

Current State of Enterprise 2.0 Knowledge Management

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Abstract—The article aims to summarize the current and nearest in future trends in the development of knowledge management in the Enterprise 2.0 technology. A short description of the technology and its features are given. The classical definition of knowledge management is presented which is further related with its position in the area of Enterprise 2.0. The observed current problems in knowledge management are discussed. Several major trends have been identified and analyzed regarding the knowledge management transformation through social business. The use of the Cloud Computing technology as a natural evolution of the Enterprise 2.0 knowledge management development is proposed.

Index Terms—Web 2.0, Enterprise 2.0, Knowledge Management, Cloud Computing.

I. INTRODUCTION

In recent years the Enterprise 2.0 technology has undergone significant enhancements and many companies have accepted it as an efficient way of managing their internal information systems. The generated by them data and resulting information have increased their volumes greatly. The process of knowledge management of such IT structures experiences new and miscellaneous problems. There is a need for a significant shift in how the knowledge management is performed.

The article attempts to point out current problems in Enterprise 2.0 knowledge management. Based on analytical research performed through different Web resources, the article tries to show the latest developments in the knowledge development and to offer new possibilities for enhancing the process of managing IT resources within the Enterprise 2.0 technology.

II. ENTERPRISE 2.0 ESSENTIALS

Web 2.0 is the main facilitator for socialisation of business applications. That is it moves from data-centric models to people-driven applications. Businesses are realizing the value is not in the data itself but in how people are using it. Social applications are meeting this demand – bringing data to the right people, allowing them to interact with it and helping them understand it. The end result is the ability to make better and faster decisions – a key differentiator in a challenging economy [1].

The information and communication technologies for knowledge management (acquisition, processing, storage

and publishing) represent important components of the information systems for the support of educational technologies and decision support systems in the area of management. The software tools for the knowledge transfer support belong to that class. These technologies integrate into a unified information system all the intelligent informational resources of the experts and all intelligent software tools for the user activity support.

In recent years the Service-Oriented Architecture (SOA), Software as a Service (SaaS), Internet networks and Internet portals, decision support systems, information systems for knowledge transfer, etc. develop and interact with each other. These activities are transforming in a new modern form of existing the information technologies, known as Web 2.0.

The Web 2.0 concept defines the methods and means for the penetration of the corresponding technologies and tools in business and education for facilitating the mutual activities among employees, partners and users in the establishment of common information networks in a given sphere and for transferring information and knowledge for competitiveness improvement.

The major factors, defining the integration of these technologies into a new business model, could be summarized as follows:

- Growing attention to new ways for improving the operational efficiency in research, educational and business organizations.
- Global continuous accelerated growth of data access and participation in common and multifunctional technologies that brings to the accumulation of new information and knowledge.
- Developments concerning the newest technologies and choice of communication tools, utilization and operation.
- Continuous process for business optimization, leading to transformations and outsourcing. This leads to integration of computer and information systems that support business operations and their continuous expansion in the organization' limits through SOA.
- The Service-Oriented Architecture is transforming into a light-weight, pragmatic and Web-oriented technology.
- Security will remain a major concern since Web 2.0 applications expose each organization to risks.
- The unstructured information from blogs and wikis will grow rapidly and will lead to an increased need for solutions for accumulation, integration, extraction and publication of information and knowledge.
- The information and communications technologies will need a financial support for the of next-generation infrastructure for the development of SaaS, SOA, mashups, etc.
- The emergence of powerful user platforms, based on

Manuscript received June 15, 2012; revised July 10, 2012.

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Rich Internet Applications (RIA).

An Enterprise 2.0 technology strategy combines the different aspects of Web 2.0 capabilities into a secure and comprehensive platform where business conversations and tasks are executed in the context of business goals. The successful Enterprise 2.0 platform is modular in its architecture so companies can add the components, resources, and services that are required as the business evolves and grows. The rich Enterprise 2.0 platform must enable enterprise applications to participate in the business conversation. In addition to higher productivity, providing information within its context leads to increased worker participation. This generates a richer, improved context for others users to leverage in their work conversations.

Enterprise 2.0 is the use of Web 2.0 technologies within an organization to enable or streamline business processes while enhancing collaboration - connecting people through the use of social-media tools. Enterprise 2.0 aims to help employees and customers collaborate, share and organize information [2]. Professor Andrew McAfee describes Enterprise 2.0 as "the use of emergent social software platforms within companies, or between companies and their partners or customers". The main Enterprise 2.0 features can be summarized as follows [3]:

- The technology facilitates the application of Web 2.0 into the enterprise.
- The technology enables people to collaborate and/or for online communities and provides for a higher level of collaboration.
- It is a new set of technologies, models and methods used to develop and deliver business software.
- The technology offers a new way for knowledge management within the organization. Large corporations use idea management systems to solicit ideas from their customers and employees. Idea generation in some cases fuels the product pipeline.
- The technology enables business agility by putting together the ability to deliver various software services in the organization.
- It facilitates transparency by making information available to all who need it and for development of content-centric systems. Information is readily available and with suitable search engines, the users can locate the information they need.
- The technology adopts an approach that is user-centric and facilitates developing and accessing content.
- It enables the use of social networking platforms either within the organization or between companies. Different blogs can be organized depending on the particular engaged community.
- The technology leverages collaboration to include not only employees but also business partners.

In his blog Professor Andrew McAfee describes how organizations use emergent social software platforms to capture and share knowledge, identify and leverage expertise, generate and refine ideas, and harness the wisdom of crowds [4]. Since then the intelligence community has deployed new 2.0 tools including launching an internal Wikipedia, encouraging blogging within strict guidelines,

and developing a search function to improve access to shared information.

The social software is the technical part of Web 2.0 - software or services that support, extend or derive added value from human social behavior. McAfee summarizes the characteristics of Social Software in the acronym SLATES (Search, Links, Authoring, Tags, Extensibility, Signals). Some researchers enhance his idea [5] to :

- Being able to publish contributions or edit content as easily as possible ("Authoring");
- Contributing structuring metadata by tagging ("Tags");
- Adding additional content and metadata by annotation and linking ("Authoring", "Links");
- Possibility to be informed about (subscribe to) new content ("Signals");
- Being able to find new content ("Search", "Tags");
- Modular, service oriented, and data-centric design of the applications ("Extensions").

Social Software can also be employed for enriching communication with customers and business partners. If that results in a bi-directional communication, this is seen as part of Enterprise 2.0. If Social Software is just used for communicating uni-directionally from the company to customers, it usually is not in the scope of Enterprise 2.0.

The three core support functions of the Social Software can be summarized as follows [5,6]:

- Information management - users are collecting, writing and annotating information through social tagging services or in group editors like wikis;
- Communication - users are communicating directly with each other, synchronously in instant messaging applications or asynchronously in forms and weblogs;
- Identity and network management - users are presenting themselves to others and are searching others by this information and are linking to each other; additionally information about the current status and activities of users is distributed to the network.

Another way to distinguish the role of social software in the enterprise can be done by the following major groups of activities [5]:

- Enterprise communication use social software as a communication platform on which every employee can participate in enterprise discussions across traditional company boundaries. Discussions can be initiated top-down as well as bottom-up and be conducted on a small level or across the enterprise;
- Collaboration and knowledge exchange enable people to collaborate on and across all levels of an organization;
- Social networking and expert search supports employees in maintaining and expanding their corporate network, based on a virtual representation of all users, including their contact data, skills, expertise and interest.
- Personal information management provides employees with the ability to select information sources and integrate them on a central and customizable personal page.
- Project management is supported by a mix of communication, workspace and resource planning tools. Much of community-building and social networking

aspects of Enterprise 2.0 are long-held goals of those involved in organizational learning and knowledge management. Certain best practices should be adopted as part of Enterprise 2.0 efforts [6],[7]:

- Defining the means of Enterprise 2.0 regarding its implementation and application in the organization;
- Assuming that Enterprise 2.0 is a program, not a project;
- Supporting the existing business model;
- Designing end-to-end value instead of functional gains;
- Defining program metrics;
- Enabling Enterprise 2.0 around a technology ecosystem, not a particular product set of vendors or products;
- Including methods to communicate success and failures across the organization.

McAfee sees two hurdles most organizations must overcome to take advantage of these new tools. First, leaders are not aware of how the tools work and how the new tools can improve internal knowledge management. Second, they're afraid that using the tools will make it impossible to control confidential information.

III. CHARACTERISTICS OF KNOWLEDGE MANAGEMENT

Knowledge management (KM) can be broadly defined as how a company harnesses innovation, brainstorming, and creativity. KM distinguishes itself from pure administration in the way that it purposefully attempts to incorporate the experience of its employees in relation to business specific processes.

Companies with established KM policy tend to be able to innovate more quickly than companies that rely on a purely hierarchical decision making structure. While companies that use KM still rely on managers to make decisions, KM tends to foster greater sharing and participation than in traditional businesses.

From a practical perspective, knowledge is defined as information in action [8]. Until people take information and use it, it isn't knowledge. In a business context, knowledge is what employees know about their customers, products, processes, mistakes and successes, whether that knowledge is tacit or explicit.

APQC defines KM as a systematic effort to enable information and knowledge to grow, flow and create value [8]. The discipline called KM is about creating and managing the processes to get the right knowledge to the right people at the right time and help people share and act on information in order to improve organizational performance.

Organizations implement a KM program promote knowledge-sharing practices. An enterprise KM program is usually a centralized, organization-wide effort to standardize KM. Enterprise does not have to be the entire corporation.

Within such a program, organizations implement KM approaches such as communities of practice, expertise location systems, and wikis to formalize and enable knowledge sharing. KM activities are all of the things KM professionals do to support planning and design, change management, communication, training and budgeting.

Through these activities and approaches, KM programs should:

- connect employees to each other in order for them to excel at their jobs;
- connect employees to knowledge assets (just enough, just in time, and just for them);
- connect those with experience or know-how with those who need it.

The knowledge management and the improved knowledge productivity are not limited to business boundaries. An analysis has shown that knowledge literature and software products pertaining to knowledge management are rapidly proliferating, and so are knowledge sites and activities on the Web and there is a strong connection between their performance and their knowledge productivity [9].

The enterprise focus is drifting towards knowledge and its productivity and would create futuristic knowledge-intensive economies.

The economic value of knowledge consists in providing great value to the customers. The entire process is innovation and execution dependent. Managing knowledge is essential to create critical future opportunities, and to enhance current organizational performance. To scope of knowledge management depends on type of knowledge used in the organizations.

The enterprises in the digital era spend more time trying to find information than they spend using knowledge productively. Research has shown that large percent of an individual spend time trying to find or reproduce important information. An effective solution is required that can reduce the time, and therefore the cost, of using information to create value. By synthesizing knowledge capital and technology organizations generate increasing value to the enterprise and use it effectively to create an innovation dynamics.

The knowledge assets of a company consist of the knowledge regarding the products, markets, technologies and organizations of a business. The process of sharing involves researchers to exchange the pieces of information mainly through e-mails or only by informal conversations. The primary goal of knowledge management is to improve organizational performance by enabling individuals to capture, share and apply their collective knowledge to make optimal decisions.

The usage of Social networking tools within enterprise provides a unique way to accumulate and disseminate knowledge. The new trends transforms intranet to writable intranet through collaboration. It empowers knowledge flow across the enterprise.

The phases of the knowledge cycle can be described as follows [9]:

- Knowledge Capture - The knowledge gathering process involves collection of information from heterogeneous sources and storing them in a structured format. For an organization the
- Knowledge need not only lie in digital format but is also available in physical format, which needs to be digitized, making it accessible to the users at any instant.
- Knowledge Storage - The knowledge storage is one of the most important aspects of knowledge management systems. The data needed to be indexed logically to enhance the storage retrieval process. Most of the times

what is search for, and the end result is something different. The knowledge retrieval limitations can be recovered using semantic based search that is more of context based and identifies the context connected with the text. The Enterprise 2.0 allows collaboration, standardization, virtualization, etc. The existing knowledge along with the new ideas is used and reused.

- Knowledge Dissemination - The knowledge distribution is the process of disseminating content across the enterprise. The web portal can be used as an interface for dissemination and collaboration. The distributed knowledge can be used for the purpose of analysis and decision-making.

Enterprise knowledge workers use social computing tools to get their work done. They blog, create podcasts and produce content for wikis [10]. They subscribe to RSS feeds, join social networking sites such as LinkedIn and Facebook, and employ shared content tagging. All of this is done to overcome the barriers to efficient collaboration posed by a distributed workforce that spans geographies and time zones.

Collaboration is absolutely necessary to the work of the enterprise. It is hard to control and sensitive to the constraints of time and distance. Knowledge workers have been using e-mail for collaboration. Shared digital workspaces that feature services such as document sharing, calendaring, task tracking allow groups of authenticated individuals – employees, customer, suppliers, and partners – to increase productivity, improve decision making, and improve the efficiency of collaborative team efforts.

Within a corporate social network, it is possible securely to coordinate, manage and monitor employee processes, interactions and activities, including [11]:

- creating the connections employees require to find and utilize information to drive business results;
- increase recruitment and on boarding programs by reaching into your workforce on prospective candidates;
- deliver just-in-time learning based on readily available employee content, collaboration, and interactions;
- more effectively manage the talent within your organization by creating a culture of collaboration and career development.

IV. KNOWLEDGE MANAGEMENT DEVELOPMENTS IN ENTERPRISE 2.0

Any organization adopting the Enterprise 2.0 model should provide for [11]:

- Managing the accuracy, integrity, reliability, timeliness, security, confidentiality of data, information, and knowledge;
- Making needed data and information available to employees, suppliers and customers;
- Managing organizational knowledge;
- Ensuring that hardware and software are reliable, secure and user-friendly.
- Ensuring the continued availability of information systems during emergencies;
- Identifying what information users need to improve performance;

- Collecting and transferring knowledge and identifying, sharing and implementing best practices.
- Backup of critical data and information and storing it offsite in case of an emergency.

One of the most vexing problems facing organizations for years has been the KM. In the past, the task of capturing, organizing and disseminating valuable information so it could be properly utilized by end-users and business executives was a hard to perform task that produced limited results.

Traditional content management and database access products were often complex and complicated to deploy and administer, and they were too inflexible to meet the varying needs of corporate users.

The technological challenges translated into significant planning, design, implementation and operational costs which created financial hurdles that were too high and derailed many knowledge management projects.

Nowadays many companies of any size struggle with [12]:

- vital corporate knowledge being trapped in information silos like email inboxes (knowledge) and need to cope effectively with an enormous – and rapidly growing – volume of information;
- a limited understanding of organizational expertise (talent) and the need to support streamlined collaboration among a dispersed and global workforce (relationships);
- the need to control the information under its stewardship for compliance and corporate governance purposes;
- the right information either is not collected or is not distributed to the right people when it can be useful;
- knowledge is lost when employees leave the company;
- no processes exist to identify the organization's knowledge assets or to collect and use that knowledge;
- the organization does not pursue, value, or share best practices.

The biggest problem with KM is it is too widely defined. A lot of knowledge management professionals offer their own version of KM and as a result, KM is pulled in different directions.

On the other hand several major trends have been identified and analyzed regarding the transformation of KM into social business [13]:

- 1) Proliferation and rapid adoption of social technology, e.g. Facebook, Twitter, Microsoft SharePoint.
- 2) Proliferation and rapid adoption of miscellaneous mobile platforms and other tablet devices.
- 3) Application of massive volumes of data to Business Intelligence. Social technology and mobile platform make collection of big data possible.
- 4) The rise of Generation Y in organizations. This generation was born digital. Basically they know what social business is and they are bringing the concept to life in their workplace.
- 5) Globalization. Many multinational companies have offices in different locations, scattered around the globe with different time zones.
- 6) Downsizing. Organizations downsize to survive and when they downsize, some organizational knowledge

would be lost.

- 7) Increased Complexity. To manage complexity a proper way is to harness collective intelligence so that organizations could sustain continuous innovation.
- 8) Increasing adoption of cloud technology. To reduce cost, many organizations are moving their intranets to the cloud. This speeds the adoption of social media and mobile gadgets.

Most enterprises need a KM portal that allows various employees to share best practices and other knowledge-related content and ensure that the knowledge obtained by a few employees is kept in a common repository.

The following are the typical components of an enterprise KM portal [14]:

- This front end will be enabled with a web portal accessible to the employees based on standard authentication options.
- There will be an option to load the content in various standard formats.
- There will be a workflow to validate the content and approve the content to be usable for a large audience.
- Depending on the needs of the organizations, the search features could vary.
- At a simple level of implementation, searches could be allowed based on document title or internally generated numbers.
- Advanced social networking features like sharing, tagging and other features can also be part of it.

Cloud computing describes a new supplement, consumption and delivery model for IT services based on the Internet, and it typically involves the provision of dynamically scalable and often virtualized resources as a service over the Internet. It is a byproduct and consequence of the ease-of-access to remote computing sites provided by the Internet. The term "cloud" is used as a metaphor for the Internet to depict the Internet in computer network diagrams as an abstraction of the underlying infrastructure it represents. Typical cloud computing providers deliver common business applications online which are accessed from another web service or software like a web browser, while the software and data are stored on servers.

The transition to Cloud Computing services provides for a higher level for mutual activities and many possibilities for knowledge management and expertise for scientific research and business as a whole. All parties in the knowledge management process can work and communicate from any place by using applications in the cloud. Although the users do not need to use any special devices to access cloud services, units such as notebooks, netbooks, smartphones, etc. will represent an adequate technical possibility for applying the corresponding cloud services.

This particular use case of KM is a natural fit for a cloud platform. Knowledge management comprises a range of strategies and practices used within an organization to identify, create, represent, distribute, and enable adoption of insights and experiences.

Cloud computing refers to services, applications, and data storage delivered online through powerful file servers.

However, the following aspects are aligned to the Cloud

model [15]:

- KM systems may have large storage needs and can utilize a cloud storage model.

Search patterns may vary and may experience sudden spikes and better to be supported with an elastic computing model.

- Most of the KM workflow and search capabilities are generic in nature and a software as a service (SaaS) application can easily fit that for a majority of enterprises.
- Knowledge Management Access Patterns goes well with BYOD (Bring Your Own Device) strategies of large enterprises as an enterprise knowledge worker may access the information at any point and from anywhere.

In the world of KM systems, the last several years have seen a widespread migration away from Intranet systems into web-based knowledge-sharing systems, in which all information is stored on a server and accessed by logged-in users over a standard web connection. Today there is a strong shift in the way knowledge is managed and stored - on servers in the cloud [16]. This has many important implications for organizations that rely on KM systems.

A. Benefits of Cloud-based Knowledge Management

The main benefit of cloud-based computing is that information and even software can be accessed from virtually any network-enabled device at any location. Knowledge stored in the cloud can be instantly accessed. This is good for organizations in which many individuals are not tied down to a single location. It can be predicted that in the near future a large number of companies will have no central offices at all but instead will consist of individuals scattered around the world all plugged into the cloud.

Cloud-based KM systems have a built-in redundancy. Since the information is typically stored across many servers and computers instead of in one place, one server outage cannot bring the whole network down. Cloud-based KM in many cases is cheaper than the alternatives. Rather than installing hardware and software on every computer that needs access to the network, companies can just store it all in the cloud and have people access it through a browser.

Social network represents a dynamic virtual organization with inherent trust relationships between friends or employees. This dynamic virtual organization can be created since these social networks reflect real world relationships. It allows users to interact, form connections and share information with one another. This trust can be used as a foundation for information, hardware and services sharing in a Social Cloud [17].

Typically, cloud environments provide low level abstractions of computation and storage. Computation and Storage Clouds act as building blocks where high level service Clouds and mash-ups can be created. Storage Clouds are often used to prolong the capabilities of storage-limited devices and provide transparent access to data from anywhere.

A large number of commercial Cloud providers like Microsoft Azure, Amazon EC2/S3, Google App Engine, provide access to scalable virtualized resources. Through predominantly posted price mechanisms, these computation,

storage, applications resources can be accessed.

In this way a Social Cloud is a scalable computing model wherein virtualized resources contributed by users are dynamically provisioned amongst a group of friends. Users may choose to share these resources freely and make use of a reciprocal credit-based model. By leveraging social networking platforms, people can gain access to huge user communities, exploit existing user management functionality and rely on reestablished trust formed through user relationships.

B. Drawbacks of Cloud-based Knowledge Management

However, there are some potential concerns inherent to cloud-based KM systems of which security is the most important one. This risk can be lessened by advanced measures to hide and protect the most security-sensitive information.

Another drawback is that setting up a cloud-based management system often requires additional tech staff, which can be expensive for some companies. Cloud networking is usually quite simple from the user's perspective, but infrastructurally it can be complicated. There are cloud-computing consultancy services that can help companies get their systems online, but these can be expensive.

V. CONCLUSION

Evidently Enterprise 2.0 knowledge management has evolved a lot in recent years, but on the other hand it has brought in new problems of managing IT resources. Enterprise 2.0 is the perfect environment where Knowledge Management systems can run smoothly. With Enterprise 2.0 much of knowledge capture happens as a by product of using transparent searchable tools for common workflow and collaboration tasks. These tools enable employees to give and take information and the flexibility of the tool allows for very dynamic usage.

The paper has shown current and new trends in the knowledge management and in particular it proposes the adoption of the Cloud Computing technology as a viable option for its natural and imminent enhancement.

ACKNOWLEDGMENT

The authors express their gratitude to the Science Fund of the University of National and World Economy, Sofia, Bulgaria for financial support under the R&D Grant NID 21.03-21/2009, titled "Research of the Capabilities of the Enterprise 2.0 Business Model for Increasing the Competitive Efficiency of the Bulgarian Companies".

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