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GLOBAL COLLABORATIVE KNOWLEDGE SYSTEMS IN HIGHER EDUCATION

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Abstract:
Global Collaborative Knowledge Systems (GCKS) are derived from Knowledge Management Systems (KMS) and its popularity in last few years is still spreading. KMS occurred as successful idea which is sharing knowledge, gaining interesting, important information and exchange experience, especially in one organization. The success of KMS has encouraged IT specialists to create a new branch, which could give users access to interesting resources without necessity of participation in any organization. The idea was to make people to share knowledge and work in the team. Simplicity and efficiency of those solutions turned out to be a key for success. The aim of GCKS is to share knowledge and information as well as joint creation of knowledge.

Such system enables to spread knowledge due to collaborative work of users. Teamwork, instead of traditional rivalry, results in more efficient work and improves new ideas arisen.

The article presents a case study considering using of GCKS in higher education (HE). Such portal should be dedicated to teachers, students and industry representatives. It should contain information, good practices and conducted project results.

Presented case study will present results concerning opportunities of development of GCKS for higher education (HE). It will be based on lessons learned and experiences gained during implementing the knowledge sharing portal dedicated to the university. The paper will also present a functionality model of such GCKS as well as opinions of potential users.

Keywords: GCKS, collaborative knowledge systems, knowledge sharing systems

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1.   INTRODUCTION

Bologna Process and European Qualification Framework (EQF) standardize the education process over the European Union (EU) countries. This standardization is based on higher studies division into three levels (Bachelor, Master and Doctoral degree) and introduction of ECTS points. However, it also covers mobility of teachers and students between universities, participating in lifelong learning and exchange programs, organizing additional courses for students carried out by experts from the others universities and businesses (also from foreign countries) (Nokkala, 2006; Webster 2002). Important aspects concern also modern methods and tools used the teaching process, such as e-learning and education quality control platforms, applications supporting contacts of teachers and students, and knowledge exchange systems.

The Bologna Process and the EQF defines a new role for higher education in the knowledge-based society (Huisman & VaN Der Wende, 2004; Larsen et. al., 2002). They also have an impact on promotion of the higher education and the process of its improvement. The role of higher education in the knowledge-based society is growing. Simultaneously its availability increases. The development of science results in creation of new disciplines and interdisciplinary fields of study. Virtual campuses are also created. They constitutes a form of distance learning and education using information technology. Cooperation between universities and industry is also supported.

All these aspects contribute to the development of more effective education and research. It also gives better opportunities for students and teachers to broaden their horizons. Innovative solutions, such as virtual campus applications, improve and modernize education and enable easy access to such knowledge resources like articles, supplementary materials, audio and video materials, tests and quizzes. Such applications also provide the ability to improve knowledge in particular areas, facilitate contact and additional consultation with a teacher, give access to the assessments, information and news. Moreover, it helps in the process of diploma theses development, including those carried out in cooperation with employers from industry. In addition, they facilitate supervision and monitoring of student internships and apprenticeships in enterprises.

Creating, sharing and spreading knowledge is very important in today world. Knowledge management systems often form a part of the virtual university campuses. This shows that knowledge management is used not only in businesses applications, but also in universities and supporting organizations. These systems are used to collect and share knowledge between scientists, support research commercialization processes as well as develop and share results of collaboration between students, teachers and entrepreneurs. These activities contribute to development of the university and positively affect on its cooperation with enterprises. Is a very important aspect of the functioning of modern universities.

Such cooperation is valuable due to the increasing need for collaboration between the sector of education and industry (Nokkala, 2006). More and more popular among scientists, students and entrepreneurs became actions and programs strengthening such cooperation. Commercialization of research results and joint research projects give positive results for both, universities and companies. Moreover, many universities are aware of benefits of cooperation with enterprises in the context of education. This cooperation, in particular, is based on the construction of academic syllabuses and organization of additional activities and seminars for students. Important factors are also internships and development of diploma theses under the supervision of a mentor from industry. Applications such as knowledge management systems support such activities, facilitate the dissemination and evaluation of their results and enable better contact of partners.

The use of knowledge management systems also has its limitations. First of all, adding, collecting, organizing, and supplementing knowledge is time demanding task. It also requires commitment and motivation of users. What is more, not all organizations declare a wish to share their worked out knowledge. However, it is worth to encourage people to use of this type of applications because they give access to work results and allow to create valuable and useful collections of good practices.
The article presents a case study considering use collaborative knowledge systems in higher education. Many universities create knowledge sharing portals just for their own use. However, the idea to convert such portals into global scale applications is promising. Such systems would help to spread cooperation between universities and enterprises as well as share ideas and projects.

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2. GLOBAL COLLABORATIVE KNOWLEDGE SYSTEMS

Global Collaborative Knowledge Systems (GCKS) is an alternative form of traditional gathering and presenting knowledge systems (Milosz & Plechawska, 2007). They are web based solutions which enable anonymous users to exchange information and knowledge. Resources are distributed, collected and updated due to collaboration of users who have access to all repository content. Huge amount of users gives good opportunity to create valuable knowledge resource (Potts & Scholtz, 2005). Efficiency of GCKS depends on users activity and goodwill, because mainly users are responsible for maintaining proper standards of knowledge (Ellis, 2007). Free access for all system participants, however, may result in relatively high probability of mistakes and errors occurrence. In spite of knowledge validation features and bad knowledge elimination methods, GCKS are in subject to vandalism attacks.

Collaboration and cooperation between users are of great importance. Teamwork improves creativity and productivity and makes work more pleasant (Breu & Hemingway, 2002). It gives better results in work efficiency, improves innovations and enable faster finishing tasks. System which enables teamwork, even among unfamiliar users, may occur a powerful tool. Global Collaborative Knowledge Systems present alternative for traditional KMS because they are usually designed and used directly by groups of people which usually do not know each other. Users have an access to all resources, they can also create and collect those resources themselves. They need to care about quality of knowledge (Yinglin & Shensheng, 2005), they also should manage and update it (DeFillipi et al., 2006). That is why GCKS work well when there are huge amount of cooperating users. Only in such circumstances a proper base of knowledge may be created and their resources can be reliable (Umeki & Masayuki, 2001). Such systems work and develop rapidly due to accessibility of the Internet. However such problems as errors or vandalism must be limited. That is why responsibility, interest and commitment of users is so important.

Knowledge represent very unstable, difficult to express and hard for maintenance type of resource (Grudzewski & Hejduk, 2004). It has a tendency to become outdated. Collecting knowledge may occur a difficult task due to the fact, that it is available in people's minds, skills, experiences, intuitions and making it freely available depends on goodwill of owner. Willingness of share knowledge is needed to make the GCKS system works efficient. Collecting and gaining knowledge needs solution, which encourage users to add their own content. It should ensure easy access to all resources and give opportunity for continuous improvement.

The use of knowledge management systems has also other limitations. First of all, adding, collecting, organizing, and developing of knowledge is time consuming task. It also requires commitment and proper motivation. Not every organization wants to share the knowledge it worked out. However, more and more organizations encourage their employees to use this type of application because they support reusing results of work and enable to create a valuable and useful collection of good practices.

3. KNOWLEGDE SHARING PORTALS DEDICATED TO HIGHER EDUCATION

Academic knowledge sharing portals are usually dedicated to support the process of lifelong learning and acquiring new skills. Such applications are dedicated to the students, teachers, sometimes also employers. Development of such application is consistent with the path set by the Lisbon Strategy to promote the idea of Europe in the modern knowledge-based economy. Collecting, sharing and using of information and knowledge is crucial for the development of universities and their students.

The role of such portals is to collect and share the knowledge gained during the implementation of different educational and research tasks including those that involve collaboration with universities and industry. Cooperation with industry may include (Milosz et al., 2012):
- Joint research projects conducted with ICT companies in such fields as web usability and accessibility, software engineering and IT project management.
- Education projects concerning M.Sc. studies curricula development.
- Seminars and trainings organized by IT specialists from industry conducted for LUT teachers and students.
- Students practices and internships realized in ICT companies' offices.
- Master thesis realized in consultation and collaboration with partners from companies.

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During performing those tasks knowledge is generated. It is a valuable resource for the university and industry organizations. Such knowledge can easily blur, so important is the collection, storage, maintenance and updating. Therefore, co-developed knowledge is stored in the system through which is available to employers, students and staff.

The purpose of such application is to support the transfer of knowledge between the university and employers, to facilitate contact between them and access to information on training, internships and also performed at the Institute of Computer Science Master's theses (Plechawska-Wojcik, 2011). Portal also makes it easier to document the conclusions of the panel meetings other universities activities.

4.   KNOWLEDGE SHARING PORTAL DEDICATED TO HIGHER EDUCATION

Universities, such as LUT, gained lessons learned from development and implementation of knowledge sharing portal dedicated to the university and its cooperating organizations (universities and companies).

The role of such portal is to collect and share knowledge gained during the implementation of university's activities, especially those involving interaction of universities and companies.

The view of the data flow diagram (DFD) at level 1 is presented in Picture 1. It represents the flow between all system modules designated as the main processes. Student, teacher, employer and supervisor are external objects - essential actors of the system.

Picture 1: DFD of knowledge sharing portal
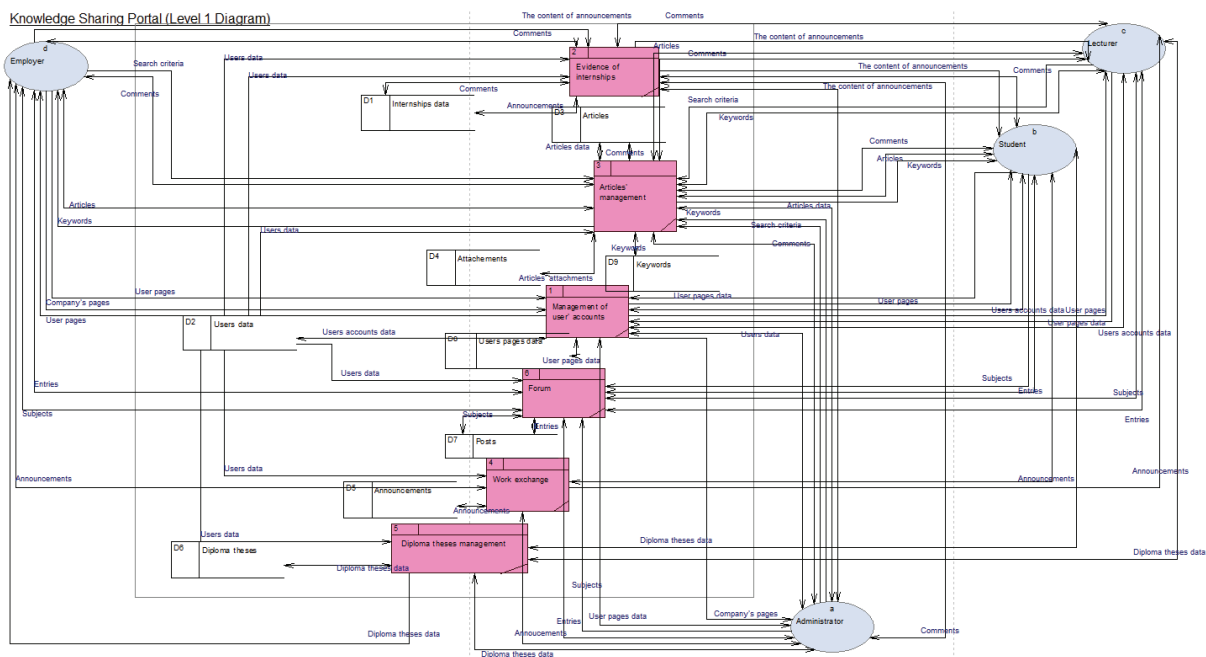
Source: own work

The portal is a web application. Access to the repository is possible only for authorized users. Once logged in, users have access to the resources of the system and its functionality. Their access is dependent on the type of the account:
- Student account enables access to all of the repository content including information on internships, jobs and graduate work. The account entitles the student to add new content to the section containing articles and conclusions of internships. They can also edit their content, add comments and read all content.
- Privileges of lecturer account are very close to the privileges of the student. Lecturers have access to the full application's functionality. They can add articles, information on practices and internships as well as jobs details. They can also use the forum, edit their own content and comment posts.

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- Employer account provides the ability to use the full functionality of applications allowing to add content to the repository, update jobs and internships data and view available diploma theses. Like the other members, employers can edit their content, add comments to articles and actively use the forum.
- Administrator account allows for active access to all system components including editing and moderating all of the content as well as managing accounts of other users.
-

The knowledge-sharing portal is a platform of cooperation between employers, students and lecturers. Adapting the portal to the needs of the user groups required splitting it into several parts:

- Thematic articles constituting a core part of the repository. Their contents contain descriptions of new technologies and tools, including those that the students learned during the internships in enterprises. What is more, this section includes detailed descriptions of students' graduate works. Additional group of articles includes information on conferences, workshops and seminars, including those related to projects. The platform also contains materials from such meetings, including notes, presentations and reports. All items are described with tags and keywords to make searching and grouping easier. Once can also add comments to articles.
- Internships are dedicated to collaboration between students and employers. This part of the repository is dedicated to the employer who may inform students about offers of internships and practices. In this section students can place weekly reports on their activities during internships in companies. They include information about technologies and tools used by students. The content also contains information about needs of labor market and interests of students.
- Job exchange is a part of a repository that allows direct access of employers to students looking for a job. The module enables to place all types of announcements related to work, training and projects. Students are able to only view the content.
- Diploma theses section stores information about, in particular, works that are the result of cooperation with employers. Insight into the details of theses will help other students to access knowledge and reliable source of materials. This section gives also employers the opportunity to familiarize with the students activities. They can also check results of work done during students internships.
- Forum is a place reserved for discussions between students, employers and lecturers. It facilitates communication and allow to report comments, requests, proposals. It is also a place where users can make comments to the portal and university's activities.

Portal is a knowledge exchange management system containing a knowledge base and modules supporting collection, storage and processing of information. In particular they include:

- A repository containing information divided into groups and categories. It contains mechanisms of management and attachment of files, links and relations between articles and other content in the system.
- Full text searching and data grouping using tags, keywords and categories. A tag cloud gives the ability to additional search.
- Individual work management including ability of adding and editing content of the repository elements.
- Collaborative knowledge management supporting sharing, collaborating and updating the knowledge. Comments, forums and discussion groups are additional available tools.
- Administration and moderation of content including tools enable to ensure efficient work in the field of content complement and formatting, user account management and system maintenance.

5. KNOWLEDGE SHARING PORTAL AS A GCKS DEDICATED TO HIGHER EDUCATION – A CASE STUDY

It is possible to transfer a knowledge sharing portal into GCKS application available for many organizations including universities and companies. Cooperation between universities and companies in the fields of science and education is of great importance today.

Applications such as knowledge exchange portals are applications designed and created to support cooperation between universities and the business community. Such applications supports the idea of the collection, transfer and share knowledge between the university and the students and the business environment. Universities and companies cooperates with many other organizations, often forming

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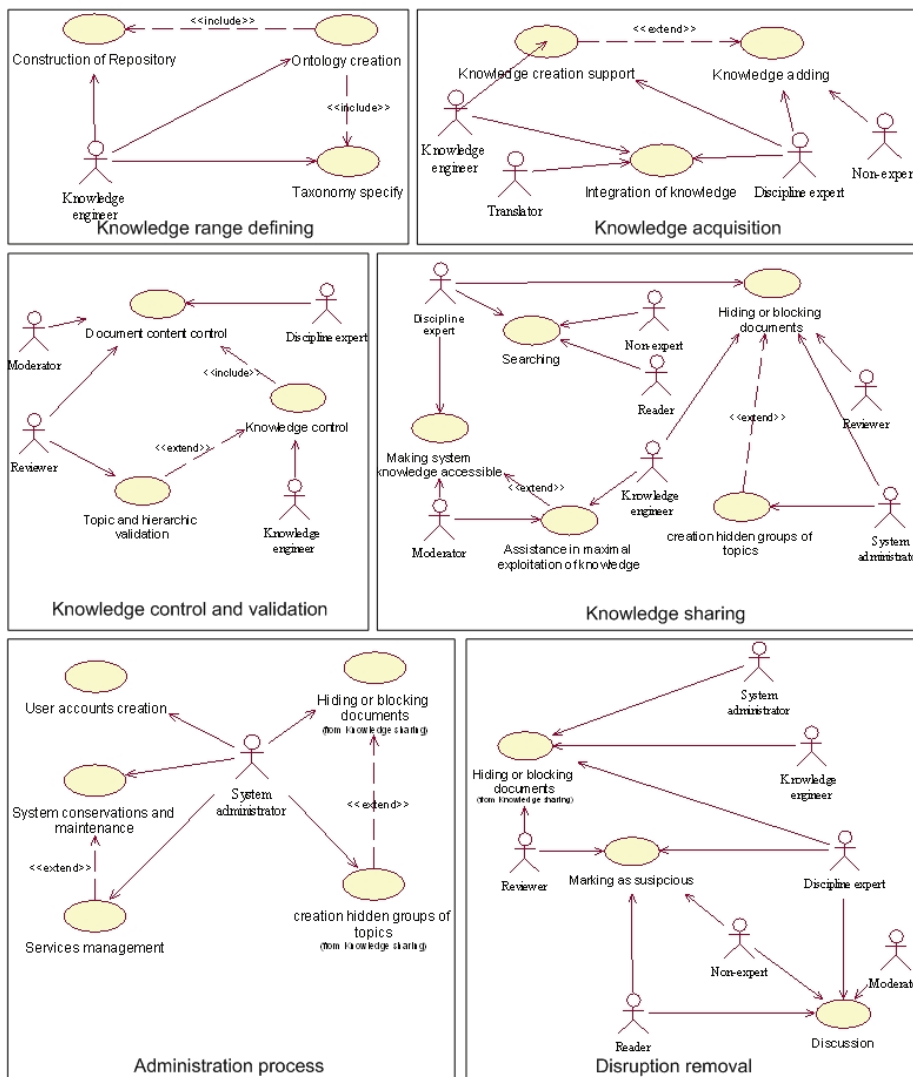Knowledge and Learning
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huge consortia. Such consortia must share and transfer knowledge and global collaborative knowledge system would will certainly make it easier to do it.

The main part of the application is a repository which requires more and more work related to the administration and moderating of increasing content. Gained knowledge may quickly become outdated, incorrect, or placed in the wrong place. There may also be other undesirable content such as profanity, fake entries or inconsistencies. Therefore, it is important to keep the entire content verified repository.

An important issue to consider is the need to encourage users to share their knowledge. It is never an easy task, because knowledge sharing takes time and willingness. Researchers usually gladly place their articles to the repository associated with their work and scientific research and development. Lessons learned from local knowledge sharing portal shows that usually there is also a lot of content developed jointly by researchers and students. Such content is usually associated with diploma theses and student development activities. A lot of the content is also related to practices and internships implemented in enterprises. Such content has been added mostly by students who shared their work progress and observations on newly-known technologies and tools. These contents can be regarded as an indirect contribution to the business community. However, there is no direct contribution of employers in the development of the content repository. It should be noted that the knowledge sharing portal regarded the project involving companies competing in the market. This makes it much harder to encourage them to share knowledge. It is associated with time-limited resources and the fear of loss of sensitive or valuable information on developed products or used technologies.

Picture 2: Use Case Diagram of GCKS

Source: own work

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Modeling of Collaborative Knowledge System, as any KMS should be started from deciding about kinds of needed knowledge. Related issues are ways of categorizing and storing.

General requirements of GCKS can be divided into three parts: processes, actors and capabilities.

Processes concerned with knowledge can be divided into four main parts: knowledge range defining, knowledge acquisition, knowledge control and validation, knowledge sharing. Additional processes are responsible for administration and disruption removal. Those listed processes can be characterized as follows (Picture. 2):

- Knowledge range defining is divided into construction of Repository, Ontology definition and Taxonomy specification.
- Knowledge acquisition – process responsible for creating and gathering knowledge, contains sub-processes such as knowledge adding, knowledge creation support and integration of new knowledge.
- Knowledge control and validation. There need to be some protection against dishonest or just incompetent users. When large group of people have access to all resources some vandalisms and mistakes occur. There should be a few controlling processes: document content control, topic and hierarchic validation and knowledge control.
- Knowledge sharing – one of two the most important processes of GCKS. Easy and available access to resources and fast way of information searching is the basis of GCKS working. Its sub-processes are: making system knowledge accessible for users, hiding or blocking some topics in case of vandalism, process of creation hidden groups of topics with access only for selected users, searching process, assistance in exploitation of accumulated knowledge by creation references to other related topics, administration processes, including system conservations and maintenance, disruption removal, which implements mechanisms allowing correcting, removing or blocking mistaken content.

6. SUMMARY

Despite any organizational and validation problems the implementation and development of the Collaborative Knowledge System dedicated to Higher Education seems to be interesting and promising idea. It has a great chance to contribute to creation of the base of interesting thematic articles and to sharing information on the activities carried out by students during practices, training, workshops, projects etc. The library of best practices, experiences and knowledge must be stored and regularly updated so that one can achieve measurable benefits. Therefore, the application should be maintained and promoted among lecturers, researchers, students and entrepreneurs even after completion of their common projects. This will give a great opportunity to spread gained resources stored in the repository among other people. They would also have the opportunity to share knowledge, insights and experiences.

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