KuiSci Collaborative and Collective Intelligence Software

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Abstract. To move toward Knowledge Societies, more collaborative work tools are highly needed. KuiSci, a derived work of KUI (Knowledge Unifying Initiator), is social networking software developed for use in the science and technology research community. The software supports community collaboration in terms of knowledge creation and sharing on the internet. The KuiSci community is used by funding organizations and researchers in the field of science and technology. A KuiSci user may be a caller, responder or researcher depending on his action over the system. The software also provides working spaces and communication tools for users to cooperate on their projects. These spaces' names correspond with their functions: caller space, responder space, KuiSci marketplace, and project workspace. The KuiSci management process is divided into two parts: project announcement and project leader selection, and project operation tasks over the community. KuiSci's success depends on how much cooperation is given by researchers' information organizations. The future of KuiSci may extend to other fields beyond merely science and technology.

Keywords: Collective intelligence, Collaborative Software, Knowledge Unifying Initiator, KuiSci, Social networking.

1   Introduction

The information society is a networked society where collective capabilities are highly needed. Both knowledge society and network society require new forms of intelligence, in particular collective intelligence. However, to satisfy the new concept of knowledge creation, collaborate software tools are needed more and more. In addition, such software tools should support the ordinary procedure and fulfill the needs from the new society.

Several kinds of collaborative tools are available in cyber society, such as email, wikis, and blogs. Sornlertlamvanich et al. introduced KUI (Knowledge Unifying Initiator) [1, 2, 3, 4] which is a platform for knowledge development that enables connection and collaboration among individual intelligence systems in order to accomplish complex missions. A variety of KUI derivations exist, including KuiPOLL [6] and KuiHerb [7].

In this paper, we introduce another derivation of KUI, named "KuiSci". It is used as a collaborative tool for the research community in the area of science and technology. KuiSci, or Knowledge Unifying Initiator for Science and Technology, works as a collaborative project management framework and tool for networking and research information exchange between scientists. KuiSci serves as a meeting place for discussion among scientists and technologists, a place for presenting national and global scale problems, a forum for brainstorming, skill and expertise exchange among scientists to harness the collective solutions. KuiSci is a place for innovative work creation.

In the rest of paper, we will briefly discuss collaborative tools, the concept of KUI, and Thailand's researcher databases in the Section 2. Concepts and components, together with the KuiSci management process are provided in Section 3. Section 4 will illustrate KuiSci software and its implementation. The conclusion and future works will be presented in Section 5.

2 COLLABORATIVE TOOLS AND RESEARCHER DATABASES

Collaborative software is software designed to facilitate people involved in a common task to achieve their goals. Most collaborative software can be used to support social networking. As this research is about online collaborative work, in this section, we shall discuss the relevance of collaborative tools and concept of social software. Since the motivation of our contribution is from software KUI, we then briefly explain the main features of KUI. In addition, KuiSci has applied web service technology to connect to external researcher databases for exploration of researcher databases available in Thailand.

2.1 Social Software

Collaborative software sometimes can be named social software, especially when collaborative software is used outside the workplace. Social software provides new opportunities for personal expression, the creation of communities, collaboration and sharing. There are varieties of such software available in the online community, including blogs, wikis, and podcasting.

Principally, we can draw a definition of social software in terms of mathematical formula [8] as follows:

$$\text{Social software} = (\text{tools} + \text{services} + \text{aggregation})^{\wedge} \text{ scale.}$$

Social software is not only application tools; it also provides services of online data. Both of them are joined together using common protocols. Social software enables people to be active participants in communities to gain new knowledge through distributed collaboration in online social networks. Various types of organizations pay attention to the importance of not only storing information and data but also creating new knowledge utilizing the stored information and data.

2.2 Knowledge Unifying Initiator: KUI

KUI [1, 2, 3, 4] is a GUI for knowledge engineering. It is developed to be a knowledge user interface for online collaborative work to create knowledge bases. KUI provides a web interface accessible for pre-registered members. An online registration is offered to manage an account by profiling the login participant making the contribution. A knowledge community can be formed and can efficiently create the domain knowledge through the features provided by KUI. These features fulfill the process of recording human knowledge.

KUI is a platform to unify the various thoughts following the process of thinking. This includes initiating the topic of interest, collection of the opinions about the selected topics, localizing the opinions through translation, and finally posting to conceptualize the knowledge. The process of public hearing is done under the selection preference simulated by a voting mechanism in the case that many alternatives occur.

2.3 Thai Researcher Databases

There are several researcher databases in Thailand located in different servers and owned by different organization. The first database is called ThaiResearch and available at www.thairesearch.in.th. This database is developed by National Science and Technology Development Agency (NSTDA). The second researcher database is named BIODATA owned by the Thailand Research Fund and Thai researchers are able to create and update their research profile at www.biodata.trf.or.th. The third database was developed by the National Research Council Research of Thailand (NRCT) and it is also called BIODATA. In addition, other specialized researcher and research databases are also available in Thailand. Examples include the telecommunication researcher database (www.tridi.ntc.or.th) developed by telecommunications research and industrial developments institute (TRIDI), and the economic and social research report database (www2.nesac.go.th) organized by national economic and social advisory council.

Each of them, however, is an independent database. That is, there is no automatic connection between databases. It will be good for the research society if there is a tool to connect such researcher databases and provide collaborative tools for researcher communication.

2.4 The Technologies of Collective Intelligence

The original collective intelligence idea is not a new concept. It is what shapes social organization – groups, companies, teams, governments, nations etc… – where individuals gather together to share and collaborate. However, they are pyramidal collective intelligence. The two natural limits of original collective intelligence, "number" and "space", are being conquered by the social networking processes. The internet and semantic web tools change the focus from the original independent collective intelligences towards a global collective intelligence [9].

3   KNOWLEDGE UNIFYING INITIATOR FOR SCIENCE AND TECHNOLOGY

KuiSci, or the Knowledge Unifying Initiator for Science and Technology, is a software tool used for collaborative work in the scientific community. The community is composed of funding organizations and scientists and technologists. The KuiSci system supports community collaboration in terms of knowledge creation and sharing on the internet. Members in KuiSci are working together supported by a social networking system. The details of KuiSci functioning, together with the social spaces provide by KuiSci will be explained in the next subsection, followed by an exploration of the KuiSci Management Process.

3.1   KuiSci Functioning

Whoever registers with KuiSci, (s)he then becomes a KuiSci member. Any member can be called "Caller" if the member submits a project to KuiSci. At the same time a member selected as project leader becomes a "Responder". A responder can invite any KuiSci member as a "Researcher" to join the project. All of them then work together in KuiSci space. There are four main spaces in the KuiSci system: 1) Caller space, 2) Responder space, 3) KuiSci Marketplace, and 4) Project workspace.

- Caller space

 The callers who have challenging projects use this space to announce their proposals. The project details including research field will be submitted to the caller space.

- Responder space

 Responder space is the place where researchers can apply their intellect and creativity for solving project problems.

- KuiSci Marketplace

 This virtual marketplace is the space provided to discover information about KuiSci projects. The information is provided by the project status such as open projects, closed projects, or all projects.

- Project Workspace

 During the life of a project, access to the project workspace is provided for relevant participants. The space provides many social networking tools including web chat, webboard, and personal inbox.

3.2   KuiSci Management Process

Principally, we can divide KuiSci collaborative works into two parts. The first part is about project announcement and project leader selection. The second part focuses on the project operation processes. The overall processes of KuiSci are illustrated in Figure 1.
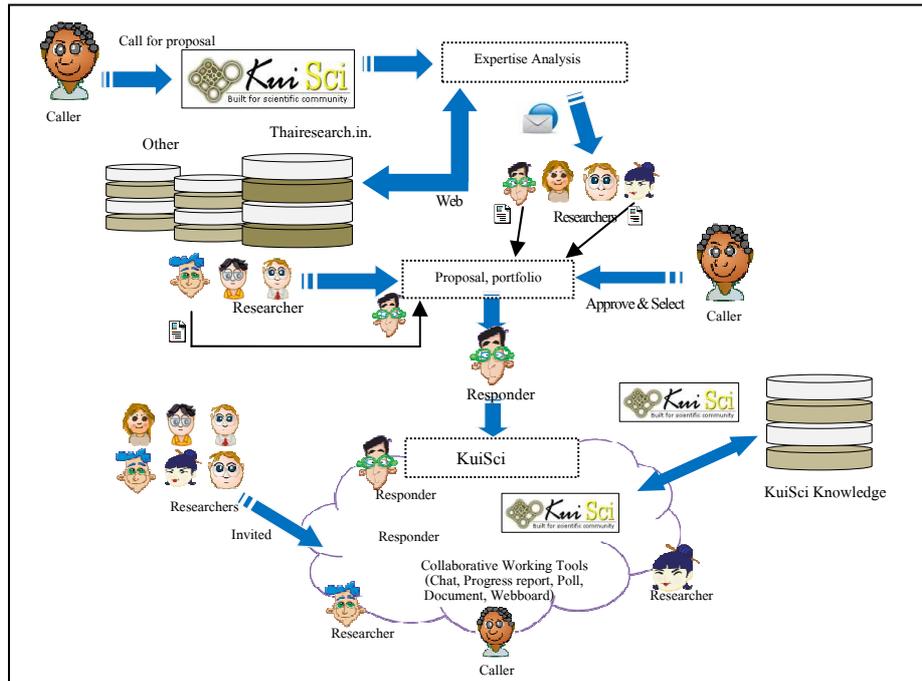
Figure 1: KuiSci Management Process

In the second part of the KuiSci management process, a research community is constructed. This space is called the "Project workspace" for the project and it allows three kinds of participants: 1) caller, 2) responder, and 3) researchers, to join the workspace. Once the project has a responder, the responder is able to invite other researchers to join this project. While the project is performed, KuiSCi provides several collaborative tools for KuiSci participants including chat, web board, private messages, polls, a progress report mechanism, a document sharing system, and email. All participants in a project can use these tools to communicate in real time using easily accessible web interface. The KuiSci Knowledge base stores information produced in the KuiSci workspaces.

3.3   Collaborative works in KuiSci

There are different ways to do collaborative work in KuiSci: 1) the collaborative relation between caller and researchers, 2) the communication between responder and researchers, 3) working together in research community, and 4) the connection of KuiSci to external database(s).

- **Caller and Researchers**

Once a project is launched and the researcher submits their project proposal together with their portfolio to KuiSci, the caller and researchers are able to work together until a project leader or responder is selected by the caller. During this time, if researchers who are interested in this project have some questions regarding the caller's project, they can automatically send such questions to the caller and it will be shown later in caller space.

- **Responder and Researchers**

A project leader or responder may need to corporate with other researchers. A responder will consider and invite suitable researchers to work together with him. The

details of the contract between the researchers and responder will be known only within the group.

- **Research Community**

During a project the research community is established. The community is composed of caller, responder and researchers. At this time knowledge sharing is take place. The community then becomes a learning organization. Since the community is composed of knowledgeable people, some of them may become good mentors for scientific and technological society.

- **KuiSci and External Database(s)**

KuiSci uses information from external databases via web services. The system tries to connect with all the researchers' databases and use information from them. In the first state, this collaboration only work under the ThaiResearch database. After the personal and organizational contracts are performed, KuiSci will be connected to other databases.

3.4 Building Collective Intelligence with KuiSci

As explained in [5], KuiSci supports community collaboration and it is focusing on being a project management tool based on expertise analysis. Moreover, when considering the technologies of collective intelligence, KuiSci also supports the global collective intelligence. The collaborative works in KuiSci collect research information and establish related research works in a knowledge base. A similar concept is found at INNOCENTIVE [10] and several examples of collective intelligence are explored in [11]. Particularly, KuiSci community, supports Thai researchers specific in the area of Science and Technology.

4   KUISCI IN ACTION

KuiSci services its community as a web application on the internet. The software itself is developed using Open Source Software tools. This section first will explain the software development tools and the technology concerned in software development. After that, example KuiSci screens are selected to explain some of the main KuiSci features.

4.1   Software Development Tools and Technology

As mention before, KuiSci is a derivative work from KUI. There are several collaborative software projects derived from KUI. Examples of KuiSci siblings include KuiPOLL and KuiHerb. This phenomenon happens because of the impact of the Open Source Software community.
  KuiSci's architectural design is based on the MVC (Model-View-Controller) concept. The main development tool is a PHP-Framework called CodeIgniter. The software uses MySQL as its DBMS. KuiSci fetches researcher information from

outside researcher databases. This process is done by running web service clients at KuiSci. At the same time at the researcher database sites, the web service servers are running.

4.2 Software Implementation

Currently, KuiSci is online at http://kui.most.go.th/kuisci. There are many portals to access KuiSci including the Science and Technology Knowledge Center (STKC) website. KuiSci can also be accessed via the allied research organization websites. The first page of KuiSci is shown in Figure 2. Whenever a user logs in to KuiSci the virtual personal space called "My KuiSci" is provided as illustrated in Figure 3.

Figure 2: The first page of KuiSci
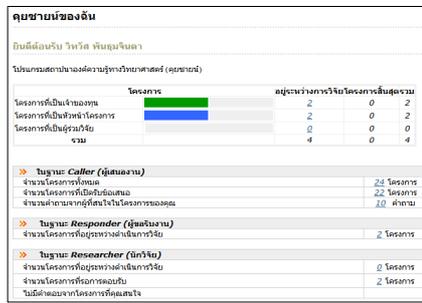
Figure 3: "My KuiSi" virtual space

KuiSci searching can be done from various views. The searching menu includes searching for caller information, searching for responder and researcher's information and searching for project information. Figure 4 shows project information from KuiSci marketplace. KuiSci matching facility is illustrated in Figure 5. And the result from KuiSci's expertise process can be used by selected project leaders for a particular project. There are many social networking tools supported in KuiSci during the lifetime of a project such as web chat, webboard, and private messages.
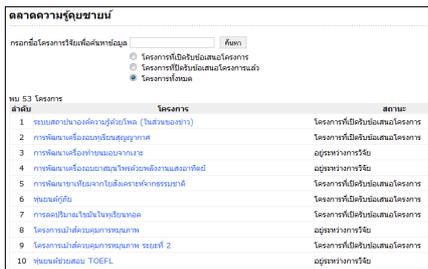
Figure 4: KuiSci's project information
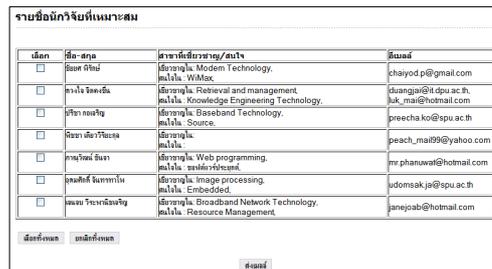
Figure 5: Project-Researches matching result

5 Conclusion and Future Works

This paper describes the social networking software called KuiSci. It is a derived work of KUI (Knowledge Unifying Initiator). The software is used as a collaborate tool in science and technology research communities. KuiSci functions include caller, responder and researchers are working over the four spaces on KuiSci: Caller space, Responder space, Marketplace and Project Workspace.

The paper also explains the KuiSci management process which is divided into two parts, the project management and the project operation. Four collaborative relations are discussed.

KuiSci is now available on its website. Its success depends on cooperation in the research community. There is great effort from the KuiSci team to connect services online from research information resources. In addition there is some guidance to extend KuiSci to cover all research areas, and not having it be limited to only science and technology. This guidance may result in another KUI derivation called KuiResearch.

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