INFORMACIJOS SISTEMOS

Functionality model of global collaborative knowledge systems

Marek Miłosz

Technical University of Lublin, Computer Science Institute
Head of Software Engineering and Database System Department
ul. Nadbystrzycka 36B, 20-618 Lublin, Poland
Tel. +48 81 525 20 46
E-mail: marekm@pluton.pol.lublin.pl

Małgorzata Plechawska

Technical University of Lublin, Computer Science Institute
Assistant, Software Engineering and Database System Department
ul. Nadbystrzycka 36B, 20-618 Lublin, Poland
Tel. +48 81 525 20 46
E-mail: gosiap@pluton.pol.lublin.pl

Global Collaborative Knowledge Systems (GCKS) are based on world wide collaboration in knowledge acquisition, content creation with permanent and fast feedback, and more or less democracy of participants. Knowledge acquisition in GCKS is massive and decentralised due to the big scale of the Internet and special features of software tools. The functionality model of GCKS is presented in this paper.

Knowledge Management Systems (KMS) achieved stable position among group of management information systems. KMS are used for creating, sharing and spreading knowledge in organization. The aim of implementing such solution is usually a company condition improvement. Global Collaborative Knowledge Systems (GCKS) are derived from KMS. They gain popularity for last few years due to their simplicity, freely availability and effectiveness. Knowledge sharing is a way of effective acquiring interesting information. KMS are used not only inside companies – there are many solutions directed to "ordinary" people (Miłosz, 2007).

GCKS are knowledge management system designed and used distinctly by groups of people (Ellis, 2007) which usually do not know each other. Willingness of share knowledge is needed to make the system work efficient. Traditional competition has negative effects and does not give desirable results. Teamwork results are more efficient, work faster and improve new ideas arisen. Collaboration indeed is not just a simple sums of individual efforts (Grosz, 2006).

Global Collaborative Knowledge Systems

Global Collaborative Knowledge Systems exemplify alternative for traditional systems of gathering and presenting knowledge. Collaboration and cooperation between users are of great importance. Users have access to knowledge resources, but first of all they create those knowledge themselves (Potts, 2005). They should put some effort into common forming new knowledge in the system. Users themselves

are responsible for maintaining right standard of knowledge. GCKS work well when there is huge amount of users. In such case there is a chance to create base of knowledge and make this knowledge more or less reliable.

Knowledge indeed is hard to manage and share. The reason is that knowledge is very unstable resource (Miłosz, 2007). It can become outdated in quite short time, and it is hard to update. Due to those facts gaining knowledge needs solution, which encourage users to add their own content and make available easy access to all resources.

This kind of system – if well constructed – is inexpensive in maintenance. A significant majority of content is added and checked by users (UML, 2003). As a result, most of system costs determine servers and software maintenance.

As an opposite to GCKS traditional encyclopedia can be introduced. Both solutions – traditional encyclopedia and GCKS – are similar due to their target and have common features: they are constructed to propagate knowledge. In contrast to traditional solutions, GCKS are not static. In content formation and sharing Internet is used, what makes this solution freely available and easy to access (Sheppard, 2007). Rights of GCKS users are usually equal. There is no need of expert status, everyone can put it's own content (Abdullah, 2005). This may lead to unreliability, inaccuracy or vandalisation (Miłosz, 2007) of content. Such phenomenon is impossible to occur in traditional encyclopedia.

Completeness – one of the most important statements of traditional solutions in GCKS is considered as impossible to achiev. When system is introduced, it's content is scant. It is developed and updated during system work. Those updates give sizeable superiority of GCKS, because it gives knowledge chance to be actual. Traditional encyclopedia is out-of-date in the moment of publication.

GCKS Functionality Model

Modeling of Collaborative Knowledge System is quite demanding due to many factors, which need to be discussed. Some of them are: user groups management, tasks categorization, concerning issues from out of collaboration space.

Modeling of knowledge management system should be started from deciding about kinds of needed knowledge. Related issues are ways of categorizing and storing (Miłosz, 2007).

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

Processes concerning dealing 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:

- **Knowledge range defining** (Fig. 1) is divided into construction of Repository, Ontology definition and Taxonomy specification.
- **Knowledge acquisition** (Fig. 1) – process responsible for creating and gathering knowledge, contains few sub-processes: knowledge adding, knowledge creation support and integration of new knowledge.
- **Knowledge control and validation** (Fig. 2). There must be some protection against dishonest or just incompetent users. When large group of people have access to all resources some vandalisms and mistakes occur. Due to it there are a few controlling processes: document content control, topic and hierarchic validation and knowledge control.
- **Knowledge sharing** (Fig. 2) – one of two the most important processes of GCKS. Easy and common 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 or other negative activities, process of creation hidden groups of topics with access only for selected groups of users,

searching process, assistance in maximal exploitation of accumulated knowledge by creation references to other related topics.

- **Administration processes** (Fig. 3), including system conservations and maintenance.
- **Disruption removal** (Fig. 3), which implements mechanisms allowing correcting, removing or blocking mistaken content.

It is significant to define actors and their role. Important issue is to determine kinds of those actors and separate tasks for each of them. Those groups may be listed as follows:

- **Knowledge engineers**, responsible for Repository construction and hierarchical order of topics.
- **Discipline experts**, creating knowledge by recording information, experiences, skills and putting it into system Repository.
- **Moderators**, checking quality and essences of comments concerning system content.
- **Reviewers**, checking quality and veracity of documents and other knowledge resources.
- **Translators**, responsible for translation and uniformity of all language versions of content.
- **Non-experts** – beginning users without knowledge, which attempt to putting their own information into Repository. This group is the most risky in creation of uncertain content. Non-experts may cause damage in GCKS, both intended or not.
- **Readers** – users, which do not add its own content into system Repository.
- **System administrators**, responsible for system maintenance.

The last main part of GCKS model is capabilities as well as services and technologies supporting

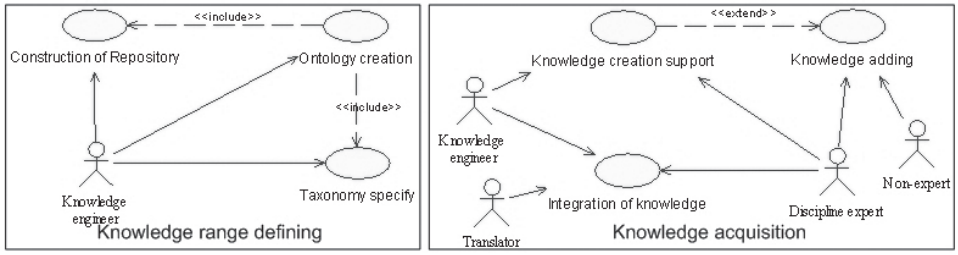

Figure 1. ***Knowledge range defining and acquisition processes – Use Case Diagram***

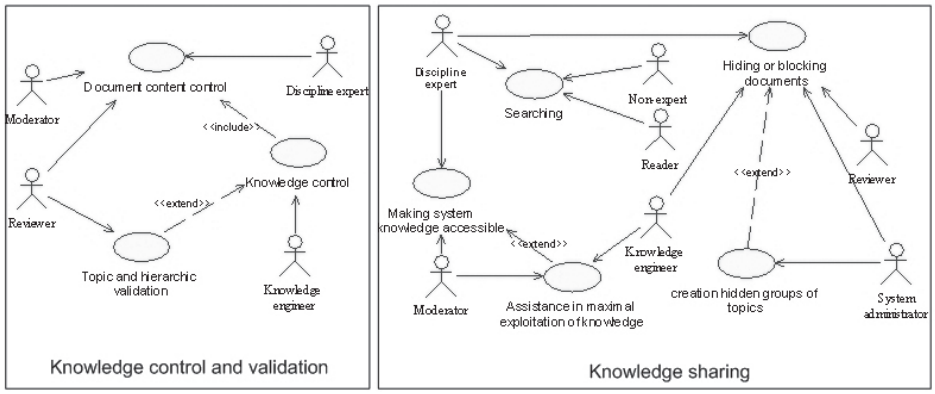

Figure 2. ***Knowledge control, validation and sharing processes – Use Case Diagram***

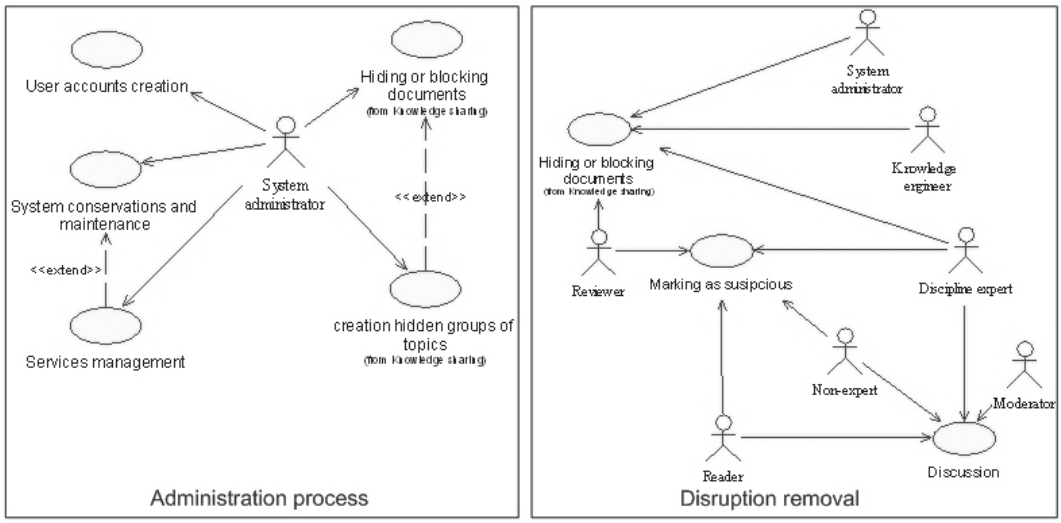

Figure 3. ***Administration and Disruption Removal processes – Use Case Diagram***

the capabilities needs. Collaborative systems, especially global, are usually constructed for huge amount of users, for groups. If groups are larger, knowledge resources increase. On the other hand managing system with huge amount of users may occur problems and require special technologies. Most of GCKS capabilities are designed for online communication. Those capabilities are: shared workspace, global communication system for all users and possibility of private group communication.

The most important issues are dealing with text objects, charts and images. Needed actions are: creating, editing, storing, categorizing, sharing, sending, transforming, blocking or removing. There also must be knowledge integration, objects location determining and translations between modules or, for example, language versions. Content summarizations, monitoring and validation, history mechanism, archives and errors removal as well as discussion or voting performing and common analyzing controversial issues is needed to make system knowledge updated and checked. Also e-mail, audio, videoconferencing and calendar support can be found as useful functionalities.

Conclusions

GCKS became popular due to growing needs of information in today world. Those systems help people to gain and standardize knowledge and share it through Internet. One of the most famous examples is Wikipedia – free Internet encyclopedia, which has above 5 million articles and is available in more than 130 languages versions.

The UML model of GCKS functionality was elaborated and presented in this paper as a part of work on formalization of those systems.

LITERATURE

ABDULLAH, R.; SELAMAT, M. H.; SAHIBUDIN, S.; ALIAS, R. A. (2005). A Framework for Knowledge Management System Implementation In Collaborative Environment For Higher Learning Institution. *Journal of Knowledge Management Practice*, March.

ELLIS, C. (2007). An Evaluation Framework for Collaborative Systems. University of Colorado at Boulder. Access through Internet: http://www.cs.colorado.edu/~skip/evalFramework.pdf

GROSZ, B. (2006) *Collaborative Systems.* Access through Internet: http://www.aaai.org/Library/President/Grosz.pdf

MIŁOSZ, M.; PLECHAWSKA, M. (2007). World Wide Collaborative Knowledge Systems – Wikipedia project case study. In *The 8th International Conference Information Management*. Gdańsk.

POTTS, M.; SCHOLTZ, S. J. (2005). Framework for Evaluating Collaborative Systems in the Real World. In *38th Hawaii International Conference on System Sciences*, National Institute of Standards and Technology.

SHEPPARD, C. (2007). A Framework for Collaborative Systems. Access through Internet: http://zing.ncsl.nist.gov/nist-icv/documents/node6.html .

UML for Knowledge Representation. A Layered, Component-Based Approach to Ontology Development (2003). Initial Submission to the Ontology Definition Metamodel RFP. Knowledge Systems Laboratory, Stanford University.

GLOBALIŲ BENDRADARBIAUJANČIŲ ŽINIŲ SISTEMŲ FUNKCIONALUMO MODELIS

Marek Miłosz, Małgorzata Plechawska

S a n t r a u k a

Globalios bendradarbiaujančios žinių sistemos (GBŽS) remiasi bendradarbiavimu pasauliniame tinkle įgyjant žinių, kuriant turinį, pasižymintį nuolatiniu ir greitu grįžtamuoju ryšiu ir didesniu ar mažesniu dalyvių demokratiškumu. GBŽS žinių įgijimas yra labai intensyvus ir decentralizuotas dėl interneto masto ir programinių priemonių specialių ypatybių. Šiame straipsnyje pateikiamas GBŽS funkcionalumo modelis.