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**INTEGRATED PLATFORM FOR COMPOSITE
KNOWLEDGE MANAGEMENT APPLICATIONS.
KNOWLEDGE-CENTRIC APPROACH**

1. Introduction

Corporate portals are treated as complex solution for knowledge management, but it is rather concentrated on business-centric such as info-centric approach than knowledge itself. It derives from the certain fact, that usage of knowledge is very common in any organization and exists in every action took by human factor. It is as much common as barely noticed. Predominately it is hard to find a special space in systemic structure for knowledge developing processes, although it is much harder to identify and formalize it. It reduces knowledge management to supporting role in organization despite of crucial meaning of it in gaining favourable position on the market.

Knowledge management became very popular lately but is still too difficult to maintain. The main obstacle for KM solution development is the lack of unequivocal model that could be applied into practice. It is caused by the fact, that knowledge management contains of different scientific domains perspectives: philosophy, psychology, organizational behaviours, information and computer science, neuroscience, cybernetics, etc. It determines various knowledge perceiving. For practical solutions we concentrate on informational and technical aspect. We turn towards information systems supported by technology. Information resources give us opportunity to create knowledge centres for further conversion and distribution. But it is impossible to manage any knowledge in isolation of its owner. Every solution of that kind demands the presence of human being.

The answer for the question if it is possible to manage knowledge is as positive as we can manage people. It causes certain difficulties with the scope of influencing and describing both subjects, people and their knowledge, because of their unstructured nature. The followers of H. Fayol's management definition (described by functions of planning, organizing, motivating and controlling) assert the opinion that knowledge management novel trend is unsubstantiated, because of motivation condition not being fulfilled.

However, through the strong association between knowledge assets and human factor in organization, the impact on knowledge motivating is determined by behavioural methods. It implies new conditions being put on knowledge management support systems for more effective utilization of intellectual assets.

It is affiliated with theoretical view on organizational KM. The knowledge circulates among the participants through the main knowledge managing processes, such as: identification and acquisition, distribution, utilization, preservation and development. Terminology of the processes is different in each approach, but despite of that, all have the same life cycle of knowledge in following actions:

- to find,
- to get,
- to articulate,
- to share,
- to keep,
- to develop.

As it is a circle, it is not the end of processing, but on every level the knowledge has new derivative form, which is needed to be discovered. In fact, all of those processes support the knowledge creation, which is main issue in that matter (Figure 1).



Fig. 1. Knowledge management cycle

Source: own study.

Each of the processes has its problem-solving tools. Some of them might associate few processes. Many of them are only social techniques, which lately have found the common ground with computer applications. There appear crucial question: how present solutions support the demands of knowledge management in organization?

2. Present knowledge management solutions

Technological solutions supporting knowledge management cannot yet provide full problem-solving apparatus, because of unstructured nature of the subject. Still there are many doubts where are the boundaries of human brain and intellectual capital of the organization. What are common difficulties with incessant knowledge processing?

Many applications assemble different modules concerning some sort of KM problems. Software providers offer complex solutions for business as well, especially in web environment, collecting mentioned applications. But still it is not enough, because such platform concentrates on informational or business aspect with minor reference to knowledge processing and its referring to organizational achievements. It is also high cost-generating with no results measurement.

Unfortunately there is a discrepancy between what the organization needs and what it gets. Primarily it depends on the level of KM problems awareness and the answer to the question: what are *the real* problems of knowledge management and what is just the need to put through some hype?

There are many tools supporting each of knowledge management process but in many cases those instruments are diffused with no conceptual connection to each other. There appears the need of analysis, classification and evaluation of existing tools such as complex, systemic solutions. For the purpose of this article, the total KM application number of 1000 has been analyzed to compare and appraise the nature of existing problems.

In practice KM supporting applications are only temporary or fragmentary solutions, solving one kind of problem at the time, despite complexity of some of them. In order to have correct perspective to the wide range of offered knowledge management tools, all accessible solutions in that matter have been searched. Accordingly to the fact, that knowledge is being created by human, the search was proceeded with Open Directory Project – large, comprehensive human-edited directory for Web environment in cooperation with AOL. It is the empowering core directory service for following search engines and portals: Netscape, Google and AOL, Lycos, HotBot, DirectHit and many others. It has been created and maintained by global community of volunteer editors. The idea is to follow the footsteps of Oxford English Dictionary but in the Internet environment.

Throughout the research a large number of different tools supporting knowledge management processes was received. The applications were analyzed by the assignment and by solution type and categorized by general process guidelines. The

following groups of tools emerged accordingly to knowledge acquiring, capturing, sharing, preservation and developing:

- knowledge discovery, that includes classification tools, text and data mining,
- conceptual tools for visual representation and knowledge creating,
- collaboration,
- information retrieval,
- online training systems.

Figure 2 presents percentage structure of total offered application for each category. **Knowledge discovery** stands for identifying and acquiring processes. It has been split into classification, data mining and text mining because of different characteristics. Most of common solutions concern tool vendors of data mining. Many of them provide applications for decision support systems, OLAP and 3D-data presentations as well. Low percentage of them provides neural network solutions. *Classification tools* have the lowest percentage of total number of solutions despite provide different kind of solutions. From common text sources organizing and publishing tools to advanced application grounded on CIRCA technology (Conceptual Information Retrieval and Communication Architecture) – ontology-based approach for knowledge organizing from unstructured contents – used for content management. *Text mining* concerns document collections analysis, information extraction, classification and clustering.

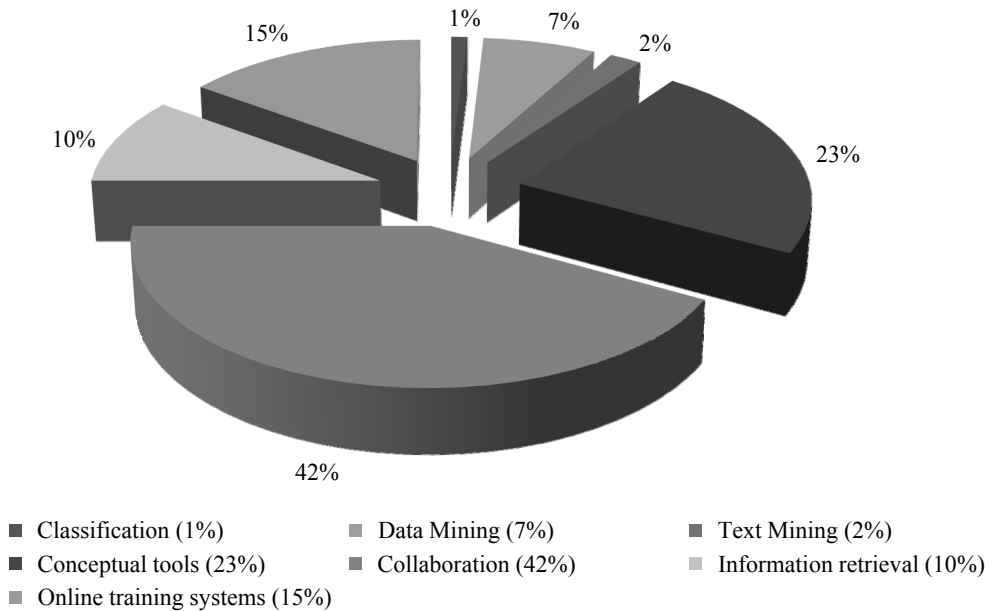


Fig. 2. Percentage of offered solutions per total KM software available on ODP

Source: own study.

Conceptual tools for creativity have rather wide range of implementation from idea-, concept- and mind mapping, diagramming and personal time scheduling as well. It concerns mostly visual /textual outlining, rapid-fire brainstorming, concept/mind mapping (over a half of total number of analysed applications) and storyboarding. That group of tools is very interesting in the field of knowledge mapping, sharing and evolving. It can be used individually and also as a groupware. Conceptual working support tools are quite numerous – simple, usually Java applications that are based on Tony and Barry Buzan's concept of effective learning. Unfortunately it is rarely affiliated with other applications supporting KM.

The analysis of total percentage values might be misrepresenting without any deeper inquiry. The most common are the **tools for collaboration**, which is about 23 percent. It comes from the fact that most of application is based on groupware, which at present is requisite for net communities (Lotus Notes, Microsoft Exchange, Novell GroupWise, OpenGroupware.org) and wide range of very popular lately instant messaging tools and application for project management. **Information retrieval** applications include some of classification tools, clustering and search engines, and some of them are based on web agents. **Online training systems** group consists of e-learning platform, online training (most of it includes just information from chosen domain – less interactive), online classrooms.

In fact, most of the applications support the information management processes: gaining, collecting, presenting and distributing. There is a small amount of tools based on content and context approach. Knowledge itself appears only within the appearance of the user. How does it inflict on organizational knowledge assets then? We can observe the natural need of binding all KM aspects to provide continuity of knowledge flow.

Corporate portals are common solution in practice. It has specialized from intranet form into a complex information platform collecting tools and features used for facilitation work of users in organization. As portal construction focus is on horizontal range of users, vortal appeals to them vertically, according to particular interest. In the field of KM, corporate portal provides tools for accessing, distributing and managing unstructured information in organizational heterogeneous environment.

Knowledge discovery processes (*to find* and *to get*) are supported by data warehouse solutions. It includes data mining, mapping, modelling, acquisition and management. For knowledge collaboration (*to share*) web portal are designed. Web portal framework gives dynamic web content management, that showcases personalized web information for the specific user. Moreover, it includes the whole package of communication and interaction features, such as: message boards (online communities, chats and forums), collaboration rooms, instant messaging, e-mail, integrated calendars and schedulers. For information retrieval (*to keep*) corporate portals provide high performance and availability of information by mechanisms of catching and clustering. The exposure of information/data repositories depends on security

level, controlled by such features as: authentication and authorization, single sign-on, web traffic monitoring, integrated user management and secure communication. So called *Business Intelligence* solutions in practice apply to data mining, Internet searching, economic forecasting and reporting. It works on databases, warehouses and query system. It operates on integrated, transformed data from corporate portals mostly for decision problem solving.

Another complex tool dedicated for KM is **corporate wiki**. It bases on web portal environment and improves content management processes through its flexibility. The impact is put on knowledge sharing by common glossaries, managing related information and collaboration between corporate users. It is very often based on open-source applications created by as much developers, as users themselves. It gives opportunity for project groupware, although the constraint for effective corporate usage is the lack of accession and integration with other corporate applications.

Most of corporate portals exclude training systems, which are treated as separate solution, if at least applicable in the organization. And most uncommon features are dedicated for conceptual work and knowledge creation, as required as part of integrated KM platform. In practice no system of content management corresponds to dynamic personal and social knowledge building modules.

Integrated, complex system should responds to the demands of knowledge management in enterprise. Although most of the KM systems are “inadequate for effective business performance” [Malhotra 2004, p. 103]. It is usually caused by the nature of inputs (data, information rules, procedures, best practices, information technology), that are practically insensitive to business environment changes. Additionally there are many variables, strictly connected with human beings, such as: attention, motivation, creativity, innovation, commitment, that are difficult for system to manage and control. For better knowledge management systems should be agile, flexible and respond to every appearing knowledge management demand. Therefore in such systems social and psychological aspects, approaches and methods need to be applied.

3. Knowledge management demands

Knowledge management derives from social psychology conceptions, which are driven by philosophy drifts [Goff 1980]. According to René Descartes, who assumed the existence of totally determined reality (based on Newton’s universe model), a human being is the element of *res cogitans* – mind, consciousness, opposite to *res extensa* – the matter, everything what is beyond [Descartes 1970]. He operated on objective knowledge (developed by Pierre Simon de Laplace), which implied possibility of any object description through the specification of its parts. The completion of this perspective had been made by Descartes’ opponents. George Herbert Mead places the conception of human being existence in objective reality, not in the mental one [Mead 1967]. He depicted personality as the node of social interactions

and the reality as the emergence of different forms (not as static, solid substance). He differs:

- “I” as the active part of personality, that corresponds with indeterminacy and will,
- “Me” as a part, that has been socialized under the process of role-taking, that both exist in mutual association, that implies total identity in the process of interactions and communications with the “significant others”. The individual is becoming socialized while playing roles and taking perspectives of “significant others”. It is called “play phase”. The roles and perspectives of “generalized other” give the meaning and rules of the group as the whole. It is called “game phase”. The final form of “generalized other” is the society or the whole humanity.

Charles Horton Cooley claimed that in human experiences there is no such thing as separate, abstract individual and there is no society separated from individual as well [Cooley 1902]. Individual and society is only collective and distributive facet of the same being. Perceived objects of social environment are the crucial elements of individual psyche. The relation between individuals consists in the relation between the idea of one individual and the rest of the mind. The image stands for direct reality. The basis for personality creation is the communication process. There are the same rules with knowledge creation. Individual knowledge is strongly attached to social aspects. It may differ on the level of single perceiving, but still derives from society knowledge premises, being shared through communication process.

Individual approach is based on *associationism*, which presents the proposition that all complex psychic actions (perceiving, learning, reminding, feelings, etc.) are created by association of elemental (atomic) parts such as sensations. Psychological *atomism* is the conception based on psyche model compound of basic, primary elements: sensations, impressions, will, thoughts and feelings. According to psychological aspect we can generalize them into two main streams of knowledge processing: perception and cognition. Perception corresponds with *res extensa*. It includes such elements as: sensations, impressions, will and feelings, which are reactions to the matter outside the individual. Cognition represents brain processing inside the individual (*res cogitans*).

The difficulties with knowledge formalization come from that one, which is perceived by individuals. The forerunner of the trend of individual knowledge, known as ‘tacit’ was Michael Polanyi. Individual knowledge is guided by exploratory and creative acts (Polanyi, 1998), that are connected with personal feelings and commitments. It determines all of variables in KM system, listed in chapter 2. In Polanyi’s theory the discovery acts, that correspond to personal knowledge, are motivated by passions, but he puts emphasis on dialogue with open community. As a conclusion we have guidelines for perceiving individual and organizational knowledge: knowledge should be treated first individually and than in social aspect.

This thought was expanded by Ikujiro Nonaka and Hirotaka Takeuchi, whose model of knowledge management defines main guidelines for complex perspective

on its dynamic nature [Nonaka, Takeuchi 1995]. The main problem with KM is, how to effectively manage dynamic knowledge creating processes. They proposed non-linear conception, based on 3 perspectives:

- Conversion processes (known as SECI: Socialization, Externalization, Combination and Internationalization);
- BA (Jap. 場 – field, place¹) – concerns the area of knowledge sharing through interaction processes such as: originating, dialoguing, systemizing and exercising;
- Knowledge assets.

Combination of these three elements gives Nonaka and Takeuchi SECI model of knowledge creating in organization. Conversion processes gives the walk-through between personal (tacit) knowledge and the structuralized one (explicit). Areas of knowledge sharing add the dimension of sharing perspective, divided into:

- entity – individual (originating, exercising) and collective (dialoguing, systemizing),
- communication channel – face-to-face (originating, dialoguing) and virtual (exercising, systemizing).

Knowledge assets are the base for SECI model, which provides the following types:

- experiential – concerning tacit knowledge deriving from common experiences and individual skills, predispositions, know-how, passion, as much as the feelings like care, love and trust;
- conceptual – concentrated on explicit knowledge represented as conceptions, designs, etc., operating on language, images and symbols;
- routine – connected with best practices in daily operations, routines and organizational culture;
- systemic – everything concerning formalized explicit knowledge, that are databases, documents, manuals, specifications, patents and licences.

Working on those three levels (knowledge assets, areas of sharing and conversion processes) we find the conception of knowledge management framework set on two dimensions: epistemological and ontological. Epistemological approach gives the proposition that only individual can create knowledge. Although it cannot exist without social aspect, which amplifies the effect of building organizational knowledge. Ontological approach requires the processes of interaction (e.g. between tacit and explicit knowledge or among the each individuals).

Dynamic nature of knowledge causes the tendency for unceasing evolution. Knowledge-centric approach to organization provides the attention to the need of continuous knowledge processing. It includes all of activities related to knowledge management, which is simply the effort for organization how to learn. It is concentrated on the main issue: the process of knowledge creation, with the support of other processes responsible for knowledge flow in organization. Highly important

¹ Own translation.

is to remember, that the nature of knowledge is not constant, but is durable and can be always reused.

The phenomena of organizational learning is not any novelty but accordingly to KM systems, there is a need to exhibit this aspect as an abstract of knowledge-centric organization. That kind of solutions is dedicated particularly to enterprises that notice the necessity of turning towards intellectual and knowledge assets. Knowledge-centric approach in KM systems concentrates on those processes, that are strictly determined by the concept of organizational learning.

4. Composite apparatus for knowledge management applications

As the conclusion from the research on KM tools and determinants driven by psychological background, main premises for knowledge management system can be made. There is a high importance of individual priority, which is based on contextual condition of knowledge creating. Therefore KM system should be conceptually reduced to individual level – personal knowledge management system (PKM). Figure 3 presents the conception of complex PKM, based on existing informational environment.

The crucial components are combined together on integrated platform, using all of available applications supporting information management. For knowledge management there is whole set of specific tools, that are normally distributed and not contextually bound. The main proposition of the model is to provide maximum of flexibility and adaptation for individual KM needs. Therefore all knowledge flow and processes are supervised by agent modules, which communicate with all of features from existing information system.

The model of composite personal knowledge management system responds to the needs and demands, defined in previous chapter. On the top there is a knowledge-centric organisation with some sort of mission and strategies realized by management system, which implies the form and functionality of information system. In the model there is assumption, that the enterprise uses web environment by portals or mashup solutions. It can be very useful for creating dynamic interface dedicated to knowledge management. It does not have to differ from existing one, with the exception of possibility for free creating an adaptive knowledge work environment, dedicated to the individual user. The simplicity of tool usage has to induce users to make the most of available features and create own knowledge creating programs. Agent systems have to control user's actions and help to adapt to individual course. User profiling is dedicated to experiential knowledge assets, which are based on epistemological approach. The knowledge created by individual is captured by agent and delivered into social aspect with the support of available KM tools. On the other hand agents help with searching and filtering specific information for the inquiry of the user. KM applications integrated on representation and application layer help with users' interaction and knowledge sharing.

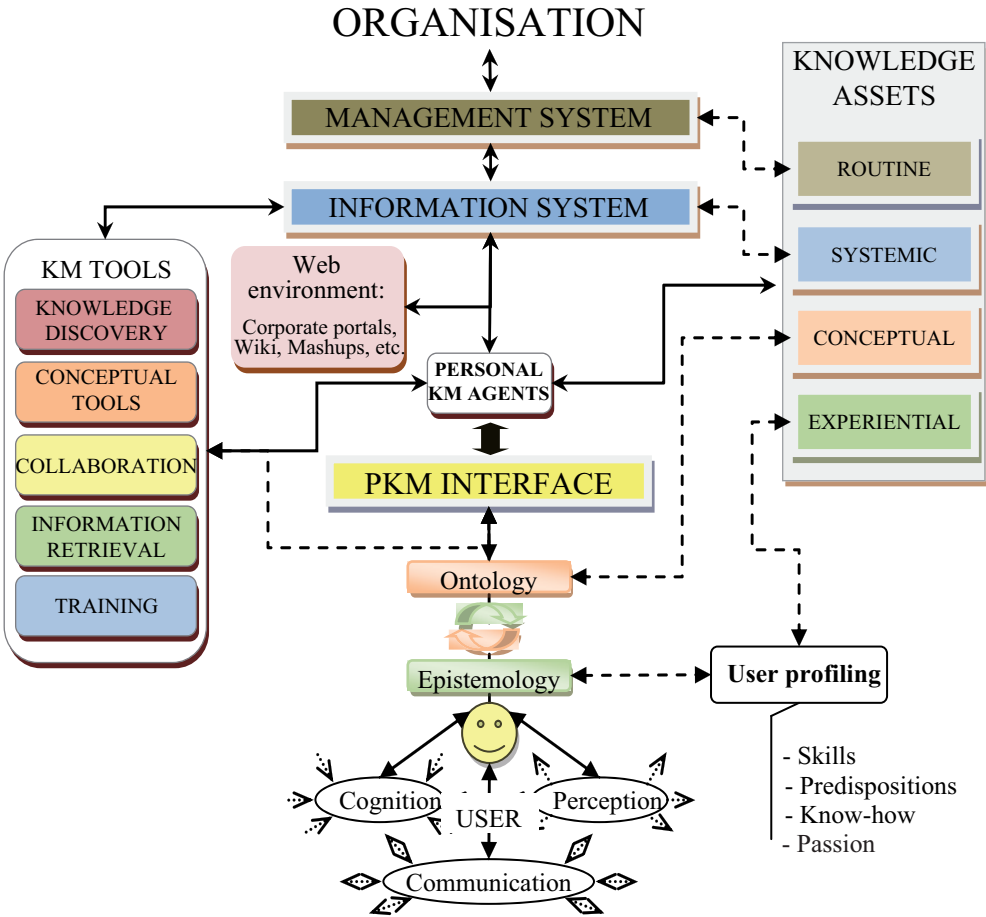


Fig. 3. Conceptual model of composite personal knowledge management system

Source: own study.

The base of the model is the conception of individual knowledge creating with common share of resources (information and knowledge repositories). Moreover it should be also working in multi-user environment. Personal KM system is designed for single users or homogeneous groups, e.g. working over the same project. Knowledge management system dedicated to the whole enterprise should be combined with many atomic PKMs. To provide the communication between knowledge users, the system should exist as a network of distributed, but integrated through information processes, personal KM subsystems. The impact put on the availability to create individual knowledge in organization, with complexity of tools and strong presentation, communication and real-time interaction side gives the opportunity to break the barrier of effective knowledge management in organization.

5. Conclusions

Practical categorization of KM tools is rather chaotic. Many of the solutions pervade each other, however still do not solve problems comprehensively. Integrated application solutions do not provide complex knowledge management problems solving. The research over the usage of KM features gives wider perspective on discrepancy between what we need in KM and what we get. Knowledge management solutions evolution is inevitable. It is based on statement that personalization of information flow helps the knowledge creation, as much as communication and interaction between users helps with knowledge distribution. Existing solutions such as corporate portals, wikis or functionality of mashups, gives great opportunity to apply existing features into knowledge management field, accordingly to crucial statements of that matter, and try to start solving problems not only partially.

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ZINTEGROWANA PLATFORMA DLA ŁĄCZNEGO WYKORZYSTANIA NARZĘDZI DO ZARZĄDZANIA WIEDZĄ. PODEJŚCIE WIEDZOCENTRYCZNE

Streszczenie

Zintegrowane narzędzia informatyczne nie zapewniają w praktyce kompleksowego rozwiązywania problemów związanych z zarządzaniem wiedzą w organizacji. Dokonana w artykule analiza wykorzystania poszczególnych kategorii aplikacji dostarcza szerszej perspektywy ukazującej rozbieżność między stanem obecnym a oczekiwanym.

Portale korporacyjne, traktowane obecnie jako kompleksowe narzędzie do zarządzania wiedzą, skoncentrowane są raczej na aspekcie biznesowym niż na samej problematyce wiedzy w organizacji. Ze względu na niezaprzeczalną wszechobecność wiedzy trudno określić jej konkretne miejsce

w strukturze systemowej. Ze względu na jej rozmyty charakter znacznie trudniej jest ją jednak identyfikować na bieżąco i formalizować. Sprawia to, że zarządzanie wiedzą sprowadzane jest wyłącznie do służebnej roli w organizacji, pomimo kluczowego znaczenia dla osiągnięcia przewagi konkurencyjnej.

Rozwój narzędzi służących zarządzaniu wiedzą jest nieunikniony. Istniejące rozwiązania, takie jak portale korporacyjne, wiki czy mashupy, pozwalają na implementację poszczególnych aplikacji służących zarządzaniu wiedzą, które w połączeniu stwarzają możliwość rozwiązywania problemów nie wycinkowo, lecz kompleksowo. W artykule przedstawiono koncepcję łącznego wykorzystania narzędzi rozwiązujących problemy związane z realizacją poszczególnych procesów zarządzania wiedzą.

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