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## **FUNCTIONALITY OF INFORMATION TECHNOLOGIES SUPPORTING KNOWLEDGE SHARING IN ORGANIZATIONS**

**Abstract:** The majority of global corporations become “knowledge companies” – companies where knowledge becomes one of the most valuable assets. Rapid development of computer networks supported by expansion of Internet allow companies to exchange knowledge without geographical limits. Knowledge management in organizations may be divided in six key competencies: identification, acquisition, development, sharing, utilization, and retention of knowledge. The article focuses on knowledge sharing and distribution as a key process that supports companies’ effective development. Latest technologies and Internet development gave possibilities to create hardware and software innovations capable of almost full support of knowledge sharing and distribution. Instant communicators, VoIP and web mash-up technologies are just few samples. Lack of geographical restraint requires a new approach of designing knowledge sharing systems. The new approach suggests building systems adjusted to IT systems complexity and data diversification present in organizations. Taking it to consideration, supported with proper corporate culture, adjusted IT infrastructure and standardization of data formats may result in good choosing of knowledge sharing and distribution system.

### **1. Introduction**

Over the past two decades, the term “knowledge worker” has settled in almost every company around the globe. On the one hand, as a next level approach to management, and on the other – as a result of continuous, rapid development of technologies and market demands.

In a large number of companies, especially those closely connected to high technologies, knowledge appears to be a major asset that creates most of their value. Importance of organizations’ intellectual assets was not to be ignored. New competition environment required innovative management approach and tools, accustomed to support effective use of knowledge in every meaning.

Communication between people in organizations is the essence of knowledge management. Effective teamwork and information flow are just at the tip of the

iceberg of areas, where communication plays a key role. It also seems to be a synonym to a process that determines modern organization's synergy: sharing and distribution of knowledge. Creating spaces for fluent knowledge flow has become a challenge, since organizations extended their scope globally and competition demanded quick responses.

Information Technology (IT) is believed by the economists and business historians to be one of the latest in series of general-purpose technologies – innovations that are so significant that they cause jumps in an economy's normal progress [McAfee 2006, p. 142]. Companies see the IT not only as a resource, but also as a key element in their strategies. Nowadays, an IT infrastructure determines modern organizations' performance. The way it is designed may have a strong impact in quality of data analysis, business processes, supply chains, etc. [Accenture 2005, p. 2]. Internet, as a part of the IT evolution, has become a medium that seems to have unlimited potential. It created new space for competition among companies, expanding its range to worldwide. What is more, it raised some of today's richest brands, such as Google or Amazon.

Internet also revealed opportunity to go global. Having research and development center in one country and production lines in another is no surprise. It is even essential to improve capabilities and reduce costs. But even with various possibilities of communication and no limits in data flow provided by the Internet, adjusting and implementing a proper knowledge diffusion system remains to be done.

This paper's aim is to prove that effective management of knowledge diffusion is fully possible only with IT support. On the following pages, you will be given an idea of how knowledge management is defined and provided with a background of modern IT topology. Next, it will be explained why Information Technology plays a key role in knowledge diffusion along with the assumptions required to be taken when implementing a knowledge sharing system. At the end, there will be presented a range of possible solutions that depend on organization's characteristics.

## 2. Knowledge management in modern organizations

Knowledge management as a whole should not be seen as a latest technology outcome. Knowledge management systems are not data storage and supply applications, since knowledge is hard to codify. To provide a clear explanation of what knowledge management is, we should start from the definition of knowledge.

G. Probst, S. Raub and K. Romhardt, in their book *Managing Knowledge*, describe knowledge as a whole body of cognitions and skills that are used by individuals to solve problems. It is based on data and information, but strictly bound to persons [Probst et al. 2000, p. 24]. Using knowledge is determined by individual approach and experience.

Concluding – knowledge management is actually managing people, communication and the cooperation between them, in a context of knowledge they possess.

Knowledge management system are all processes, technologies and activities that support evaluating and managing knowledge assets in an organization. According to the model presented by Probst, Raub and Romhardt, organizational knowledge management consists of closely related core processes of knowledge management. They distinguish six of them:

**Knowledge identification** – analyzing and describing company’s knowledge environment and assets.

**Knowledge acquisition** – importing knowledge from outside sources such as customers, partners, competitors, etc.

**Knowledge development** – generating and developing new skills, both individual and organizational. It involves also other learning processes, developing new products and ideas.

**Knowledge sharing and distribution** – process of sharing and spreading knowledge which is already present within the organization.

**Knowledge utilization** – a productive use of knowledge in the company’s everyday activities.

**Knowledge retention** – selecting, storing and regular updating of organizational knowledge.

The core processes of knowledge management should be directed by carefully selected goals that determine the strategy of developing organizational knowledge potential. A knowledge assessment process should be applied to provide measurements and feedback, essential for effective adjustments.

Careful management of knowledge-based processes is critical for every company. Search for improvements in every cell of organizational “organism” requires involving all factors that may have any influence, starting from the lowest levels of the hierarchy. This forces to consider all employees as knowledge workers, focus on their skills and experience and direct them towards the realization of strategic targets.

Efficient communication, along with the best methods to share knowledge and distribute information in as many units from interior and exterior of organization as required, results in better creativity, quicker problem solving and minimizes the amount of mistakes. Outstanding companies deployed knowledge management into their philosophies long time ago. For instance, Toyota, a world’s leading car manufacturer, does not look at its employees just as if they were pairs of hands, but it sees them as knowledge workers with experience on the company’s front lines. It invests heavily in people, and garners ideas from anyone and everywhere: the office, the production hall, the distributors [Takeuchi et al. 2008, p. 98].

Among the core processes of knowledge management, sharing and distribution of knowledge within organization plays a key role. It was defined as getting the right knowledge present in an organization to the right place [Probst et al. 2000, p. 165]. Delivering insight to knowledge in any possible form, whether it is a report from previous similar project or personal advisory, can be critical factor in decision mak-

ing process. A knowledge distribution system should be an environment that enables communication among employees and give access to codified knowledge. It should make the knowledge easily accessible and affordable. It gains a new meaning if the company operates worldwide and people cooperate simultaneously from two opposite parts of the globe. Importance of proper knowledge distribution is well understand by Accenture, a leading IT consulting company. It holds the biggest database among the companies that contains data, reports from previous projects and best practices. It is also forced by organization culture: any consultant can be called by another for advice at every time, and is supposed to get the response in twelve hours.

Due to new approaches to management, nowadays the definition of knowledge sharing should be extended and include knowledge that is also present outside the organization. A large amount of narrowly specialized companies caused projects that are now more often run by one or more companies, for instance as joint-ventures. Such partnerships give the participators an opportunity to exchange knowledge and experience while working on a common project. New technology gave organizations way to expand its innovative capabilities. Co-creation, which is a new approach to innovation, gets customers and business partners involved in product creation process. Presented practice was successfully conducted by LEGO, that invited customers to suggest new models interactively. Websites based on Web 2.0 technologies make the final prove – according to report presented by McKinsey and Company, user-generated media websites increase their number of visitors in 100% every year, comparing 20 to 30% in traditional websites [Bughin et al. 2008, p. 5].

### 3. Information technology overview

According to survey conducted on IT executives by Accenture, 87% of them think of it as important capability, not just resource with a supportive function [Accenture 2005, p. 2]. This redefines IT to be one of the key components of competitive advantage, having strong influence on company's performance. Organizations must actively scan for possibilities that new technologies bring and assess if any of them may be adopted. Strong competition leaves no place for loss leaders. Technologies likely to boost company's performance should be deployed without hesitation.

Another argument supporting usage of information technologies lies in companies' profiles. They are no longer local businesses but global organizations. Efficient IT is crucial for coordinating operations on such scale in its every part: management, finances and communication. Computer technologies support almost all of the business processes.

Investments in IT also result in significant costs reduction. This happens in two ways. First is the potential of analytics. A wide range of tools enables managers to have an insight view in organizations measurable indicators. Conducting analysis

and simulations using available data help them find strengths, weaknesses, possible causes, effects and others. This helps to adjust business process and cut the cost.

Second is continuous fall of data storage costs, even up to 20% every year [Kaplan et al. 2008, p. 1]. Electronic documentation and forms are already dominating. Technology gives possibility to store any kind of data, from text to advanced multimedia. Costs are being cut dramatically not only by reducing space for storing, but also by giving immediate access to archival data. Some companies made it priority to reduce usage of paper for its documents in order to operate more efficient in matter of time and costs. American insurance company, eSurance, reduced almost by 100% the usage of paper in company, leaving all formalities to be done online. That enabled company to reduce prices of car insurance policies.

Information Technology (IT) is the study, design, development, deployment, support and management of computer-based information systems, basically hardware and software.<sup>1</sup> It manages all the processes connected with information storing, processing, transmitting, securing and converting. Information technology system is a set of hardware, software and processes that work together or simultaneously in defined scope.

For the past twenty years we have witnessed a rapid development of IT. It covers so many fields, that for some it has no longer supportive function, but it is a main part of strategy and existence of organizations. In a large amount of them, IT maintains an operational environment, a dimension through which companies function.

For the purpose of this article, the structure of Information Technology is presented to give better understanding of knowledge sharing technological background and challenges that it deals with. It is presented in the organizational context.

The first criterion is complexity of the information technology system as a whole. **Simple IT systems** are small scale and their tasks are limited to operations that have tactical meaning. They are common in small organizations and number of its users do not exceed the one of organization's employees. Systems of **developed complexity** have extended range (usually to region or country, but not necessarily), advanced network combined of local networks cooperating through Internet and extended number of multiple users. That kind of system works to achieve both strategic and operational goals, mostly used in medium sized organizations and with large geographical scope. **Complex systems** are commonly seen in large scale organizations, usually operate globally. They use a wide range of specialized software with a large number of multiple type users. This whole system is a main participator in achieving strategic, long-term goals.

The second criterion is the amount and diversity of data that is being generated or processed inside the IT environment. **Low level data diversification** occurs in small and medium organizations, where data are used for operational purposes, and it generates small amount of data. **Common data diversity level** exists in medium-

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<sup>1</sup> As defined by the Information Technology Association of America.

sized and large organizations that may generate large amounts of data but not diversified in type. **High level of data diversity** is present when systems generate and process large amounts of multiple types of data. This appears in systems that operate in medium-sized and large organizations, operating in a large geographical scale.

Latest outcomes based on Web 2.0 trends enabled human potential to speak openly. Approach of building user-generated content websites was quickly adopted for corporate usage, though it still has yet to discover new capabilities of those technologies and unlock their full potential. Knowledge sharing is also about communication, so we can witness a development of sophisticated, both software and hardware, communication platforms.

**Mash-ups** are web applications that combine data from various sources into a single tool. Google Maps use this technology to provide real estate data and locate them on the maps. Corporate mash-ups are extensively used for data aggregation and presentation, they generate an end result suitable for users and other applications.

**Internet blogs** (web logs) are web sites used by individuals that work as web diaries, with a capability of adding multimedia contents. Third users have the ability to add comments in an interactive format. They became popular method of public relations and releasing unofficial information. Among corporate Intranets, they are powerful tool for effortless sharing of knowledge, information and opinions.

**Wikis** are collections of web pages, designed to enable any user who access it to contribute and modify its content. They are used widely in collaborative and community Web sites. The best known wiki is Wikipedia.org, the world's largest free encyclopedia. Companies use it as common knowledge management tool.

**Instant messaging (IM)** is a form of real-time communication based on text messages. Two or more people communicate using computer connected to the local network or Internet. IM software have some other capabilities such as using webcams or talk directly over VoIP. Although IM is used by millions of individuals all over the world (the most popular applications are Yahoo! Messenger and Microsoft Messenger), it was instantly adjusted for corporate usage to expand communication efficiency. Due to some security and legal conditions, corporate software is based on custom configured company servers and uses advanced encryption methods such as SSL. The most common Enterprise Instant Messaging systems are Lotus Sometime, Microsoft Office Communication Servers and Jabber XCP.<sup>2</sup>

**VoIP** (Voice over Internet Protocol) is the technology with the greatest business potential. VoIP is nothing more than ability to make phone calls through Internet connection. The difference is that the speech is converted into digital data that can be stored, manipulated, processed, copied, searched, combined with other data and redistributable to every person connected to network. Other advantage is, apart from obvious cost reduction, that VoIP is easier to coordinate, more secure and precise in communication on the basis of when and why it is being sent and to whom. There

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<sup>2</sup> Source of the definitions above: [www.wikipedia.org](http://www.wikipedia.org).

have already been researched and experiments running to integrate the VoIP with databases, work flow, knowledge management software and others [Werbach 2005, pp. 140-147].

#### 4. Information technologies supporting knowledge sharing

Effective deployment and functioning of knowledge sharing system requires the following conditions:

**Corporate culture.** The best possible technology solution will fail if the organization does not foster and encourage the culture of free knowledge sharing. It must be a culture of trust and teamwork, with a right to speak what is on people's minds. There also must be a certain level of tolerance for mistakes and competition among employees should be highly avoided. Google successfully maintains the atmosphere of teamwork with a high risk tolerance, having in mind that error and innovation go hand in hand [Iyer, Davenport 2008, p. 66].

**Adjusted IT infrastructure and interface.** Infrastructure plays a key role when considering performance. It should be built up to organization scale and needs, with usefulness on mind first. System should be also elastic enough to expand its capabilities up to company's growth. Simplicity is also well seen. It enables intuitive usage, so knowledge workers focus on things that really matter. Cost efficiency when choosing a solution should be also considered and carefully analyzed.

**Standardization of data formats.** All systems and data must have maximum compatibility. This feature guarantees that any information sent is accessible and able for processing. Using standards reduces the problems and increase the number of possible solutions. The compatibility with external systems and environments should be also considered, especially with company's strategic partners or customers. Open source software communities have thousands of members all over the world. They use as simple solutions as e-mails while working on programs source codes just to be sure that information spread can be read by everyone involved in a project [Evans, Wolf 2005, pp. 96-104].

Choosing an adequate system requires careful analysis of organization's needs, its characteristics and processes. Deploying such solutions often requires changes in the organization if its structure does not meet the market demands. Building a framework for choosing a proper solution required different approach. The organization structures and functionalities became more complicated to classify, so IT solutions for knowledge sharing and distribution should be considered from the perspective of IT infrastructure complexity and data diversity. It is based on the following assumptions:

- knowledge sharing and distribution through IT is mostly constricted to sharing and releasing codified knowledge, which is information;
- data diversity determines processes of publishing and exchanging data;
- an IT infrastructure complexity reflects the organization's structure and characteristics.

Choosing that approach may help to find applications that will efficiently manage access to information and corporate expertise, communication among knowledge workers and allow to codify and store knowledge.

Table 1. Requirements of implementing certain knowledge sharing systems

Level of data diversity	Simple IT system	System of developed complexity	Complex system
Low	Solutions based on using applications for browsing standard data formats, a simple computer network with data access management provided by operating system. Instant messaging and VoIP software required while remote working.	Occurs within project groups. Requires a data access management and advanced network. Knowledge exchange is realized by web solutions such as e-mails, Wikis, blogs. Instant messaging and VoIP software highly required.	Intranet portal, wikis, corporate VoIP networks adjusted to communication canals highly required. Certain organizations may require commercial solutions or custom made systems.
Common	Requirements as above, with additional advanced data management and conversion applications.	Requirements as above, with sophisticated data/content management systems and more functional communication networks (corporate VoIP network)	Requirements as above, with additional advanced data management and conversion applications.
High	Communication networks accustomed to handle large amount of various data types. Advanced data conversion/presentation applications highly required, along with efficient high storage database.	Commercial solutions required, custom made systems if applicable. Efficiently designed Intranet portals, advanced Wiki sites, blogs and VoIP networks also recommended.	Requires fully functional, commercial solutions specialized for knowledge management or custom made system. Corporate Intranet portals, advanced Wiki sites and corporate VoIP networks highly applicable.

Source: own elaboration.

Applications supporting knowledge sharing deliver certain functions to enhance the performance of communication, information management and distribution of knowledge.

Simple IT systems with low level data diversity require adjusting methods included in operation systems and applications regularly used. Computer network configured to handle non-sophisticated data access management and network disk space for storing data (network hard disks) are the best solutions. To support communication within team members instant messaging applications are sufficient enough.

Having wider networks require designing external Internet or internal Intranet web sites for wiki and blog publication methods. Those methods can be easily administrated, simultaneously they allow instant access and rights to create and modify



the content. Presented solutions are widely used especially by Internet businesses. Even companies that maintain a massive IT infrastructures use those technologies. Apart from using custom designed system and database, Google employees share their ideas through company's blogs and wikis [Iyer, Davenport 2008, pp. 59-68].

Well established communication system consists of messaging or communication applications or hardware, and database containing information about employees and their skills. The high quality knowledge can be gained only from people having it. Database containing skills description can be accessed through corporate wikisites accustomed for this purpose, or specially or custom designed commercial solutions. Accenture, an IT consulting company uses a massive database of employees, their skills, experience, expertise and history of completed projects. Database combined with the corporate quick response culture gives a powerful system through which we can access the knowledge of thousands of company's consultants and receive a reply within twelve hours.

Commercial, fully functional systems offer the full range of capabilities within one, easy accessible and integrated system. Tools provided by applications like Open Text LiveLink or Hyperwave Collaborative Management Platform, are based on the latest technologies available. They enhance not only companies knowledge sharing and distribution systems but also handle all knowledge management processes. The key features included in those systems are:

- information/document management including data access management, version control and usage tracking,
- data types management with data conversion tools handling over a hundred file formats,
- full-text search of information within electronic documents,
- automation of knowledge management processes.

They also provide tools for teamwork support, scanning and storing documents and e-learning systems.

Systems mentioned above have been successfully deployed in many corporation operating globally – British Petroleum, Volkswagen AG, Media Saturn Holding (use Hyperwave), Siemens, Motorola and Dow Chemical (use Open Text solutions) are only few excerpts from the vast portfolios of theirs.<sup>3</sup>

## 5. Conclusions

Knowledge sharing and distribution requires IT solutions for a high performance, whether it is a team working on a project or a global multi-sector corporation. New methods of codifying knowledge assets and competition demands a quick response to competitors moves and that demands support of IT.

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<sup>3</sup> Sources: Hyperwave ([www.hyperwave.com](http://www.hyperwave.com)) and Open Text Corporation ([www.opentext.com](http://www.opentext.com)).

Efficient knowledge diffusion needs to be supported by the organizational culture that praises teamwork, cooperation and give its employees psychological safety. It is a foundation for successful deployment of computer-aided knowledge management system.

Deployment of adequate IT solution needs to be preceded by a careful analysis of companies needs, structure and costs. The first two aspects have a good reflection in organization IT infrastructure and data types variety. Since codified knowledge is a certain kind of information, knowledge diffusion support must include data and information management. The last crucial feature is communication system or support.

Successful implementation of such systems may result in increase of company's performance, enhance creativity and innovation. It also creates conditions to boosts learning capabilities. All combined together could become one of the company's key competitive advantages.

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