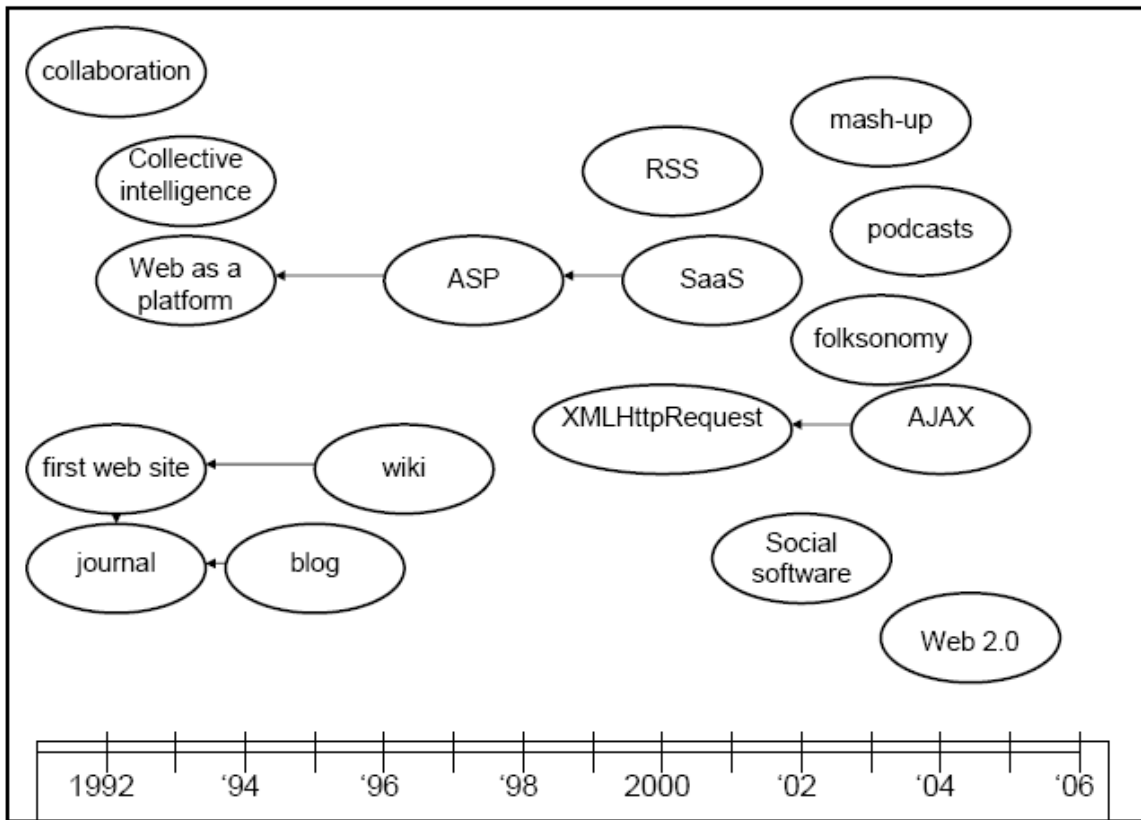


Figure 1 Internet 'buzz' words evolution (Schiller, 2006)

Regardless the discussion on the appropriate terminology, it was widely agreed that there was a business revolution in the PC production due to conjunction of different evolutions in technologies and approaches for them not previously exploited.

1.2. 'WEB 2.0' CHARACTERISATION

To better understand the term, the predecessor concepts of this new paradigm are explained in the next paragraphs. Service Oriented Architecture or SOA is a “strategy that proclaims the intention to build all the software assets in the company using the service-oriented programming methodology. In addition, services are software components, constructed so that they can be easily linked with other software components” (Anonymous, 2007). The proposal following these services is straightforward: Technology should be expressed in pieces that commerce people can understand instead of a hidden application such as ERP or CRM. SOA was the natural

progression of the OO (object-oriented) software programming with the key distinction that then these enclosed software objects were far more intricate and complete. The final result which is expected to accomplish is that software programming at user level will be simplified at the level that non tech-savvy can understand and likely do it by themselves. Other clear advantages of service-oriented software programming were that it eased software re-use; it increased productivity and agility in modifications and IT operations.

'Web 2.0' was said to provide a richer user experience than 'Web 1.0' through a new set of technologies, and Ajax was the typical example. The abbreviation Ajax describes a series of technologies that let browsers to offer users with a more accepted browsing practice. "Previous to Ajax, web pages were affecting their users with the submit/wait/redisplay process, where the users' actions were always synchronized with the server's 'think time'. Ajax provides the ability to communicate with the server asynchronously, thereby freeing the user experience from the request/response cycle" (Teare, 2005). Ajax and other technologies are challenged by experts that evaluate the security of their applications in comparison to standard web applications (Wiens, 2007).

Other important concept being foundation for the 'Web 2.0' is the Social Software. According to Wikipedia, social software "enables people to rendezvous, connect and collaborate through computer-mediated communication". That terms mainly refers to large communities of users outside the workplace, being the scaled term known as 'collaborative software' which enables people to be involved in a common task to reach common objectives, generally applied to inside the firewall. Hinchcliffe (2006) and others observed that 'Web 2.0' could be the result of a global Service Oriented Architecture. With the Figure 2, Hinchcliffe (2006) tried to draw the convergence of both terms SOA and 'Web 2.0' in order to clarify which attributes were common for them. Yet, the difference between them is confusing and the tendency attempts to overlap the terms in the future. In the first edition of the 'Web 2.0' conference, Battelle (2005) summarised some of the key principles of 'Web 2.0' applications, such as the web as a platform, the "data as the driving force", architecture of participation, adoption of the Software as a Service (SaaS) philosophy, lightweight business models

and open source development. MacManus and Porter (2005) argued that the “web of documents had morphed into a web of data”. Examples of that metamorphosis were RSS aggregators, application programming interfaces (APIs) and web services where data could be reached through XML-RPC, SOAP and other technologies.

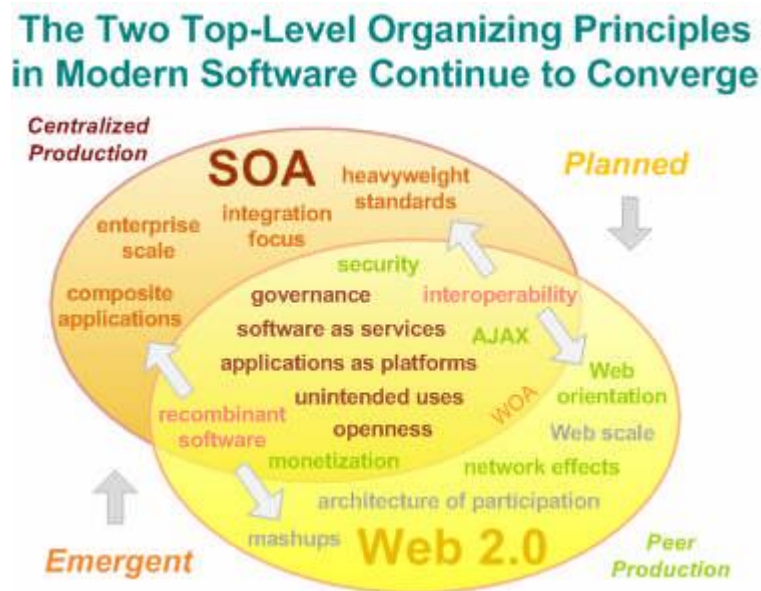


Figure 2 The Two Top-Level Organising Principles in Modern Software Continue to Converge (Hinchcliffe, 2006)

The aggregate of these new approaches in those different factors led to think of a new era of Internet applications and people interoperating with each other. That facilitated the rapid extension of the term in everyone's mind (O'Reilly, 2006).

1.3. 'ENTERPRISE 2.0'

Since the 'Web 2.0' (W2.0) movement was from the beginning targeted to either individuals or communities of individuals, knowledge experts and knowledge-based companies immediately considered whether it would be any benefits on applying 'Web 2.0' in their organisational architecture. Singel (2006) and others advised that there were some software vendors (SocialText, Zimbra) focusing their W2.0 products to business. But McAfee (2006) was who really pioneered successfully this idea coining a

new term in his article “Enterprise 2.0: The Dawn of Emergent Collaboration”. The term ‘Enterprise 2.0’ was immediately adopted by other authors as the application of the ‘Web 2.0’ paradigm into the organisational environment. ‘Web 2.0’ features (also ‘Enterprise 2.0’) included blogs, podcasts, shared news, social networking, wikis and other technology-based capabilities that allowed users -businesses or individuals- to connect with and learn from each other (Connolly, 2007). Connolly talked about connectivity and being able to measure everything that users are doing online.

Regardless the clear advantages that ‘Enterprise 2.0’ could bring to ‘inside the firewall’ some authors (Hoover, 2007; McAfee, 2006; Wiens, 2007) also expressed concerns about adoption hurdles that the new web technologies would have to overcome. Some of those ones were security, lack of expertise of the knowledge workers to be familiar with the new tools, integration with legacy technologies and difficulty to provide a measure on Return Of Investment (ROI). It is important to remark finally that cultural aspects flew over all those. The CIO of global services at British Telecom, claimed that if people do not want to share, they will not share (Daniel, 2007). ‘Enterprise 2.0’ tools have the singularity that they offer high flexibility in their use cases, they are user-friendly with very short learning curve and most of times not requiring training to start using them. And especially, their performance improves with the users’ contributions. So that, within the fact that are unlocking (or web-enabling) the content accumulated in Content Management Systems (CMS) facilitate web-based exploration and categorisation for content detection and re-use for distribution.

A survey carried out in 2007 revealed practices in terms of ‘Enterprise 2.0’ approach from different large companies’ viewpoint (Hoover, 2007). Some of those companies defined two separated strategies classifying the tools into two major parts. The first was web-based information-sharing. A rising number of organisations were discovering successful business uses for blogs, wikis, syndicated feeds, pervasive search, social networking and collaborative content portals (such as Microsoft’s SharePoint). Dye (2007) pointed out that the “metadata that each user left behind made the search process more dynamic, and documents became findable the minute they were going online”. As users add tags, votes, links over time, the metadata adjacent to each entry transformed to reproduce the file’s evolving function in the

information base. If a report on one topic became an significant source for another, a new tag was the only requirement to make available that report on the map for fellow searchers. The second area found by Hoover (2007) was enable voice and messaging through the web, where Voice over IP (VoIP), instant messaging, videoconferencing and combined communications could make it promising to link people in real time online. Finally mash-ups, somewhere in the middle between both areas seemed to get easier integration joining two web-based data fonts simultaneously in one place.

Other extended classification of 'Enterprise 2.0' technologies is SLATES, the acronym that McAfee (2006) used to indicate its six components:

- Search. For any information platform to be valuable, its users had to be able to find what they were looking for. Hierarchical structures on intranets seemed not to help in finding information for its users.
- Links, the second key concept, helped to rank results as the best pages were the ones that were most frequently linked to. In order for this to change within companies, many people had to be given the ability to build links. The most straightforward way to accomplish this was to let the intranet be built by a large group rather than a small one.
- Authoring. Most people have something to contribute, whether it is knowledge, insight, experience, a comment, a fact, an edit, a link, and so on, and authorship was a way to elicit these contributions.
- Tags. The categorisation system that emerged from tagging called 'folksonomy', in some ways opposite to taxonomy, which was an up-front categorization scheme developed by an expert. Deploying a tool that allowed tagging within an enterprise would allocate more visible patterns and processes in knowledge work.
- Extensions. Some computers used algorithms to say to users "if you liked that, then by extension you'll like this".
- Signals. New content was added so often that it could become a full-time job just to check for updates on all sites of interest. Signals helped to carry out these tasks and they could come as e-mails alerts, but these contribute to overload the inbox. RSS, a novel technology, allowed the aggregation of content from many different around the Web.

Finally some of the points that were taken to consensus about 'Enterprise 2.0' were:

- 'Enterprise 2.0' technologies did not respect horizontal and vertical boundaries within organisations. They promote emergent collaboration (McAfee, 2006).
- The simpler, the better.
- The user is not only content consumer but also content creator.

1.3.1. 'Enterprise 2.0' technological segments

To better understand which were the business benefits performed and the organizational challenges faced, a review of the most relevant technological segments is presented in the next pages. Besides the classifications already mentioned on 'Enterprise 2.0' tools, other authors made a basic division into two main categories:

- Innovative on technological aspects
- Innovative on collaboration aspects

Innovative on technological aspects are those whose introduction has been caused by a recent technological innovation or a new application of technologies already existing. Segments that belong to this category are massive multi-player online role-playing games (MMORPG), podcasting, mash-ups, RSS, tagging and most of web-based online meeting tools. Innovative on collaboration aspects are those whose expansion to be included as business tools have been realised by a new concept use and cultural changes caused by generational transfer. Examples of those include Blogs, Wikis, Social Networks, web-based applications (such as office applications, project management applications and others) and shared bookmarking.

Other classification attempted to split between knowledge repository tools (blogs, wikis, and podcasts, instant messaging) and knowledge harnessing tools (social networking and bookmarking, RSS, mash-ups). Blogs, abbreviation for 'web logs', are web pages where content creators or content syndications display in inverse chronological order their 'posts' (articles, links, etc.) in an informal manner allowing readers to make comments on them in the same page to exchange opinions and

thoughts about the topic or new that is being posted. They do not need knowledge on programming as they use templates to ease updates or links to other posts or websites. It is also usual to call Vlogs to those which display video instead of written information (Orr, 2004; Ives and Watlington, 2005). Since around 2004, commercial enterprises have been realising the advantages of blogging as a knowledge management tool. Unlike email, blog platforms automatically address established groups of information to receivers chosen by name, author, etc. And “when they are sustained by a content management tool, can be configured for project management, team collaboration and other applications of knowledge management” (Orr, 2004). Connolly (2007) observed that the most successful blogs are those that bring the user strong content with regularity. Also an aggregation of articles adds value saving time to the reader.

Different authors (Richmond, 2005; Orr, 2004; Taylor, 2007) referred to a high level classification of blogs used for organisational purposes:

- Corporate blogs, where the CEO (sometimes PR department or other organisation representatives) write for their customers partners and associated stakeholders in an informal channel that may be in some cases branded and embedded within the corporate website but in others it is an ‘independent’ page that usually tackles conversations related with the sector in which the business is being developed.
- Internal blogs. Corporate information relevant to its workers (as an information board) where feed-back, suggestions and reporting methods are easily handled through the inherent features in a blog is displayed on them.
- Project blogs. Those blogs are developed to support collaboration activities directly related with a project or any other activity carried out in teams or departments. Sometimes this project blogs are used to keep client updated with the last information available regarding its project.
- Individual blogs. These are created and maintained by individuals in the organisation. The purposes of them are diverse and vary from research and awareness activities to collaboration in workspaces through a network of links among individual blogs.

Like other 'Web 2.0' tools, blogs have been identified as likely the tool on future activities for collaboration purposes (also wikis) in small scale projects. They provide an informal but rich communication source where knowledge re-use becomes an easy task archiving posts in different ways such as chronological, by topics, by tags, or findable through a search engine (Ives and Watlington, 2005). Brown (2001) added to it that the best way to engage the conversation is through his "five steps for effective communication: to listen and understand, value, interpret, and contribute". Furthermore, Richmond (2005) advises that to build an audience, blogs do not have to be funny or provocative, but they have to be authentic and provide useful information. And he notes that the personal touch helps build relationships with current and prospect customers, partners and internal workers.

A wiki is technically a bunch of web pages that can be edited by a group and they can transform into serious collaboration tools when augmented with file attachments, macros, directory-based multi-level security and RSS readers to automatically inform users of changes. With a click of a button, a visitor can add new material to the page or change what is already there. Others can see it once they refresh the page. And all the changes are tracked, and earlier versions can be restored if important information is deleted. The major benefit of a wiki is that it decreases the team's dependence on overwhelmed email, which in many corporations is used as the final repository for all essential information (Totty, 2005). Wikis are not a full-fledged training tool yes, but analysts cite their potential as being almost unlimited. Because wikis look much like a raw webpage or a simple blog, they are often easily misunderstood. The low cost is a double-edged sword as the simplicity of the wiki is dismissed in some quarters as unprofessional or inconsistent with a corporate image (Laff, 2007). Mining information can be hard. Some kind of editorial control is required. This is why "wikis tend to work well alongside various other technologies, such as blogs, and within frameworks where the scope and rules of discussion have been formally agreed" (Rhymer, 2005). And many analysts cite resistance to the use of wiki technology because of the lack of knowledge about its capability. Majchrzak et al. (2006) conducted a survey on corporate wikis. And results point out that business wikis appear to be sustainable. And user behaviours were classified as 'synthesizers' and adders of information. Wherever there is a need to cascade knowledge that can later be further refined, a wiki

is fit for purpose (Winder, 2006). Of course, it is within the environment of the knowledge worker and knowledge facilitator that wikis reach their most power. They enable information records to be assembled fast, and without having concessions on the quality and authority of the content. And their variety of uses is unlimited. It is in a certain manner like the company booklet or a sort of online whiteboard. And their applications “range from shared workspaces for teams to low-cost websites anyone can set up” (Rhymer, 2005).

Both blogs and wikis will impact on email management. Nowadays about ninety percent of the collaboration in an enterprise occurs in email, and as a result, seventy five percent of an organisation’s knowledge assets still reside within email clients (Kaser, 2007). Vesset (2006) insisted that “the use of blogs and wikis does not necessarily need to be completely formalised and controlled in the organisation, so that one of the big benefits is that they are informal”. But the administrator is in charge of communicating a minimum of basic rules about their appropriate use, as it happened previously with email and instant messaging. There are a few consumer-oriented social collaboration sites such as MySpace, Youtube or Flickr but what are going to take businesses from those is a question that made increase the study and development of social networking platforms like LinkedIn or Xing/Open BC. Business networking activities differ depending on whether the network is extended within organisational boundaries or beyond the firewall to establish contact with providers, customers, or other partnership in the supply chain. For the first ones, the most typical example is expertise location, where an employee tries to find out the best colleague in the company to undertake a task or to help to solve a specific problem faced. For the second, the most typical examples are job vacancies management (employer/employee), search for new business partnerships or prospects campaign. Business networks platforms are also attracting the attention of knowledge management practitioners (Anonymous, 2007). Expertise location inside large organisations is one of their common uses. Manufacturer corporations using these platforms could use it to put inexperienced employees of its customer-services team in contact with experts engineers. It may also be employed to recognize experts inside the firewall. Software firms are likely going to start blending social features such as personal networks into most of business software applications. “One of the greatest

challenges facing people who use large information spaces is to remember and retrieve items that they have previously found and thought to be interesting” (Buchanan, 2005). The wish to locate and distribute information among groups, teams and CoP has led, naturally, to the expansion of a several shared bookmarking systems. These tools permit individuals to generate individual compilations of bookmarks and immediately share through web browsers their results with other colleagues (Wittenburg, 1995).

Regardless public sharing of bookmarks to intranet resources may be of concern as proprietary information that could be leaked, the apparent success of internet-based social bookmarking services raises the question of whether large organisations would also benefit from a social bookmarking system (Millen, 2005). A significant enhancement of bookmarks (or media files) sharing systems is the use of keywords or tags that are explicitly entered by the user of each bookmark. These tags “allow the individual user to organise and display their collection with labels that are meaningful to them” (Weinberger, 2005). Furthermore, multiple tagging lets bookmarks to fit into more than one class, keeping away from one of the restrictions of the hierarchically prearranged folders found in most web browsers.

Finally, there were RSS and mashups as tools to manage data, information and knowledge sources. This is the main aspect in common but there are a lot more that make them totally different. RSS (Really Simple Syndication) allows people and organisations to subscribe to external content in XML format. Enterprise RSS servers also allow the user to create the news or to subscribe to internal content coming from databases, the intranet or other IT systems (Scarff, 2006). Instead of having to go to a number of websites, blogs, etc. to check them for updates, a user can subscribe to the feed from those sites and receive updates as they happen, automatically. In this sense, RSS feeds are like signing up for an email list –except that the emails from a list have to fight for attention (Wilkins, 2006). Other characteristic that is used to understand the different use between email and RSS is that the first will inform the user on ‘what-to-do’, whilst the second is keeping him/her updated on ‘what-to-know’. In a review on Enterprise RSS (Young, 2007) was claimed that lack of internal content, bandwidth demands, IT requirements and amplified security risks are the major drawbacks to

unmanaged RSS adoption. Although if implemented correctly, collaboration, integration and filtering will be some of the multiple benefits this tool can bring. As it is shown in Figure 3, the content in an Enterprise RSS solution flows through a central hub that receives the feed from both external to the organisation and internal from the Content Management System (CMS) and delivers the different targeted feeds to different groups of employees that will receive only the information they need.

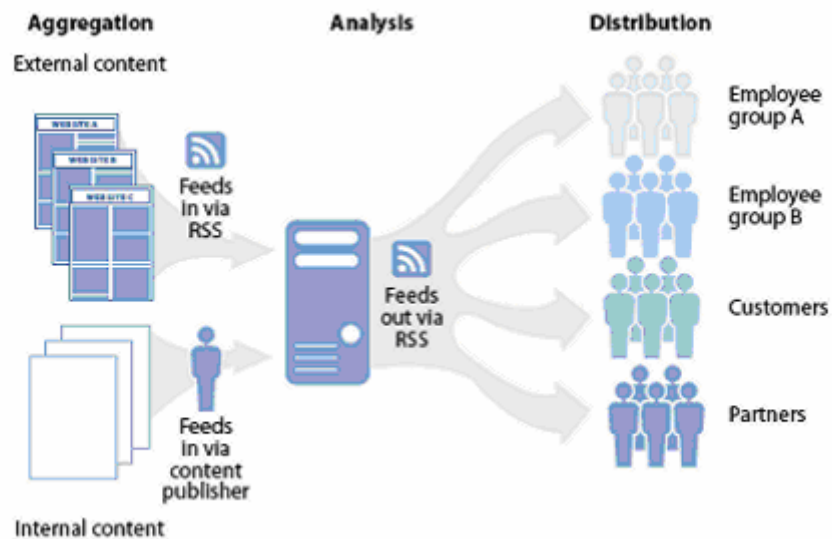


Figure 3 Content Flowing in an Enterprise RSS Solution (Forrester Research, 2007)

Mash-ups are web pages or applications that integrate complementary elements (databases, business logic or interfaces) from two or more different sources (Scarff, 2006). Orr (2007) describes that the mash-up concept is “rapidly spreading into designs for customising features of major business system models”, starting with the customer relationship management (CRM) and moving towards service-oriented architecture (SOA) for the whole organisation. Main benefits from them are that the user can extract the benefit in the aggregation from different sources when they are presented together. This overview provides an advantage in decision making in terms of lead time reduction and cause-effect relationships. Linthicum (2007) concluded that mashups lie on the perimeter between the enterprise and the web and may provide extraordinary benefits to the organisation, but to create a mash-up first their purpose and place in a SOA must be understood. Hinchcliffe (2006) reported that “Mashups

could theoretically allow business users to move — when appropriate — from their current ‘end-user development tools’ such as Microsoft Excel that are highly isolated and poorly integrated to much more deeply integrated models that are more Web-based and hence more open, collaborative, reusable, shareable, and in general make better use of existing sources of content and functionality (Figure 4)”.

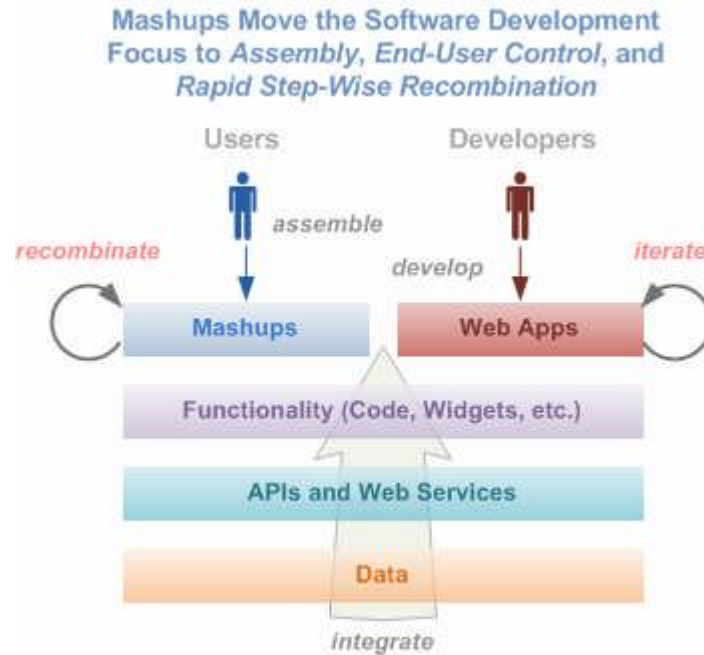


Figure 4 Mash-ups and the Software Development Focus (Hinchcliffe, 2007)

1.3.2. Interaction between the ‘Enterprise 2.0’ paradigm and people, processes, technology

‘Enterprise 2.0’ and people

“An underlying assumption of knowledge sharing is that individuals can share the knowledge they have. Although this is a valid assumption for explicit knowledge that can readily be examined apart from the individual who originated it, tacit knowledge is not as easily examined” (Jones, 2005).

In order to unify Knowledge Management (KM) definition it has been considered the approach described by Koenig (2006) who categorised Knowledge Management as the forest for all the trees, where those were business concepts and trends from the late 20th century. It is also important to state as a background that the relationship between Knowledge Management strategies and Information Technology (IT) practices has always been difficult to align. Mohamed et al. (2006) reported that “Knowledge Management initiatives could be successful without using IT tools”, and IT should be deployed utterly when necessary. Baskerville et al. (2001) adopted the approach that “knowledge in the organisation is both converging and diverging”. Those premises have contributed to elaborate a framework where collaboration tools and social software have been identified to accommodate most of the benefits that can be extracted from them. “Collaboration tools are central to effective IT support for knowledge and information management” as described by Harris-Jones (2006) and many progresses took place in this segment during 2005. He remarked some fascinating shifts taking place in those closely related areas, e.g. content management systems and search engines. IT often believes that everything is in place for people to collaborate easily and effectively, but this does not correspond to users' experience. It usually happens that IT departments are not consulting the people who will actually use the technology. Other common mistake has been that previous generations of Knowledge Management practices have tended to be internally focused and not tied to strategic drivers. Finally, the connection between culture and technology can no longer be ignored when customer centricity moved to the centre stage (Saint-Onge, 2005). For example, one common challenge faced by knowledge managers in the past has been that “sophisticated KM products like EMC Software's Documentum put the burden of management on the users, who must take additional steps to access documents and register them with the system”. Other indicator is the generalised thought that in “IT departments fright of the arrival of the more user friendly SharePoint (from Microsoft) because of its need for in-house server and support resources” (Spanbauer, 2006). Nevertheless, he also claimed that lately, a new flourish of smaller, lighter and cheaper tools has happening to go where the former knowledge management tools often didn't, conveying organisational knowledge back out into the first line.

The adoption of new technologies in organisations has usually been coupled with transforming business processes and more generally challenging the way that the business itself was understood. Change management 'good practices' have led companies to address their organisational issues (Cruz, 2006). Business managers, most often, cannot internalise the fact that changes are made by people and not by some new performance measurement system, or a new technology, or a new organizational structure. However, they are also confronted by uncertain and turbulent environments, changing customer demands and the need to constantly realign technology, strategy, organisational culture and business processes. On the other, individuals in organizations also face formidable challenges such as the possible obsolescence of one's skills and knowledge, finding satisfaction in their work, possible retrenchment due to downsizing, economic dissatisfaction, and maintaining human dignity in the work place. Therefore, both the organisation and the individuals in them are confronted by a constantly changing and increasingly demanding competitive business environment.

Basically, organisational development is a process for teaching people how to solve problems, take advantage of opportunities and learn how to do that better and better over time. It focuses on issues related to human side of organisations by finding ways to increase the effectiveness of individuals, teams and the organisation's human and social processes. Since it is about how people and organisations function and how to make them function better, the field is based on knowledge from behavioural science disciplines. But attention, a notable aspect of this new generation of knowledge management tools is the way they offer themselves for casual involvement. Acting independently, and without need of server space or tech support, business units can simply try out the new KM systems, sometimes in stealth mode (Spanbauer, 2006).

In contrast, other focus to measure successfully systems' adoption models has been using maturity models (MM) approach. And the most extended work in this area is that of Enterprise Resource Planning (ERP) and Knowledge Management systems. Holland and Light (2001) considered a maturity model of the ERP to provide a roadmap for understanding the evolution of ERP systems in organisations. And a good example for KM-MM is that of Natarajan (2005). Like most of other KM-MM, the key

points commonly outlined are a systematic approach, leadership, motivation and training. As it stands, there are not Maturity Models to assess collaboration tools from unawareness to full deployment and understanding from their users. It is probable that a MM approach for collaboration tools will be developed to support organisation efforts in carrying out the move into 'Enterprise 2.0'.

There is also an unsolved conflict with 'Web 2.0' that extended to 'Enterprise 2.0' concept. The concept sometimes refers only to the IT tools that enable the new ways of collaborating and leveraging organisational knowledge. Others, it also evolves those approaches so that refers to behavioural changes that previously were purely Knowledge Management challenges. As described by Karrer (2007), some understand 'Enterprise 2.0' as a part of the whole Knowledge Management saying E2.0 simply provides KM with some new tools that can help with the KM problem of participation, including but not limited to social media. However, there are also experts considering that 'Enterprise 2.0' is much more than knowledge management but KM is a piece of it and 'Enterprise 2.0' helps KM to achieve its early, and often unfulfilled, promise. Looking at knowledge management at the enterprise level raises a paradox. To be victorious, KM and portals must centre on real organisational issues at the functional and process level" (Ives, 2007).

The lack of collaboration tools recently is only one of the reasons that become corporations and expertise hierarchically structured. 'Web 2.0' tools will not make organizational hierarchy and politics change radically. They are not going to make the ideas of the bottom-line employee in organisations as influential as those of the top management. Most of the problems that do not allow knowledge from moving freely in organizations – power differentials, lack of trust, missing incentives, unsupportive cultures, and the general busyness of employees today – will not be addressed or substantially changed by technology alone. If a group of tools would bring about such changes, "they would have to be truly magical, and 'Enterprise 2.0' tools fall short of magic" (Davenport, 2007).

The three easiest ways to do 'Enterprise 2.0' according to Semple (2007): "Do nothing. And then your bright, thoughtful and energetic staff will do it for you. Trouble is they

will do it outside your firewall on bulletin boards, instant message exchanges personal blogs and probably on islands in Second Life and you will have lost the ability to understand it, influence it, and integrate it into how you do business. The second easiest way is to find ways of allowing this to happen inside the firewall which can be as simple as sticking in some low cost or free tools and then making sure your existing organisation can get out if the way. The third easiest way is to do the second easiest way and then engage those who would have done the easiest way and get them to help you: keep the energy levels up.”

An EKM organization and its services must be properly positioned with other enterprise support services such as learning and performance management. This final integration step is essential to successfully coordinate the efforts of each of these functions, both minimizing turf wars and optimizing enterprise level performance. When an organisation is using ‘Enterprise 2.0’ to support knowledge management, these issues remain on the table. The benefits of carefully designed enterprise support remain and should not be overlooked simply because the tools are so easy to implement at the grass roots level (Ives, 2007).

‘Enterprise 2.0’ and processes

Scenarios where information is missing or procedures are fuzzy are more and more general and stem from the fact that corporations arranging business process management (BPM) tools fall short to contain Enterprise Content Management (ECM) contributions in their strategic development. BPM can scope “from managing high volume transactions to collaborative team-oriented business processes” (Kumar, 2007). On one hand, the focus on transactional processes is above all on workflow standardisation, duty allocation, tasks line administration and operative resource scheduling and optimisation.

Furthermore, Collaborative Document Management (CDM) is an imperative support for implementing a ECM strategy, and fills the gap connecting people and processes (Kumar, 2007). The research about the role of back-office transactional systems such as Enterprise Resource Planning (ERP) systems as organisational “knowledge libraries” and the introduction on them of decision support systems, groupware and others was

carried out by several authors (Baskerville et al., 2006; Holland and Light, 2001). The first ones focus their discussion on that knowledge in organisation can be seen both under converging and diverging approach. The first is because the knowledge of organisational experts overlaps much more after an ERP adoption. From the individual perspective, however, knowledge is becoming more divergent. Further, the ERP system is a key medium for learning, since it provides a key tool for acquiring information about the day-to-day business activity. In other words, organisational learning is mediated, enabled, and confident by the ERP system. Finally, one practical implication is the risk involved in the concentration of organisational knowledge in the “frenzied view” and the power users. The second ones focus their study on presenting a model for understanding the process and content of the development of the maturity of ERP systems in organisations. However, they advise that ERP systems do not cover all the IT requirements of modern organisations; therefore they are excluding an integration of other modules of organisational knowledge and business intelligence within ERP capabilities. Jones (2005) contributes to the research in this area underlying the assumption that individuals will be able to share their knowledge. And although this is a valid assumption for explicit knowledge that can readily be examined apart from the individual who originated it, tacit knowledge is not as easily examined. Collaborative business processes on the other hand, often means that the document creation process is highly collaborative and normally occurs within the context of a project team. Emphasis is on ease of creation, revision, and access to document via multiple familiar interfaces such as Microsoft Office, Outlook and Web applications and it offers a mix of both structured as well as ad hoc workflow (Kumar, 2007).

‘Enterprise 2.0’ and technology

One of the most repeated statements among academics has been that ‘Enterprise 2.0’ tools are Knowledge Management tools in opposition to Content Management (CM) tools. Furthermore, Document, Content, and Knowledge Management, are considered one of the Top 10 technology concerns expected to have the greatest impact in the coming year (Barlas et. al, 2007). Despite CM tools are often taken inside the KM toolset; it is an important difference between them. Content Management is the process of tracking and communicating all stages of editorial production (Fleischer, 2003). He considered CM easy to automate because it comprises a repeatable

sequence of tasks. Moreover, CM is not really about content, but what is happening with it. KM, by contrast, deals directly with how you organise and categorise what the content seeks to convey. For this reason, KM is more difficult to automate because it is open to interpretation.

E2.0 ("enterprise social software") is different from KM because it is all about information technology - it does not and cannot exist without it; and it appears to have the power to change the shape of organisations, while KM typically tried to improve what was there or provide a way to tap into the back channel (Karrer, 2007). It's important to remark that some disagreements with the conventional wisdom surrounding all the concepts tagged '2.0' are completely fixed at the irrational opinion some practitioners have about recommending technology associated with this topic as a solution to all the problems faced by large organisations. Many times the lack of knowledge on technical aspects such as security, identity, records management, integration, interoperability and other concerns frights senior managers when the study of a possible deployment comes through. It is essential to facilitate employees themselves to create their own knowledge sharing communication channels and collaborative environments, however they need to do so within policies and structures that do not put the enterprise at risk (Gotta, 2007). Enterprise IT people want to control information, sitting inside a protected data bubble, but outside the bubble, users are increasingly looking beyond the enterprise for information in Google, RSS feeds, blogs and other 'Web 2.0' sites. He adds that the current ECM systems do not take into account this information outside the enterprise (Ives, 2007).

1.4. FUTURE FOR ENTERPRISE SOCIAL SOFTWARE APPLICATIONS

Traditional business intelligence has focused primarily on delivering information to decision makers whether at the executive or staff levels. Although there has been much progress in the speed, accuracy and presentation methods of delivering information to users, there has been little progress in extending true decision support functionality to the broader organisations (Vesset, 2006). This statement still remains true, since knowledge management systems have grown addressing document and

content management issues but they have not been integrated with other decision-making systems such as scorecard boards and others.

Although it has not been offered yet from the leading vendors such as Microsoft, IBM or Oracle it is assumed that social software will converge with knowledge management and business intelligence systems (Kobielus, 2007). Therefore, there are only a few examples for 'in-house' systems in testing stage that may advance what is coming next. First Web 2.0's effects on business intelligence are said to be collaboration features, advisers, personal agents and cognitive engines as well as web-based platforms (Raden, 2006; Britt, 2007). IDC (International Data Group) has stressed the importance of focusing on decision-centric business intelligence (DCBI), which extends traditional business intelligence in the following ways (Vesset, 2006) involving 'Web 2.0' technologies:

- Adds collaboration support on top of access to information by individuals;
- Employs advanced analytics for decision optimisation. However, as these are not sufficient, DCBI also adds other requirements over traditional BI and over advanced analytics;
- Decision capture. DCBI must be capable of capturing the record of what decision was made and why. The resulting repository of decisions (the decision base or knowledge base) anchors a learning environment and provides persistent record to address compliance demands Decision search. More often than not, if an organisation tracks decisions, it is likely to be in the form of project reports that document bulletin boards, workspaces, blogs and a range of other asynchronous collaboration facilities.

Britt (2007) added to this that business intelligence users will continue to move to enterprise-wide systems that will incorporate not only BI, but also customer relationship management, enterprise resource systems and other technologies that can be used in an enterprise-wide, service oriented architecture (SOA). "The continuing movement to SOA architectures will increase the importance of focusing on data, content and application integration issues and the effect will be applications not longer knowing the source of information." This step in the integration between business intelligence and collaboration platforms is the current challenge that is being

faced at an organisational level, but to forecast beyond that it is worthwhile to come back to the consumer side and see which are the leading edge web technologies and potential applications of those. “To add a layer of meaning in the top of the existing Web that would make it less of a catalogue and more of a guide- and even provide the foundation for systems that can reason in a human fashion” (Markoff, 2006) is the goal of computer scientist and start-up companies. Markoff argues that the ‘semantic web’ also named ‘Web 3.0’ will instantly become more commercially valuable than today’s search engines, which returns thousands or even millions of documents but as a rule do not answer questions directly although researchers and entrepreneurs say that it is unlikely that there will be complete artificial intelligence systems any time soon.

Borland (2007) poses that the next wave of technologies might ultimately blend pared down Semantic Web tools with Web 2.0’s capacity for user-generated connections. He adds that it also may include a dash of data mining, with computers automatically extracting patterns from the Net’s hubbub of conversation. “The technology will probably take years to fulfil its promise” he points out, “but it will almost certainly make the Web easier to use.

1.5. CONCLUSIONS AND RESEARCH GAP

The use of ‘Web 2.0’ technologies has a lot of potential applications to improve knowledge-based business processes and enhance innovation. It also provides a new platform of tools that can be effectively introduced into organisational agents such as intranets and corporate portals. The success of the incorporation of the ‘Web 2.0’ paradigm to the organisational environment does not only depend on the toolset but also on the cultural change that the use of these technologies brings ‘inside the firewall’.

Researchers have covered the presentation of the different segments as innovative collaboration techniques inside organisational boundaries and the challenges that they may find in the future when they are deployed. Nevertheless, success drivers that would lead to a successful implementation have not been studied. Furthermore, the

way the knowledge management practitioners must assess their current strategies and approaches to find whether or not it would be worth to move into 'Enterprise 2.0' tools and their potential benefits have not been analysed in depth.

There is also a gap in the study of how each technology impacts separately on organisational knowledge strategies, and if this impact is equal for all technologies. For this reason, it would be important to develop a landscape overview of 'Web 2.0' technologies defining certain qualitative indicators such as 'social input' or 'impact on organisational knowledge'. The future of the corporate web-based collaboration tools will face integration issues to reach seamless convergence with business intelligence, collaboration and transactional based systems. The challenge is to take a step further from the search engines by providing not only information but also human-style decisions. However, how these technologies could be applied in learning environments has not been analysed in depth. Experts' views are required to address the future of 'Web 2.0' for learning purposes.

Just like the previous generation of workers received computer literacy classes en masse and learned how to use business productivity applications such as word processing, spreadsheets, and email, the same will be required for the current generation of workers and Enterprise 2.0. This is even simple guidance such as should something go into a blog post, a wiki page, or mashup application. Also why and when should workers respond to comments and participate in social networking, bookmarking, and internal/external online communities? Outside of technology companies and within mainstream businesses, we've clearly seen that Enterprise 2.0 tools have an additional hurdle to jump in learning how to tap their benefits, especially if the organization has relatively low turnover and few younger workers. The hurdle is making sure that workers have a clear understanding of the specific techniques of how to apply Enterprise 2.0 tools to their daily work. Social media information formats such as project status wiki pages to departmental news blogs are still foreign to most workers today and proactive worker education will be required to make sure the investments in Enterprise 2.0 are being appropriately reaped.

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