Eunika Mercier-Laurent

MODEME, IAE University Jean Moulin, Lyon

KNOWLEDGE MANAGEMENT FOR BUSINESS

Summary: Knowledge Management was introduced in companies in the early 1990s as a management method. In the same time knowledge was managed in the various knowledge-based systems, such as decision support, diagnostic, optimisation, scheduling, process control and others. Artificial Intelligence method and tools have been also used in finance, prediction, insurance and banking services. This paper presents the current trends in Knowledge Management, including web 2.0, and describes economic changes and their consequences on the way of doing business through Collaborative Innovation Systems. Future KM has to help all internal and external knowledge cultivators[1] to be successful in capturing ideas and transforming them into values. KM is also considered as management method for the Knowledge Economy. We give some precisions on the components of the Kflow to effectively assist the Collaborative Innovation Systems.

Keywords: Knowledge Management, artificial intelligence, innovation.

1. Introduction

The roots of the term "knowledge management" can be traced back to the late 1960s and early 1970s in the Anglo-American literature. However, the term appeared again in the mid 1980s in the context as it is still used today. P. Drucker [13] was probably the first to write about knowledge management as a management method. D. Amidon introduced a knowledge holonomy in 1989 [1]. The Corporate Knowledge concept was invented in 1991 [22], while Artificial Intelligence has been focused on knowledge acquisition, modelling and processing for over 50 years [23]. From the economic point of view J. Schumpeter [32] was among the visionaries talking about innovation and knowledge.

With globalization the business and the ways to do business have changed. Internet brought new possibilities for communication and business activities.

Knowledge Management has several aspects, we consider here KM as a managerial method, technological approach and innovation enabler.

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[1] Term introduced by E. Mercier-Laurent [24].

There have been a large number of fields and disciplines dealing with the handling of knowledge, intelligence, innovation [2], change [19], learning [4; 34] or organizational memory [25; 35]. Business, ICT and sociology are the main lines of Knowledge Management development. Various approaches have played a role in the development of the global vision [21]. In 1998 begins in Europe the knowledge-based business, strongly linked with Internet and digital economy. Internet brought to the light old existing technology such as groupware and workflow. Service providers offer Business Intelligence solutions based mainly on Internet engines. Many companies pushing by software vendors introduced KM by tools without taking into account the real needs of "knowledge cultivators"[2] and whole organization. Tools are often complex and user has to adapt, for example many enterprises introduced SAP and they consider that they are practicing KM [23].

First CKOs are IT professionals which limit KM to IT, using classic "data thinking" [11; 24]. In many cases Intranet serves just to share files or to share the applications (few) such as help desk, diagnostic, document management and competency management [14]. Middle management begun to play the game, but facing the difficulty of understanding and adopting tools they stopped and continued their own data bases. Many initiatives on middle management level cannot go up to strategic (K.E. Sweiby middle-up-down [37]). This period is characterized by lack of taking into account the previous AI experience as well as knowledge transfer involving and lack of "knowledge thinking" [24]. There are as many approaches as domains; each department had its own KM not connected with the others.

2. Current KM initiatives

Among the current KM practices in companies the most are still tool-oriented. There are also problem solving oriented; in this case KM gather and organise all knowledge relative to given solution, such as process control or help desk [22]. KM could be also method-oriented – bottom up [21] or top down [3]. Many KM initiatives are activity-oriented such as Business Intelligence, document management, regional development [6; 30], or innovation management [17; 26; 28]. Very few have really integrated KM as strategic and global approach. Among them Novo Nordisk seems to be one of the most advanced [31; 35].

From the technology point of view many company activities claim to be involved in knowledge management through community of practices on a given topic, such as security, maintenance, reliability, innovation and others. Social networks reinforce the virtual communities' activity. However, in many cases the capitalization of the exchanged knowledge is basic – mainly in texts without any

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[2] E. Mercier-Laurent replaced "knowledge workers" by more accurate word "knowledge cultivators" (*jardinier de la connaissance*).

knowledge modelling for future retrieval. The various data mining techniques, derived from machine learning research [27; 38] have been applied for over 10 years mainly for marketing [15], diagnostic [5; 7] in banking and insurance [21; 25], medical imaging, bio-informatics and many others. Some claim to manage knowledge through the CRM applications [12] or project management. Decision support systems built in various domains such as process control [10], diagnostic, and risks management are also dealing with knowledge; some of their initiators were able to build a relative knowledge flow incrementally. Business intelligence uses mainly search engines and data and text mining techniques. Some companies and organizations have built collective experience to reuse it for diagnostic based services or for risk management. Knowledge-based advisory and learning systems are also the potential bricks of a knowledge flow, as are the help desk systems off and on-line.

While many of these KM building blocks are running separately (Figure 1), in some cases they are available on intranet or on the company website.
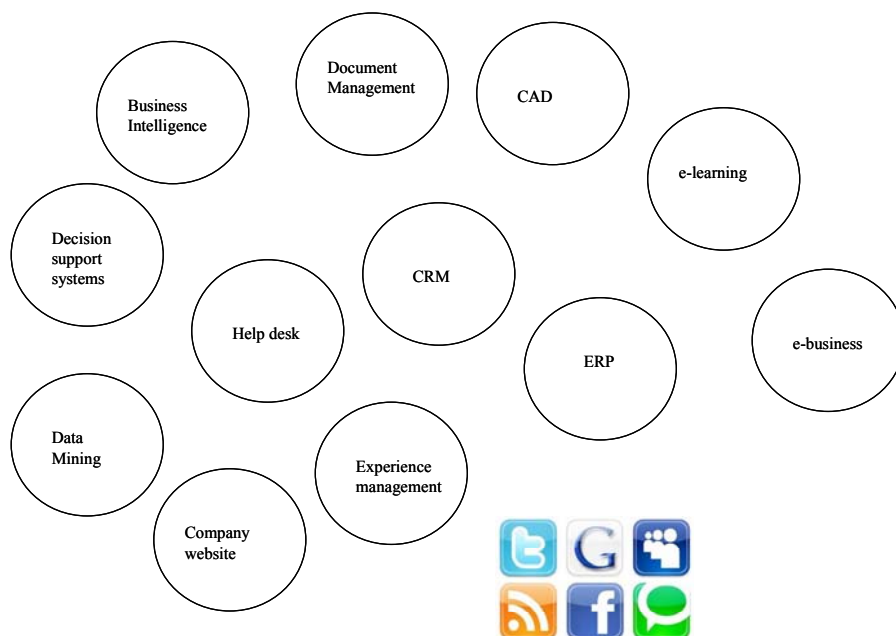

Figure 1. Knowledge Management blocks

Source: author's elaboration.

The companies practicing the tool-based separate blocks KM have to work with a lot of software providers and services providers. Only few companies feel the real benefit of having an optimized knowledge flow.

The Storytelling technique described by J. Seely Brown [33] from Xerox Park inspired probably by knowledge transfer method for knowledge-based systems was introduced on the market by S. Denning [9] from the World Bank in the fall of the 1990s and tried by such companies as Danone.

Many KM conferences involving companies are about web 2.0 influence. Their organizers consider that web 2.0 brought a significant contribution to the development of KM in companies. In fact web 2.0 provides just some multimedia services, embryonic semantic web, social networks and RSS flow [38] without any knowledge modelling and processing. Some authors claim the ontology being the part of web 2.0; in fact ontology has been introduced in 1994 with conceptual knowledge models [18; 24].

3. Evolution of business

The context of today business is evolving very quickly. The planes and the Internet are the main factors of globalization and hypercompetition follows [8]. Internet initialized e-commerce and other global activities, but brought also the information overload, because from the beginning nobody was worried about how to organise information and how to manage the jams on the information highway. We became e-society living in ubiquitous e-networks world. Technology evolves very quickly; new computer-like devices such as iphone connected to web 2.0 brought more e- and m-services such as distance work and meeting facilities, access to social networks, map-based or GPS guidance, RSS flow of information or improved search engines. The paradox is that the more the technology is performing, the more spam we get and more protection we need against cyber criminality [38]. As a result we have less time to focus on innovation.

This irreversible global change, search for cheaper workers, and worldwide economic crisis, generate the unemployment in the developed countries and are the principal cause of "dying" of regions. The transportation of goods around the world contributes to the global warming; it is urgent to take care of our planet and reduce our impact on ecosystems. We have a global crisis to manage. In this situation the innovation is considered as the only issue able to create jobs and boost the economy. Some IT companies decided to "go green", ecology trend is also a great opportunity for new business. However, the Information Society has to learn how to harness technology and how to take a real business advantages from it.

From the economic point of view we enter to the knowledge economy era (Figure 2), and the biggest difficulty is to manage the intangible, while many companies are still acting using the industrial era logic, and "faster, cheaper, better" approach.
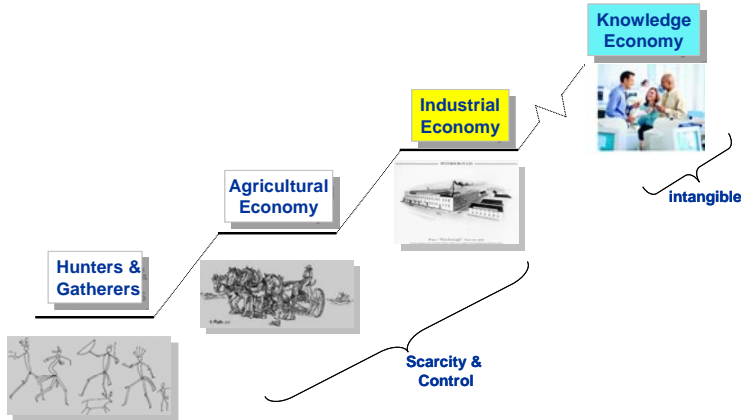
Figure 2. Evolution of economy

Source: [26].

In 1997 D. Amidon published the table of 5 generations of management [2], shown in Figure 3, inspired by C.M. Savage [29].

	1st Technology as the Asset	*2nd Project as the Asset*	*3rd Enterprise as the Asset*	*4th Customer as the Asset*	*5th Knowledge as the Asset*
Core Strategy	• R& in Isolation	• Link to Business	• Technology/ Business Integration	• Integration With Customer R&D	• Collaborative Innovation System
Change Factors	• Unpredictable Serendipity	• Inter-dependence	• Systematic R&D Management	• Accelerated Discontinuous Global Change	• Kaleidoscopic Dynamics
Performance	• R&D as Overhead	• Cost-Sharing	• Balancing Risk/Reward	• 'Productivity Paradox'	• Intellectual Capacity/ Impact
Structure	• Hierarchical; Functionally-Driven	• Matrix	• Distributed Coordination	• Multi-Dimensional 'Communities of Practice'	• Symbiotic Networks
People	• We/They Competition	• Proactive Cooperation	• Structured Collaboration	• Focus on Values and Capability	• Self-Managing Knowledge Workers
Process	• Minimal Communication	• Project-to-Project Basis	• Purposeful R&D/Portfolio	• Feedback Loops and 'information persistence'	• Cross-Boundary Learning and Knowledge Flow
Technology	• Embryonic	• Data-Based	• Information-Based	• IT as a Competitive Weapon	• Intelligent Knowledge Processors

Customer *Retention* ➔ Customer *Satisfaction* ➔ Customer *Success* ➔

Figure 3. Five generations of management methods

Source: [2].

Knowledge Economy corresponds to the 5th generation of management. The main characteristics of this generation are: collaborative innovation systems,

impact of intellectual capacity, company structure evolves to symbiotic networks, employees are knowledge workers, company becomes a learning organization and technology provides intelligent knowledge processors. The collaborative innovations systems involve clients and other stakeholders in the company innovation process. In this context the role of KM is to assist all knowledge cultivators both internal and external in their work at individual and collective levels and to help them to transform their ideas into the tangible and intangible success.

4. Future business – innovation as business strategy

We consider that the future business in the knowledge era can develop thanks to collaborative innovation systems. According to H. Schou-Rode [31] approximately 80% of a company's value derive from intangible assets, approximately 80% of new ideas derive from external stakeholders – primarily company's customers, over 70% of new product ideas come from customers. At least 60% of what a company needs to know to be successful resides outside the company. Stakeholders (Extended Business Networks) involvement is vital for success of the company and all participants of the collaborative innovation system. This success also depends on how quickly we detect opportunities together and how imaginative we are to transform them into values for all participants. It depends on our knowledge of needs and our capacity to address new ones. The economic success in the global context depends on such factors as: risks taking, capacity to create new needs, capability to generate the value from links, ability to work with virtual teams and imagination in the business models. Taking care of the ecosystems is our duty, but also could be a new source of business.

5. Collaborative Innovation Systems (CIS)

According to Mercier-Laurent's definition of innovation it is a process *from idea to sustainable success* [24]. The traditional innovation process is closed – only R&D can innovate. To extend it to the CIS, we need to involve internal (participative innovation) and external actors into the whole process [20; 31]. Clients know better what they need and they know our competitors' offers. The CIS has to address their needs and also create new ones. Our needs engineering method can help in technology-based innovation. It is shown in Figure 4.

Partners and distributors can bring an added value to the products/services we invented or the fresh ideas. The right alliances can help us to extend the market or to become leader.
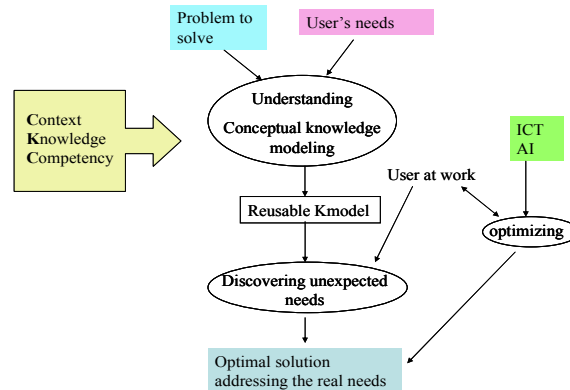
Figure 4. Needs' engineering

Source: [24].

6. Knowledge Management for future business

Several years ago B. Gates wrote a book *Business The Speed of Thought* [16]. He pointed out how far the organized information flow is important for the speed of business. His definition of KM is as follows: "Knowledge management is nothing more than managing information flow, getting the right information to the people who need it so that they can act on it quickly".

In Knowledge Economy we have to go further and switch from information to knowledge. Collaborative innovation systems need the effective knowledge flow [24] including, among others, the following functionalities:

- effective search engines with coherence verification facilities, able of multimedia search, for example the name of the object corresponding to a picture taken with a mobile phone,
- easy knowledge acquisition, modelling and sharing,
- effective opportunity finding system,
- risk management (decision support systems and simulators),
- advice systems to assist companies in reducing the impact on ecosystems able to simulate before doing,
- eco-design systems,
- ideas generators and computer aided innovation systems, able to help us in successful managing of the innovation process,
- automatic translation for multicultural environment,
- m-working facilities,

- real-time learning including several methods such as e- and m-learning, learning by doing, from examples,
- feedback management,
- security, and many others.

Some of the facilities mentioned above are already available, but separately, not included into an optimized company knowledge flow, build applying knowledge-based systems rules, on conceptual knowledge models.

Coherence verification techniques invented for experts systems will be also very useful, particularly for Business Intelligence activities and opportunities hunting. Constraint programming can easily help to verify, among others, the eco-systems constraints.

7. Conclusions and perspectives

From the research point of view the role of the university is to invent or build with existing technological components an intelligent human assistant able to help the knowledge cultivators in their work. It is also to be a guide for companies in the transition from industrial to the knowledge economy and society and educate a new generation of managers able to think differently, to measure intangible, to create values from links, to take risks and to be entrepreneurs and opportunity hunters.

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ZARZĄDZANIE WIEDZĄ W BIZNESIE

Streszczenie: Zarządzanie wiedzą zostało wprowadzone na początku lat dziewięćdziesiątych
XX w. jako nowa metoda zarządzania przedsiębiorstwami. Jednocześnie jest ono widoczne w
różnych systemach opartych na przetwarzaniu wiedzy, takich jak wspomaganie decyzji, dia-
gnostyka, optymizacja, planowanie, kontrola procesów i w innych podobnych zastosowaniach.
Metody i narzędzia sztucznej inteligencji są również używane do zarządzania wiedzą w eko-
nomii, do przewidywania, w dziedzinie ubezpieczeń i w usługach bankowych. Powyższy arty-
kuł przedstawia aktualne tendencje w dziedzinach Knowledge Management, w tym web 2.0, i
opisuje zmiany gospodarcze i ich wpływ na sposoby prowadzenia biznesu w ramach Kolabo-
ratywnych Systemów Innowacji (CIS). Ogólny proces zarządzania wiedzą ma pomóc wszyst-
kim ogrodnikom wiedzy w efektywnym zdobywaniu pomysłów i ich przekształcaniu w warto-
ści ekonomiczne. KM jest również traktowane jako metoda zarządzania dla gospodarki opartej
na wiedzy. Artykuł precyzuje składniki ogólnego przepływu wiedzy (Kflow), niezbędne do
skutecznego wspomagania Systemów Innowacji.