Advanced Web 2.0 based interactive technology to support informal learning for enhancing quality of business management

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Abstract—Right knowledge and managerial skills are foundations of successful organizational management. A major part of this knowledge is tacit knowledge. Organizational knowledge is particularly related to exchange of information between organization and its stakeholders.

Organizational and personal learning are prerequisites for enhancing management knowledge and skills in striving for quality of business management. Multifarious managerial knowledge and skills are needed in a consistent way at different levels in organizations. Effective learning requires application of new learning theories like connectivity, interactivity, and sharing knowledge. Factually 80% of learning takes place by informal learning. Management learning is integrated with normal managing activities of the business leaders.

A Knowledge Work Environment reported in this paper is to facilitate effective and efficient knowledge-intensive and networked business activities. The approach is based on proved social software and Web 2.0 technologies from the open source software community. This solution is also aligned with Enterprise 2.0 and Real Time Economy (RTE) approaches.

Index Terms—Informal on-the-job learning, quality of business management, knowledge work, social media, Web 2.0

I. INTRODUCTION

Continual organizational and personal learning are prerequisites for an excellent management and leadership and for a sustainable business success [21, 23] in all kinds of organizations. Management consists of coordinated activities to direct and control an organization. Quality management [22] is now understood as quality of management and it means the degree to which needs and expectations of organization’s all stakeholders are being fulfilled by organization’s managerial activities. Leadership refers to organization’s leading persons’ ability to influence and direct the performance of organization’s people towards the achievement of organizational goals [21]. Systematic leadership should be exercised formally and informally throughout the organization. This includes structures and mechanisms for decision making, selection and development of leaders and managers, and reinforcement of values, ethical behavior, business directions, and achievements of performance needs and expectations.

Successful management of organizations is based on right business related knowledge and management skills to use the knowledge on time effectively and efficiently for the current business needs. Business leaders also need in their daily tasks a lot of very specialized knowledge and information. Many business leaders are not necessarily well prepared or committed in their special responsibilities in today’s complex business environments [28]. Although they may consult with experts to consider specialized questions they can’t delegate their responsibilities, e.g. in the fields of finance, statutory regulations, quality, information security, social responsibility, human resource management, etc. Additionally to key business leaders, continuous and efficient exchange of information is a necessity between organization’s all stakeholders, including customers, employees, shareholders, suppliers, business partners, and the great public. In today’s business environments, both number and variety of stakeholders has increased, and communication between them has increased, intensified, diversified, and accelerated tremendously due to global information and communication networks and services [1, 2, 14]. This applies to all types of organizations including business companies, public civil service organizations, and even third sector not-for-profit organizations.

Organizations that will prosper are those that most effectively take advantage of social collaboration networks and use those benefits in organizations’ managements to foster and further develop their competitive advantages. This paper’s approach is referred as Knowledge Work Environment (KWE) to support an organization’s managerial activities and to enable organization to operate in and benefit from the modern digital communication networks and facilities. The KWE is a collection of software components and methodologies that support social collaboration in networks. The approach of this paper has been realized and experienced in many practical cases. Those realizations and lessons learnt have described in this paper.

KWE’s principal aim is to improve effectiveness and efficiency of working practices in knowledge-intensive organizations and business processes. Management is an important application area of the KWE. Essentially this includes the purposes of continuous genuine on-the-job learning in the field of business leadership and management.

Typically management learning in organizations is based on training by traditional or e-learning means. Investments in these solutions have not proved very effective. Only basic management and leadership skills may be learned by traditional training courses or
corresponding educational events. Business people who are responsible for managing organizations are busy and they have not enough time to attend comprehensive training and education programs and they are not very interested to use e-learning systems. On the other hand, 80% of all learning factually takes place through informal learning [18, 5].

The KWE is based on the idea that nowadays all employees and particularly executives and managers are in all organizations knowledge workers in one way or another. Knowledge workers use their intellect and social networks to convert their ideas into useful outcomes in their working processes. In general, knowledge working practices are core skills in the whole post-industrial society. To get things done, knowledge work requires human interaction in social context and utilization of modern knowledge infrastructure of IT (Interactive Technology) and tools to benefit of the reduced transaction costs for learning, communication and collaboration [7, 39].

Realization of the proved KWE is based on disruptive innovations [15] as server-based software system that is used by a group of users over the Internet through a standard web-browser, the approach that is often referred as SaaS (Software as a Service) [29]. KWE draws from the idea that knowledge work and learning are actually networked phenomena. KWE is more like a landscape which utilizes a global network for the benefit of the knowledge worker [6].

II. APPLYING NEW LEARNING THEORIES AND PRINCIPLES FOR QUALITY OF LEARNING

Traditional training and education means do not necessarily support effectively on-the-job learning for management and leadership skills. There have been a lot of positive expectations and promises for e-learning solutions especially based on standardized approaches like SCORM (the Sharable Content Object Reference Model) [24], AIC (The Aviation Industry Computer-Based Training) [25], and SingCore (Singapore-defined standard for metadata to tag learning objects and assets) [26]. Practical experiences, however, prove that these approaches do not provide effective solutions for on-the-job learning [16].

In the first stage of e-learning it was understood only as usage of new technological solutions facilitating distant learning and automation of certain activities of training and education and their management. The next stage was the development of particular “learning management systems” in order to manage training activities comprehensively. However, still traditional training practices were followed, e.g. training was still based on course structures. Experiences at least in business environments and relating to specialized management knowledge have not been encouraging [28]. Learning systems are too expensive, learning too boring, search of material (learning objects) too cumbersome, and reusable objects not really reusable [16, 17]. One should also note that the decay time of knowledge – and especially as needed by business management – has been remarkably shortened.

Behaviorism and objectivism, cognitivism and pragmatism, and constructivism and interpretivism have been the most significant learning theories and traditions often utilized until now in the training and education. Learning needs and theories that describe learning principles and processes should, however, be reflective of today’s underlying social environments. Quality in e-learning requires application of new learning theory-approaches like connectivity, interactivity, and sharing knowledge [16, 17, 19, 30]. New social software technology and Web 2.0 – that has also been used in the KWE solution – give possibilities to realize these new learning theories in practical cases particularly in business organizational environments. This also facilitates learning in networks which is now practical situation in all business cases.

Today learning objects are not presented ordered in a sequence, but randomly unordered. That does not take place in classrooms or schools but in the environment, to where business people find themselves, in their workplaces or “third places” [18]. We don’t present learning objects at all, we contribute them to the conversation, and we become part of the conversation. They are not just texts; they are our publications and speeches, our thoughts – in fact, we in real-time conversation and communication [7].

Managing quality of training and education has drifted to problematic situation when too inflexible learning management systems or quality management systems have been introduced in training organizations. One example is to apply too mechanistically the European higher education quality approach in universities according to the well-known Bologna Process [27]. The situation has drifted to similar problems as with quality management systems in business organizations applying mechanistically e.g. the ISO 9000 standards [28]. Quality approach in the organizational learning should be seamlessly integrated with an innovative way to manage an organization’s business as a whole.

III. LEARNING IN KNOWLEDGE-BASED BUSINESS MANAGEMENT

Learning in a business-management context refers to new knowledge and skills acquired for business managing activities. Learning includes organizational and personal learning. Learning needs to be embedded in the way the organization operates. This means that learning is seamlessly a part of regular daily work that is practiced at personal, business process, business unit and corporate levels by solving problems at their source, focusing on building and sharing knowledge throughout the organization and among its stakeholders, and striving for advantages of opportunities to effect significant, meaningful changes [21, 22].

On-the-job learning offers a cost-effective way to link learning to the organizational needs and priorities. Learning in organizations is directed not only toward better products but also towards more responsive, adaptive, innovative, and efficient business processes [9] for gaining organization’s marketplace success sustainability and performance advantages and giving business leaders’ and employees’ satisfaction and motivation to excel.

Management and leadership skills are needed everywhere and at different levels in organizations. This includes board of directors, CEO and executives, strategic business areas, headquarter functions,
supporting functions, business processes, projects, teams, and individuals (self-management). Management / leadership awareness around the organization is an essential topic for realizing management and leadership skills in practical organizational cases. This also includes understanding good management practices and their application [31]. This awareness may be defined very simply: having knowledge of management and leadership. However, what is the meaning of this is not at all any simple thing. Awareness is a profound totality of physical, psychological, and philosophical aspects of sensations, perceptions, ideas, attitudes, and feelings related to an individual or a group having knowledge of the abstract and comprehensive of good management at any given time or within a given time span. In time dimension, developing of the knowledge and learning become interesting aspects. It may be recognized different depth-levels of intellectual behavior in learning [4, 5].

Leadership emphasizes business leaders' personal and human aspects in conducting business resources and actions, and is based on managers' inherent understanding, knowledge and behaviors. A great challenge is to combine explicit and tacit knowledge in all managerial business decisions and to get knowledge moved among individuals within the whole organization between different actors, and from tacit domain to explicit domain and also vice versa (Fig. 1). Working collaboratively using intellectual capacity of the whole organization is the target for business benefits.

A well-known theoretical foundation for knowledge transformation is a process for knowledge transformation from tacit to explicit and vice verse through “Socialization - Externalization - Combination – Internalization” (SECI) of the knowledge [8]. Managing a SECI process is a key issue in organizations appreciating and enhancing intellectual and social capital.


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IV.KWE AS WEB 2.0 APPLICATION

The core of KWE consists of ability to lead knowledge workers into work areas, where they work in collaboration to learn by building new knowledge. They have also all relevant explicit information easily available through related document files. The tools that is available for use at work areas is meant to improve internal and external communication of such knowledge working in teams.

The five basic tools of KWE include wiki, blog, aggregator, forums and files [33]. These tools are based on software and Web 2.0 [10] technology. Many organizations are already using these tools but in the KWE they have been integrated as a comprehensive knowledge working platform. Both tacit and explicit organizational knowledge may be managed by these tools consistently.

Other tools that may be easily integrated with a KWE include email, Skype [12], calendar, virtual meeting, and organization’s existing legacy IT systems.

Basically aggregators and blogs bring ideas in the collaborative knowledge building (forums) from which crystallized knowledge is created as iterative documents (wiki), while file storage serves as a place for storing related documents. The method of reflecting on experience (blogs) and building knowledge models (wiki) collectively produces results that can be blogged further to other teams or individuals. This creates an intelligent link for new knowledge building. Fig. 2 summarizes tools and their roles included in the KWE. Technology of these tools and popularity of their benefits have been proved in large scale public use in Internet. Now a big challenge is to use those tools also internally in organizational business purposes and especially in the business management process. This approach is also titled as “Enterprise 2.0” approach.

![Diagram of KWE](attachment:fig2.png)

Figure 2. Tools and their usage in KWE: “Raw material” for group conversations is got via participants' blogging and automatic aggregation-feedings. Resulting new group-knowledge is published in wiki and further shared e.g. in organization's information blogs.

Practical social media based organizational knowledge-work and learning solutions are continuously enhancing in all types of organizations and business communities and organizations have strategic initiatives to get business advantage through their application [37]. These possibilities include:
- Mashup: Website or application that combines content from more than one source into an integrated experience [34]
- Tagging: Visual depiction of content tags used on a website [35]
- Facebook: Social utility that connects people with friends and others who work, study and live around them [38]
- Real Time Economy (RTE): Speeding up information flow between companies, each having capabilities to monitor their businesses continuously and quickly react to changes and exceptions [32, 33]

Within KWE, the intelligent links consist of people who process, analyze and reflect on aggregated observations and experience to create value in form of new refined ideas that are socialized as inputs to other intelligent links. In this way several intelligent links form a social knowledge building network that resembles the way organizations and people work in human interaction. This is resulting improved communication where ideas are not only communicated but processed and refined to support the business activities of the participants. (Ref. SEC1 [8])

V. Basic KWE tools

Blog operates as a user's own or group's online news site. The latest blog entry is always the topmost and the earliest entry is in the end. Each entry has a link for reference and commenting ability. Each entry has a title, release date, author, set of subjects or categories, hypertext content, ability to link to other websites or blogs, and comments that are relevant in the context of a blog entry.

The most important feature of a blog for knowledge work and collaborative learning is the fact that it provides a place for observation and reflection from experiences in a social context. The idea is to make one's reflections visible to others, thus making ideas visible in an organization to cultivate their growth into new ventures. Since year 2003 blogs have gained increased momentum in the way people use the social web. Blogging can nowadays be considered as one of the corner stones for maintaining industry-specific expertise in a social context. Blogging is the most prominent tool for knowledge work and learning basic knowledge work skills. Many business leaders have their business-related blogging pages also in Internet. “Blogosphere” covers all human aspects and activities [11]. Audio- and video-blogging are interesting forms of blogging.

Aggregator is a tool which enables a user to combine a set of sources like news, blogs, commentary, announcements etc. into a single unified place. It is like a private newspaper the user forms on need basis from multiple sources. Aggregator syndicates information feeds that are machine readable versions of information sources using techniques like RSS (Real Simple Solicitation) [13]. With an aggregator a knowledge worker is able to speed up the process of reading and analyzing sources for relevant up-to-date information. Aggregator combines a self-updating information landscape, where a user is able to categorize various feeds and read them in the way one likes. Each aggregator feed has a name and icon. Feeds are collected into folders specified by the user that provides a way to navigate between and through feeds. Each entry in a feed has a title, author and date, hypertext content with links, and a set of metadata.

Wiki is a tool for collaborative document writing where a group of people work simultaneously on various documents which are hyperlinked together through simple easy-to-use links to other pages within the KWE or in Internet. Wikis grow through these hyperlinks, as new links are added to the existing pages. Each wiki page has a version history of edits making the iterative nature of wiki editing visible. It is possible to roll-back into earlier versions or simply just see, what changes other users have made to a single document. Wikis operate as organizational memory and a way to capture knowledge assets in more easily manageable environment. In fact, all organizations and their operational domains, e.g. business processes, are like wikis, with information that is shaping under labels like “Strategic management”, “New product development process” and “Customer service”.

VI. Managing Information Security Within a KWE

The KWE includes detailed procedures for managing access rights. It is possible to provide access rights to various areas in the system for visibility, read, create, modify, and remove information. Compared to typical public blog, wiki and aggregation implementations, user groups can separate their own work area from other work areas and control the authentication of external parties for access to their own information. In this way blogs, wikis and aggregators become also safe for business critical communication.

KWE is used through a web-browser through a secure protocol, HTTPS (Hypertext Transfer Protocol over Secure Socket Layer). Browser cookie authentication method can be tweaked to terminate user session based on idle timeout and immediate cookie termination in cases where the browser is closed. For increased security, VPN (Virtual Private Network) and network-based access rules may be created. Some users want the software to be installed on their own servers for increased security and control, but in most cases this is not more secure than outsourcing the service through “Software-as-a-Service” (SaaS) [29] by trusted operators and administrators who are specialized in securing KWE for business purposes. Features that require users to use certain operating systems, browsers, or installing new software on their computers are avoided by using a KWE as a service.

VII. Open Source Software Technology for Realizing a KWE

Open source software community is the biggest resource in the world for developing software products. Therefore it is a challenging basis for realizing the KWE platform. It provides rapid application development. Under the terms of the open source software license everyone has the possibility to modify the source code of KWE and re-distribute the changes.

Open source ensures to apply experiences of extensive software engineering in a global environment. Also many users from various business areas, cultures, age groups and levels of technical expertise may contribute to the design of the usability in the system. The aim is to create a simple, usable and flexible user experience.
VIII. PRACTICAL EXPERIENCES

Strategic management is one of organizations' significant business processes [36]. Its purpose is to strive for enhancing overall business performance of an organization for better competitiveness and success. Strategic management consists particularly of organizational change management. However, simultaneously also organization's current business results should be ensured as a whole as planned. Strategic management is strongly a knowledge-based collaborative and innovative activity where typically organization's board of directors, executing managers, selected experts, personnel representatives, and stakeholders' representatives are being involved. Strategic collaborative learning is a significant prerequisite for organization’s sustainable success [23].

Fig. 3 shows how the KWE tools are available at the user interface of the system for collaborative strategic management.

![Figure 3. Window-elements of KWE tools at users' system-interfaces](Image)

The KWE is useful in all kinds of networked collaborative knowledge-intensive cooperation, group work, and on-the-job learning. Especially benefits are obvious in cases where participants are geographically scattered and where arranging synchronous meetings is difficult. An individual may easily contribute via the KWE to many simultaneously active groups which is a typical situation for individuals in business organizations.

Typical cases where the KWE approach has proved useful in practice include:

- Corporate-internal expert groups, e.g. product designers, human resource people, quality managers, and maintenance people
- Project groups
- Process teams
- Organizations' supplier or customer networks
- Benchmarking clubs of different organizations
- Collaborating business-clusters
- Networked SME’s, e.g. small cooperating consulting or expert companies
- Networked learning in educational institutes

IX. CONCLUSIONS

There are lots of problems in traditional practices in leveraging effectively usage of traditional training and learning or e-learning practices in organizations at management level [5]. A KWE solution based on social software or Web 2.0 technology offers simple, easy-to-implement / use / modify, and inexpensive solutions. It is particularly useful when organizations or people are operating in networks and work is strongly knowledge-intensive. Organizations may develop their information and knowledge management from passive documentation-emphasized and information-chaotic situation of organizational intranet systems to effective leveraging the usage of information and knowledge for the purpose of continuous on-the-job learning in managing effectively and efficiently business performance. Social media based organizational knowledge-work and learning applications and initiatives are continuously enhancing in all types of organizations and business communities.

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