Enhancing Groupware for Knowledge Management

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Abstract - *Groupware is popularly used for organisational knowledge management. However, present features of groupware, arguably, only allow very limited knowledge management to be carried out. Most groupware only function as a suite of generic tools, and its ability to provide effective knowledge management depends on how it is used by an organisation's employees or users. In this paper, an experimental groupware called KM-Groupware is presented. It contains functions that broaden the spectrum of knowledge management functions of current groupware. For this purpose, a selection of three tools has been enhanced and integrated, i.e. a document management tool, a blogging tool, and an e-mail client.*

Keywords: Knowledge management, groupware, document management, blog, e-mail.

1 Introduction

Groupware is a popular means for organisational employees to communicate and collaborate via a suite of computer applications. Common groupware applications are e-mail, calendar, shared file repository, forum, bulletin board, etc. Examples of groupware are IBM's Lotus Notes, Novell's Groupwise as well as the OpenGroupware initiative.

Presently, groupware is widely used to enforce some level of organisational knowledge management [1], i.e. by allowing collaboration and sharing of ideas and documents. However, with the present features of groupware, they arguably only allow very limited knowledge management to be carried out. Most groupware are top-down in nature and only function as a suite of generic tools. Its ability to provide effective knowledge management depends on how it is used by an organisation's employees or users [2]. For instance, not many users share e-mails or documents that contain problem solving knowledge effectively on a wide-scale.

In this paper, Knowledge-Based Document Management Tools for Groupware or just simply KM-Groupware is presented. It is an experimental groupware which contains functions that broadens the spectrum of knowledge management functions that are available in current groupware. KM-Groupware aims to provide features that "enforce" knowledge management upon organisational employees. For this purpose, three tools have been integrated: a document management tool, a blogging tool, and an e-mail client. Although essentially these tools are not new to most groupware, the functions of these three common tools have been enhanced to allow better knowledge management. KM-Groupware also introduces some elements of Web 2.0 [3] with its blogging, interactivity, and community-based features.

2 Methodology

In the process of developing the KM-Groupware (see Figure 1), the areas of knowledge management that are lacking in present groupware were identified. Then, applications that could be enhanced to complement existing groupware were identified. Following this, specific enhancements were chosen. These enhancements could be incorporated into these applications which would "steer" users towards practicing knowledge management rather that just making use of the application's regular features.

Figure 1. The KM-Groupware methodology

2.1 Knowledge management deficiencies in groupware

From general observation, current groupware do have the potential to manage knowledge. However, they lack in ensuring that knowledge is actually being managed. For example, although groupware e-mail clients are useful for knowledge creation, sharing and reuse, e-mails in most cases are only read while they are still new. Older e-mails which may contain useful information and knowledge are often forgotten. As another example, file databases, while having the potential for knowledge organisation, sharing and reuse, are rarely utilised effectively for the purpose of these knowledge management tasks.

Therefore, current groupware are still lacking in the areas of knowledge creation, knowledge organisation, knowledge sharing, and knowledge utilisation/reuse.

2.2 Choice of applications

Based on the deficiencies of current groupware, a choice of tools was made, i.e. document management tools, blogging tools, and e-mail clients. These would be enhanced to complement existing groupware applications.

Document management tools are essential for storing the outputs of the employees and would be useful for knowledge sharing, organisation, and reuse. Outputs may be in the form of reports, presentations, spreadsheets, etc. Blogging tools are currently not a common groupware application but they are popular outside of groupware circles to express opinions and ideas. This makes it an excellent candidate, with some enhancements, for knowledge creation and sharing [4]. E-mail clients being one of the most widely used computer application, is also an obvious choice for enhancement [5] [6]. E-mail clients can address knowledge creation, sharing and reuse.

2.3 Enhancements to the applications

Having decided on three applications, the following subsections discuss the enhancements that could be incorporated into the chosen applications and motivations behind these enhancements.

2.3.1 Document management

Document management tools, although widely incorporated into groupware, leave much of the task of knowledge organisation and reuse to the user. Therefore, document management tools in groupware could be enhanced with text analysis/text mining features to add metadata to documents being stored. Metadata could be in the form of extracted keywords, subject headings and a short summary. The metadata could then be used to organise the repository of documents and to enhance the accuracy of document search.

2.3.2 Blogging tool

Current blogging tools provide users with an interface to type in the post title and the text of the post. Other information includes the timestamp, author, comments and trackback. These are sufficient in most blogging situations, especially for regular journal or diary writing purposes. However, to facilitate organisational knowledge creation and sharing, it would be advantageous if users/authors are allowed to customise the fields of the blog posts, i.e. to include other details that suit the requirements of the working environment. This allows blogs to be used for work-related reporting or sharing of problems and solutions.

Another enhancement to the organisational blogging experience would be to allow follow-up posting, i.e. to be able to select a previous post and write a new post as a follow-up. This is useful when readers are interested to know the history of a particular post.

2.3.3 E-mail

Most users are accustomed to an e-mail client that allows one to send and receive e-mails, and perhaps even set filters to organise e-mail. In an organisation, e-mail communication facilitates problem solving and sharing of ideas. However, only newer e-mails are given attention and much of the old e-mails are often just "archived" and are rarely used to solve similar problems in future. There is also the issue of the volume of e-mail messages being sent within the organisation. The large number of e-mails makes it difficult to appreciate good problem solving e-mails or ideas.

E-mail clients could be enhanced with a hybrid of discussion group and review features [7]. This allows users to consult a group of users, i.e. anyone having the same e-mail client, and receive replies and solutions from the group. The replies and solutions are rated by everyone in the group. This enhancement allows e-mails to be effectively used for knowledge creation, sharing and reuse. Besides the subject heading, keywords can be included to make it easier to organise e-mails.

3 Implementation

Based on the three applications, a prototype KM-Groupware was developed to integrate the three applications. The three applications were named KM-Document Manager, KM-Blog, and KM-Mail (see Figure 2).

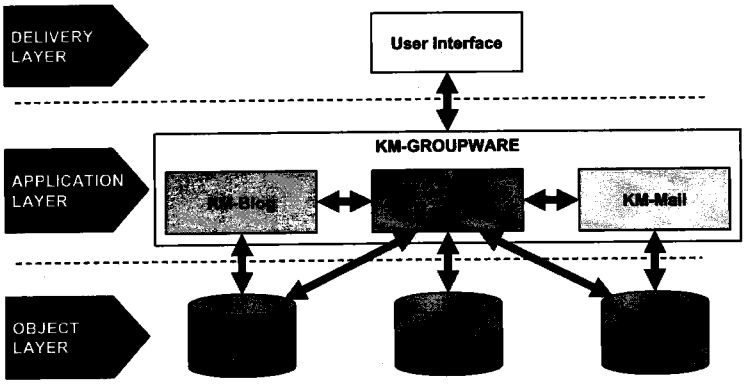

Figure 2. KM-Groupware overview

3.1 KM-Document Manager

The nerve of the KM-Groupware is the KM-Document Manager which primarily has sub-modules for uploading, downloading and viewing of documents, adding and editing text documents, searching for documents, and audit trail. A sample audit trail screenshot is shown in Figure 3.

The enhancement incorporated into this application focuses on the upload sub-module which requires users to include the document title, description and metadata (context, keywords, etc.). Submission of the document would trigger a simple keyword extraction feature to extract additional keywords by analysing word frequency after stop words have been removed. The results are ranked and the most frequent n number of words are chosen as additional keywords. The value of n is proportionate to the length of the document.

For document downloading, the user would first be shown a list of documents and the relevant document title, metadata and additional keywords.

The search sub-module (see Figure 4) involves checking through the metadata and all keywords of the documents in the repository. The search sub-module is extended to the KM-Blog and KM-Mail tools in view that blog posts and e-mails are by themselves also documents.

3.2 KM-Blog

As mentioned earlier, the value-added feature of the KM-Blog tool is the customisable nature of the post fields. Therefore, in the blog configuration interface, users have the option of setting the number of fields required and the field-types. This allows KM-Blog to adapt to different purposes, e.g. medical case reporting which would require fields such as the title, observation, signs and symptoms, diagnosis, treatment, etc. The number of fields can be changed at any time and every new post refers to this updated configuration for the required field details. Any changes to the number of fields do not affect previous posts. Viewing of previous posts would maintain the original number of fields.

Another enhanced feature is the inclusion of follow-up posts. This is essentially a new post except that the user begins by identifying a previous post of interest while browsing the blog (see Figure 5). On the interface of the previous post, the user is allowed to perform a follow-up (see Figure 6). A hyperlink (or permalink) of the previous post would be automatically inserted into the new post to indicate a relationship between the two posts. When viewing the list of available posts, the presence of follow-up posts is also indicated.

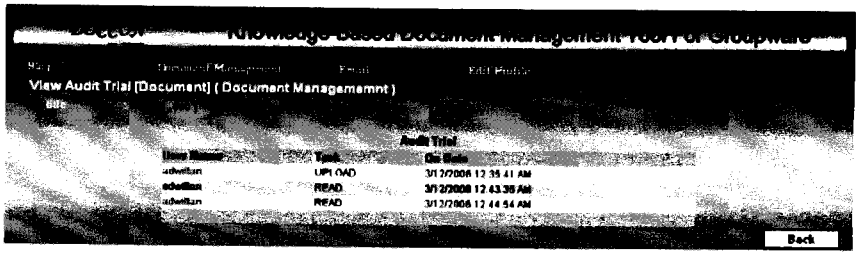

Figure 3. Viewing a document audit trail

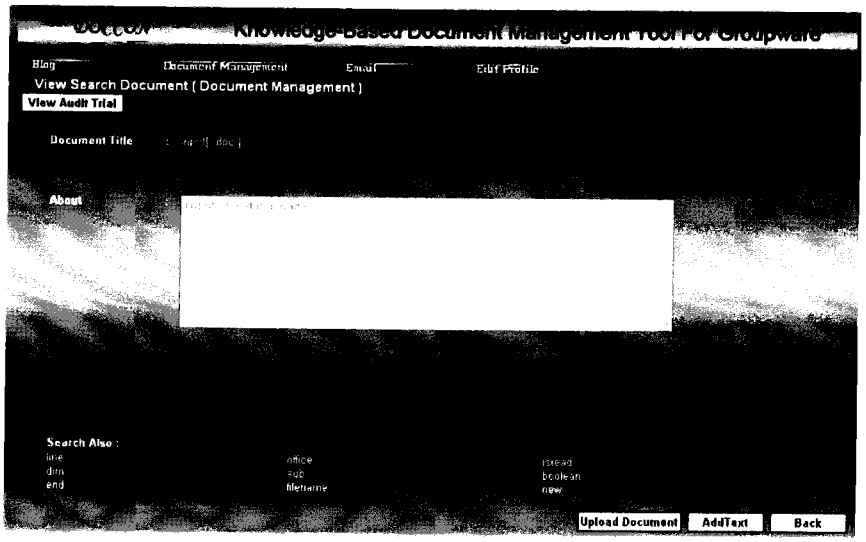

Figure 4. Viewing a searched document

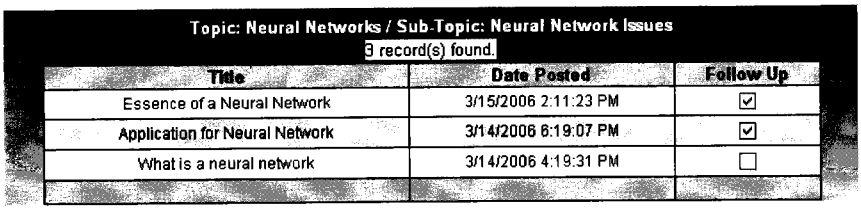

Figure 5. Selecting relevant posts to follow-up.

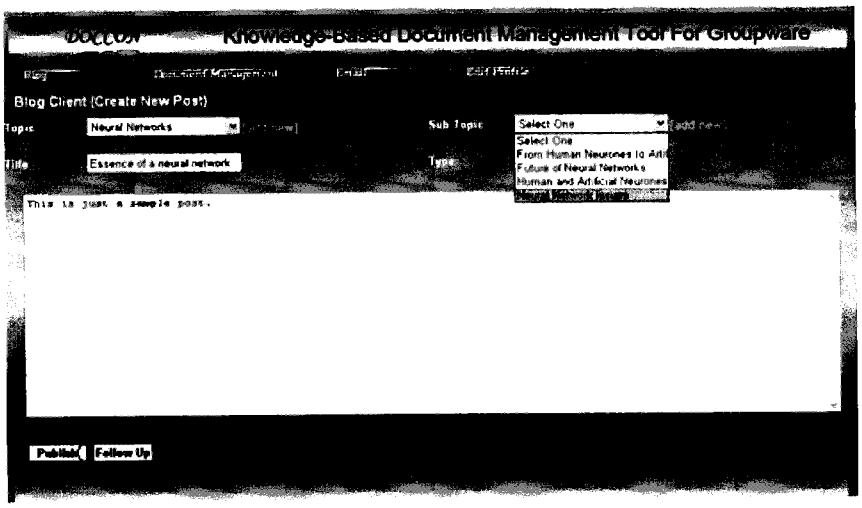

Figure 6. Posting a follow-up

3.3 KM-Mail

In this application, a user wanting to share a problem is provided with a special interface similar to that for composing a new e-mail. In this interface, the user is required to specify a group of recipients and the problem description in the subject field and e-mail body. These are sent to everyone in the group. Subsequent replies with solutions and comments to the problem description from the group members would be sent to everyone in the group. These solutions and comments can then be rated by everyone (see Figure 7). These ratings would be sent to everyone in the group and the collective rating for that particular reply (solution or comment) would be calculated and displayed in everyone's e-mail folder. The e-mail ID is therefore important to track replies.

To organise e-mails, the user is provided with an interface to specify categories of e-mail. Each category is specified separately by using keywords and their respective weights. The weights indicate how important a particular keyword is. During the categorisation process, an e-mail's keywords are matched to a particular category specification. If a match is found in the e-mail's keywords, the weights of the category specification's keywords are summed and averaged. If this averaged weight exceeds a predetermined threshold, the e-mail is put into that category. As such, it is possible for an e-mail to belong to more than one category (see Figure 8). These categories can facilitate searching from the KM-Document Manager.

4 Findings and Discussion

Overall, these are some observations:

- The enhancements do help "enforce" knowledge management in groupware in a proactive way, e.g. knowledge organisation is enforced via the simple text mining feature in KM-Document Manager, and knowledge sharing is enforced in KM-Mail via the forced distribution of replies (and ratings) to everyone on the group;
- The enhancements try to adapt to specific tasks in the organisations, e.g. via customisable blogs in KM-Blog, and via group problem sharing and solving in KM-Mail;
- Groupware content for documents, blogs and e-mails is now more structured and complemented with metadata or keywords.

We believe these enhancements come at a price as they involve new ways of doing things, e.g. having to customise the blog fields, rate e-mails, and include keywords in documents and e-mails. The consequences of these added steps remain to be seen as the prototype is currently not available to users for testing. Resistance to change is expected but it is believed that without these enhancements, groupware would remain a generic and reactive suite of tools for data and information management rather than being customisable and proactive for knowledge management.

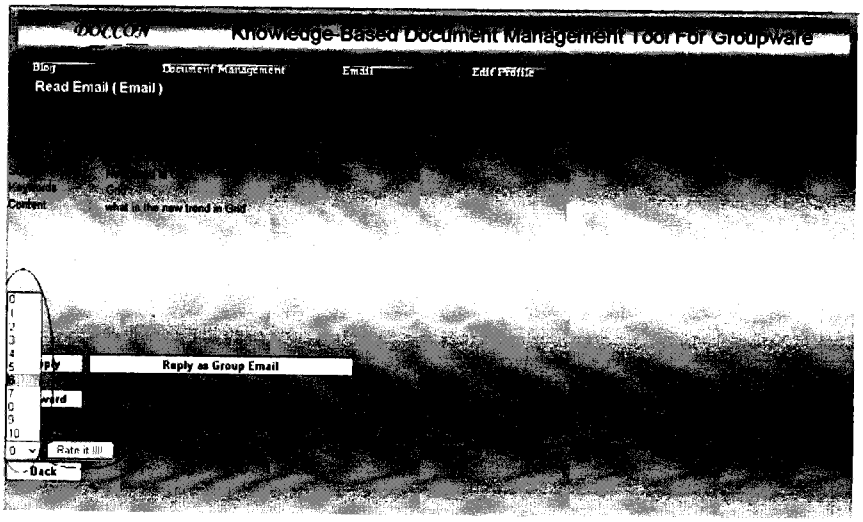

Figure 7. Rating an e-mail reply

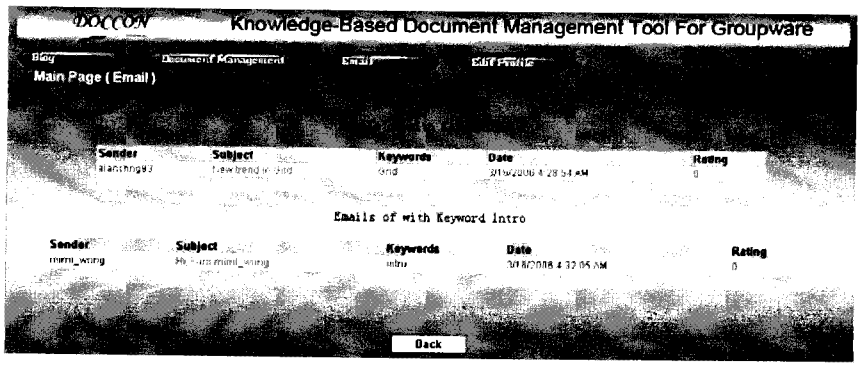

Figure 8. Categorising e-mails

The emphasis of KM-Groupware is to make groupware more than just a suite of tools for communication and storage. Groupware has to be enriched so that its tools and content can be structured in such a manner to facilitate decision making. KM-Groupware has managed to achieve this to a certain degree with the various enhancements.

5 Conclusion

Many organisations still rely on off-the-shelf groupware and as expected, they would need to contend with the off-the-shelf groupware applications they contain. It is hoped that KM-Groupware would eventually become as widely available as possible, perhaps enough to be labelled "off-the-shelf". However, the emphasis would still lie on the unique features of its components or applications.

The prototype KM-Groupware is still under development and various enhancements are still being researched on. The list of applications may be expanded to include collaborative tools such as those for coalition formation [8] and planning, as well as to realise a knowledge management initiative in the healthcare domain [9].

With the new generation of web applications becoming more popular, such as those categorised as Web 2.0 [3] applications, it is hoped that the groupware of the future would truly "manage" knowledge via elements of interactivity, connectivity, and personalisation.

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