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**INFORMATION SYSTEMS  
FOR KNOWLEDGE WORKERS SUPPORT**

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**SYSTEMY INFORMATYCZNE  
WSPIERAJĄCE PRACOWNIKÓW WIEDZY**

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**Summary:** The paper is dedicated to the Knowledge Management Information Systems (KMIS) as support tools for knowledge workers (KWs) activities. The general aim of the paper is to analyze the currently used systems and find out whether they meet all the requirements of KWs in the Knowledge Management (KM) process. To clarify the subjects of the research, the notions KWs and KMIS are presented in the form of concept maps. To specify the demands of KWs as for the software tools that assist them in the process of KM, the typology of KWs tasks was developed. Operation of the KMIS is examined from the point of view of their compatibility with the tasks and actions performed by KWs – in order to enhance functionality of the existing systems. The systems are divided into groups, each of them matched with a particular KM task. A case study of the open-source platform Moodle is given as a justification of the fact that support quality of KMIS presently requires improvements.

**Keywords:** Knowledge Management, knowledge worker, knowledge action, Knowledge Management Information System.

**Streszczenie:** Artykuł poświęcony jest systemom informatycznym zarządzania wiedzą (SIZW) jako narzędziom dla wsparcia pracowników wiedzy (PW). Głównym celem artykułu jest analiza obecnie używanych SIZW i sprawdzenie, czy spełniają one wszystkie wymagania PW w procesie zarządzania wiedzą (ZW). W celu wyjaśnienia podmiotu badań pojęcia PW i SIZW są przedstawione w formie map koncepcyjnych. W celu określenia wymagań PW do narzędzi programowych, które wspierają ich w procesie ZW, opracowano typologię zadań PW. Działanie SIZW jest badane pod kątem ich zgodności z zadaniami i działaniami wykonywanymi przez PW – w celu zwiększenia funkcjonalności istniejących SIZW. Systemy są podzielone na grupy, z których każda odpowiada konkretnemu zadaniu procesu ZW. Studium przypadku platformy Moodle podano jako uzasadnienie faktu, że jakość wsparcia SIZW obecnie wymaga ulepszeń.

**Słowa kluczowe:** zarządzanie wiedzą, pracownik wiedzy, działania pracowników wiedzy, systemy informatyczne zarządzania wiedzą.

## 1. Introduction

Organizations that exist on the modern market, are currently facing the challenges of globalization, hyper competition, technological development and virtualization. The new environment requires a different way of thinking and behavior for those, who want to stay competitive and prosperous. That is why most organizations seek for new sources of advantage.

It is believed that presently the factors influencing organizational competitiveness have transformed from physical and tangible resources to those based on knowledge. Thus, organizations depend on the successful exploitations, application and integration of their *knowledge management* (KM) process [Sajeva 2010].

It is generally accepted that since knowledge is considered to be a critical factor for organization's survival, it should be captured, managed and utilized in a way that fosters organizational development. Knowledge management is viewed as a function that creates or locates knowledge, manages the flow of knowledge and ensures that knowledge is used effectively and efficiently for the long-term benefit of the organization. Therefore, effective organization of knowledge is in the heart of KM and the significance of KM lies in the most gainful use of knowledge for organizational purposes [Hoq, Akter 2012; Oluikpe 2012].

The group of people engaged in Knowledge Management process are called *knowledge workers* (KWs). There are three key features which differentiate knowledge work from other forms of conventional work. Firstly, the KW adds value to work through mental activities. Secondly, the kind of thinking applied by KWs is not a step-by-step linear mental work – they have to be creative and non-linear in their thinking. The third distinctive feature of knowledge work is that it uses knowledge to produce more knowledge [Mohanta, Kannan, Thooyamani 2006].

The implementation of various IT systems for supporting knowledge management processes has recently gained significant popularity. Information technologies form the ground for KWs to apply and process knowledge. Knowledge Management Information Systems (KMIS) are supposed to integrate functionalities and provide comprehensive organization and control of the processes knowledge generation, transfer and storage [Laha 2008]. That is why when studying the activity of knowledge workers, it is reasonable to pay attention to the tools which assist them. It is necessary to examine the functionalities of these KMIS systems and analyze whether they fully meet the requirements of knowledge workers and what additions can be made to improve these systems' operation and, as a result, the KWs efficiency.

From the above-stated there come the following objectives of the paper:

1. With the purpose to clarify the subjects of the research and to set the specific area of further research – to define the notions *knowledge worker* and *Knowledge Management Information System*.

2. With the objective to specify the demands of KW as for the software tools that assist them in the process of knowledge creation, storage, distribution etc. – to determine *the tasks* performed by them and specify *the typology* of these tasks.

3. In order to improve functionality of the existing KMIS systems – to define *the tasks*, which can be performed by these systems and match these tasks with those conducted by the knowledge workers.

4. In order to justify the necessity of improving the support quality of KMIS systems – to present *a case study* of a well-known system for knowledge workers.

The realization of the objectives is structured in a following way:

1. Section 2 contains the realization of the first part of the first objective and of the second objective. Here the definition to the notion of knowledge worker is given and the typology of KW tasks is presented.

2. Section 3 covers the second part of the first objective, as well as the third and fourth objectives. The visualization of the notion Knowledge Management Information System is followed by the scheme of tasks, performed by particular KMIS. The examination of the support quality of KMIS systems is justified by the case study, based on questionnaire research.

## 2. Knowledge workers and their tasks

In the work of [Porat 1998] five groups of knowledge workers are distinguished: knowledge producers, knowledge distributors, market search and coordination specialists, information processors, information machine workers. The workers of educational sphere (academic teachers) are referred to as *knowledge distributors*.

In order to understand the phenomena of KW at higher educational institutions, it is reasonable to examine the specific features of *academic teachers* as knowledge distributors. Thus, KW of the academic sphere is a person, who:

1. *Possesses* theoretical and practical knowledge as well as professional experience not only in their professional area, but in all the spheres connected with it.

2. *Wants* to develop and improve knowledge, share and apply this knowledge, experience, competences, as well as apply resources, methods and tools.

3. *Is able* to search, find, interpret and apply personal and publicly available knowledge, experiences, tools, resources, methods etc.

4. *Can* using the opportunities, provided by the University, actively participate in the process of creating new knowledge during the process of learning as well as on students' graduation from the University.

5. *Requires* knowledge, experience, social competencies, engagement, etc., to achieve the objectives of the University.

Besides, according to the theory of [Bernstein 2010], modern teachers, as representatives of knowledge work, in the process of *knowledge distribution* realize the interaction between:

1. *Technology*, which is driving the productivity of knowledge work – the technology of obtaining, storing, extracting and distributing knowledge among other teachers as well as among students.

2. *Information*, which is the basis for knowledge and decision making – information as a result of processing data and facts, available in various information sources, as well as of the results of personal conclusions, experience and wisdom.

3. *Humans*, who are performing the process of education and management at the University (for students and employees).

Presently, there exist many versions of definition of a knowledge worker. Some of them are similar and express the same ideas in other words, and some of them present different vision on the KW phenomena. To clarify the subject of the research the author finds it reasonable to examine the existing definitions and to formulate an aggregated one.

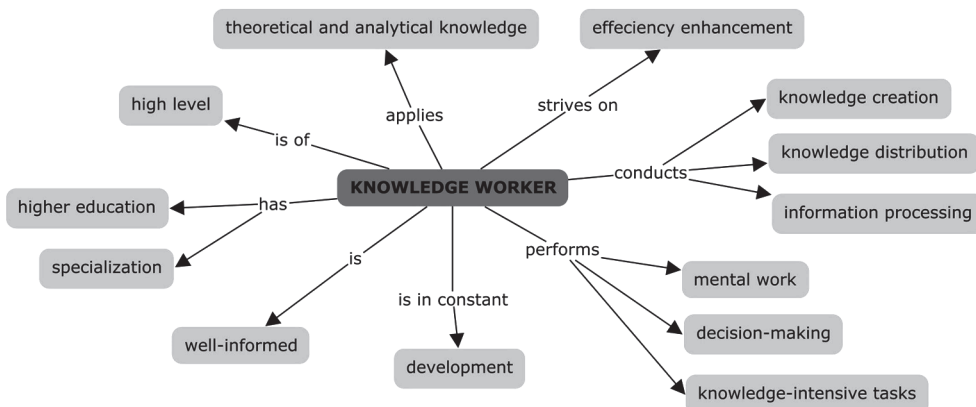
The most valuable (from the author’s point of view) definitions of a knowledge worker are presented as follows:

1. Knowledge workers are high level employees who apply theoretical and analytical knowledge, acquired through formal education, to develop new products or services [Drucker 1995].

2. A Knowledge worker performs a set of knowledge-intensive tasks (decision-making, knowledge-production scenarios, monitoring organizational performance, etc.), mainly with the support of IT, dominated by communication, data production and consumption actions [Reinhardt et al. 2011].

3. Knowledge workers understand, define, influence and help shape their domain of influence, knowledge, activity and responsibility. They understand the people, information and potential resources within that domain as well as have the authority to act within that domain [Morello, Caldwell 2001].

On the basis of the definitions given above, as well as those not mentioned in the paper (including [Figurska 2015; Serrat 2008; Skrzypek 2009], the author has formed the following definition of a knowledge worker [Rizun, 2016] and has chosen to



**Fig. 1.** Knowledge worker’s semantic map

Source: own work based on among others [Figurska 2015; Serrat 2008; Skrzypek 2009].

present it in a form of a semantic map (Fig. 1). The map includes the key words from the definition, presenting the key characteristics of a knowledge worker.

Thus, it is reasonable to say that *the first part of the first objective* of the paper – definition of a knowledge worker, has been reached.

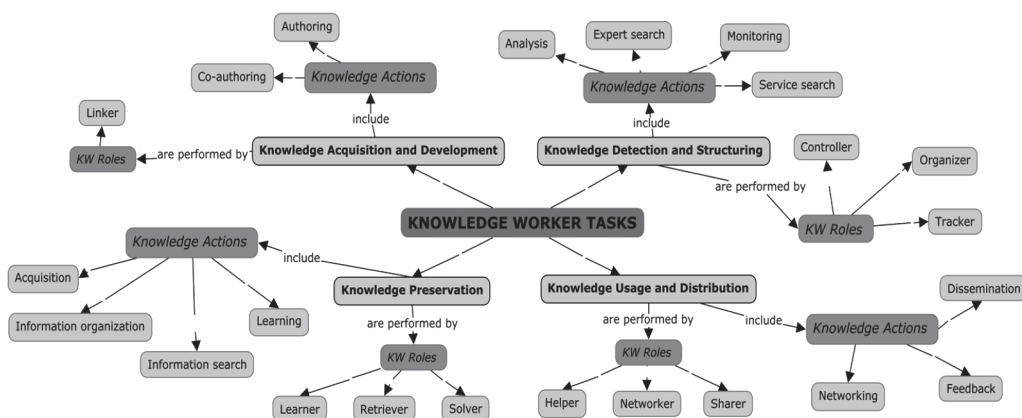
For the realization of *the second objective* of the paper – formulation of the typology of KWs tasks, it is necessary to refer to the work of [Reinhardt et al. 2011]. The work contains description of ten knowledge worker roles, as well as actions, inherent for each of the tasks (Tab. 1).

On the basis of the table presented above, the author has developed an aggregated topology of KWs tasks (Fig. 2). The tasks were divided into four main groups,

**Table 1.** Knowledge workers' roles and actions

Role	Description
Controller	Monitors the organizational performance based on raw information.
Helper	Transfers information to teach others, once he passed a problem.
Sharer	Disseminates information in a community.
Learner	Uses information and practices to improve personal skills and competence.
Linker	Associates and accumulates information from different sources to generate new information.
Networker	Creates personal or project related connections with people involved in the same kind of work, to share information and support each other.
Organizer	Is involved in personal or organizational planning of activities, e.g. to-do lists and scheduling.
Retriever	Searches and collects information on a given topic.
Solver	Finds or provides a way to deal with a problem.
Tracker	Monitors and reacts on personal and organizational actions that may become problems.

Source: [Porat 1998].



**Fig. 2.** Map of knowledge worker's tasks

Source: [Porat 1998].

formed on the basis of the Knowledge Management Process Model [Probst, Raub, Romhardt 2010]. They represent the key activities conducted in the process of managing knowledge: knowledge acquisition and development, knowledge preservation, knowledge usage and distribution, and knowledge structuring and detection [Omotayo 2015; Rózewski et al. 2015].

At this stage, it is necessary to remember about *the second part of the first objective* of the paper – the definition of the Knowledge Management Information System. Understanding this phenomenon will give the possibility to proceed to realization of *the third objective* of the paper – definition of the tasks which can be performed by these systems and matching them with the tasks conducted by knowledge workers.

### 3. Information systems for knowledge workers

According to Sajeva [2010] technical systems (for instance, groupware, e-mail, databases, intranet etc.) are applied in KM for collection, codification, storage, and manipulation of knowledge.

Mohanta, Kannan and Thooyamani [2006] state that technologies are used by KWs to facilitate access to information and its manipulation. Information technologies (IT) are referred to as computer equipment and programs applied to access, process, store, and disseminate information. As examples word processing, spreadsheet, and electronic mail programs are mentioned. The paper also highlights the fact that IT are designed to reduce the amount of time workers spend on information access, management and manipulation and to increase the accuracy of these processes and, at the same time, that IT and the Internet have made information easy-to-access, user-friendly and up-to-date. Moreover, the emerging mobile and wireless IT support the mobile nature of the KWs job.

In accordance with the work of [Maier, Hädrich 2006] Knowledge Management Systems are characterized by such terms as: knowledge warehouse, knowledge management software, technology or organizational memory (information) system, e-learning suite, learning management platform, portal, document management, collaboration or groupware. KMIS is defined as a system that functions to provide a means by which knowledge from the past is brought to bear on present activities, thus resulting in increased levels of effectiveness for the organization.

The figure (Fig. 3), defining Knowledge Management Information System, was developed in a form of a semantic map, on the basis of the above-presented definitions, as well as on the author's experience.

Applying Knowledge Management Process Model [Probst, Raub, Romhardt 2010], the author has formed a map (Fig. 4) of existing KM Information Systems, which are (or can be) applied by knowledge workers. The scheme gives a picture of how each knowledge task is supported by a particular group of systems.

Thus, it can be stated that the realization of *the third objective* of the paper has been performed – the connection between the existing KMIS systems and the tasks of Knowledge Workers has been presented.

The realization of *the fourth objective* of this research paper will support justification of the necessity to improve the existing KMIS systems and make them more suitable for the needs of KWs.

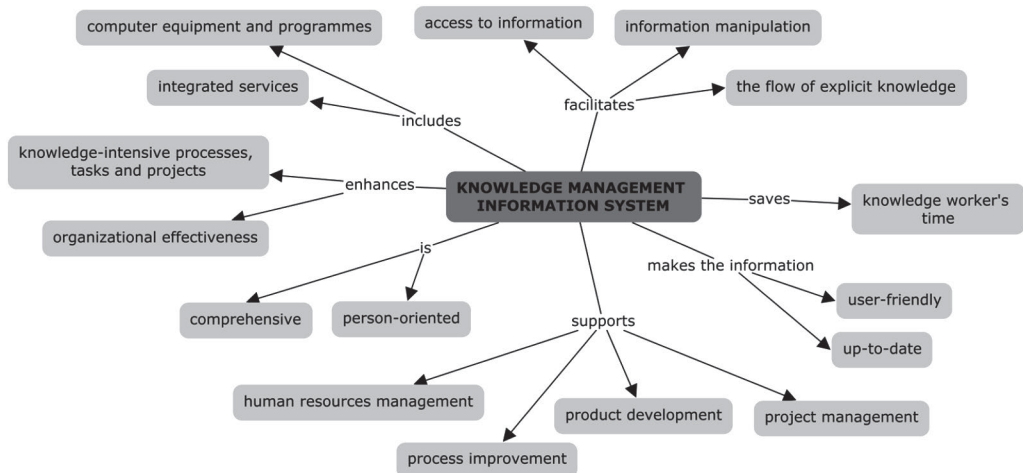


Fig. 3. Knowledge Management Information System (definition map)

Source: own work.

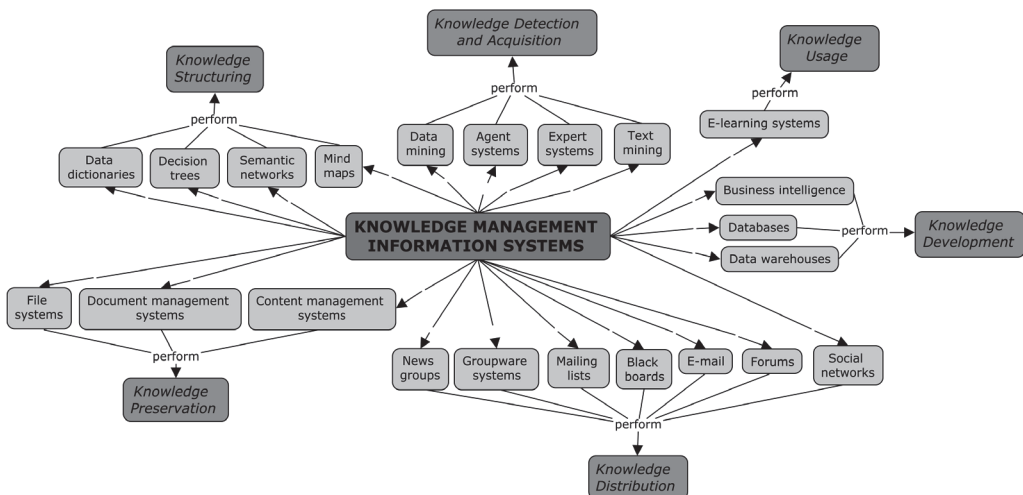


Fig. 4. Knowledge Management Information Systems

Source: [Probst, Raub, Romhardt 2010].



To realize the objective the author refers to *a case study* that examines the e-learning platform for educational institutions – *the open-source Moodle platform* (further – “platform”).

Developed on pedagogical principles, the platform is used for blended learning, distance education and other e-learning projects in schools, universities, workplaces and other sectors. The platform is used to create private websites with online courses for educators and trainers. Moodle is an acronym for Modular Object-Oriented Dynamic Learning Environment [Wikipedia].

The author considers Moodle to be a good example of information systems of knowledge search, storage and distribution – a tool for knowledge distribution assistance. Technical features of this platform allow to obtain, share, store and apply information, as well as have it rather secure in the platform’s storage system.

The case study covers a questionnaire [Rizun 2016], which was developed with an objective to find out whether the platform meets the requirements of knowledge workers (and to what extent). It was aimed at teachers of higher education institutions. Among other issues raised in the questionnaire, it covers the changes that need to be introduced to the platform for the optimization of the knowledge workers job. More than one issue could be chosen. Table 2 contains the suggestions of teachers, demonstrating weaknesses of the platform regarding the support of knowledge workers.

**Table 2.** KW requirements for changes to Moodle features

Change requirements to Moodle features	Answers
Change the structure of catalog of files	31,8 %
Implement a key word search of materials	52,4 %
Increase the level of materials protection	13,6 %
Implement a live chat with students and other users of the platform	23,8 %
Add calendar settings: reminders for users to add new material	33,3 %

Source: [Probst, Raub, Romhardt 2010].

Analyzing the figures, we can state the following:

a) the necessity to change the structure of catalogues and to add a keyword search, as well as to add calendar settings means that the function of *knowledge structuring* of the platform is evaluated as weak;

b) the need to increase the safety level refers to the improvement of *knowledge preservation* function;

c) suggestion about live-chat for teachers and students means that the options of *knowledge usage, distribution and acquisition* of the platform are also to be enhanced.

When *the fourth objective* of the paper is realized, the final picture of the Knowledge Management Systems for knowledge workers support can be seen.



## 4. Conclusions

The paper sets the objective to analyze the job of knowledge workers from the point of view of technical support they get. Knowledge Management Information Systems are aimed at facilitating and improving activities of knowledge workers. The paper shows that there exist specific systems for particular tasks and actions conducted in the knowledge management process. Yet it is proved (on the example of a case study from Moodle platform) that the KMIS systems are not perfect and do not meet all the requirements of knowledge workers. The information obtained from the case study leaves room for further research in the direction of KMIS systems improvement with the objective to make them more attractive for knowledge workers, particularly in the educational sphere.

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