VKB in a Heterogeneous, Long-Distance, Multi-User Environment.

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ABSTRACT
The Visual Knowledge Builder, VKB, is a spatial hypertext system intended for individual use or the use in small user groups. An informal experiment carried out to investigate its usability in a heterogeneous, long-distance, multi-user environment yielded a number of issues. This short paper briefly outlines the problems identified and presents a few suggestions for a “workgroup version” of VKB.

Categories and Subject Descriptors
H.5.4 [Information Interfaces and Presentation]: Hypertext/Hypermedia – architectures, user issues.

General Terms
Design, Experimentation, Human Factors.

Keywords
Spatial Hypertext, Heterogeneous Systems, Long-Distance Group Work, Multi-User Environments.

1. INTRODUCTION
This paper describes an experiment that investigates the use of the spatial hypertext system VKB in a heterogeneous, long-distance computing environment with a small group of users.

After giving an overview of spatial hypertext and VKB, the setup of the experiment is presented. The identified issues are detailed in section 2. Section 3 gives a number of suggestions for a “workgroup version” of VKB.

1.1 Spatial Hypertext and VKB
Traditional hypertext systems rely on explicit connections among documents and pieces of information. Spatial hypertext, on the other hand, is based on implicit relations. It exploits human visual memory and skills such as the recognition of patterns, proximity, colour, shape, and other characteristics. These features are used in order to define relationships and connections between objects implicitly, i.e., objects that are closer to each other or objects with similar visual features are in a relationship with each other (e.g., [2]).

VKB implements this notion of spatial hypertext (see [4; 6]). It allows users to create and align simple objects such as text fields or images, but also more complex hierarchies of two-dimensional spaces named “collections”. The visual properties of both simple objects and collections including border and background colour, border width, type definitions and other attributes can be specified.

In addition to this, VKB offers a range of tools that facilitate and support the authoring of spatial hypertext projects: a history function, for instance, keeps track of all actions that are carried out in a project (e.g., [3]). It can be used to determine the order in which objects were created or modified, and increases the understanding of more sophisticated workspaces.

1.2 The Experiment
This informal experiment is independent from the development of the software. The task was for four users to summarise and organise about forty conference papers in a common workspace so that they can be found and retrieved easily. The duration of the project was approximately six weeks.

A long-distance environment with different time zones was simulated, i.e., the users pretended to be situated in different countries – Austria, California, New Zealand, and South Africa. Thus, they did not have the opportunity to communicate personally, and the only means of information exchange were the common VKB project and technologies such as e-mail and instant messaging.

Different computing platforms including Windows XP, Linux, and Mac OS X were employed. The various computer systems were connected to the Internet with different technologies ranging from relatively slow modem connections to faster, permanent connections such as Cable or T1.

2. IDENTIFIED ISSUES
This section briefly describes the most significant problems that occurred during the group work in the common workspace.

2.1 Communication
The analysis in the long-distance environment has shown that the need for electronic communication among project members is greater than in workgroups where personal communication is possible. Especially in the initial phase of the project, many parameters had to be agreed upon: which categories are to be used? How should a paper be represented – is it an object or a collection? What is the layout of the summaries of the papers? etc.

For this purpose, the four group members made use of external communication facilities such as e-mail but, at the same time, also created objects with notes to other users in the common workspace. Hence, users had to get project-related information from several sources, and regularly, some information was lost.

The frequency at which messages were exchanged decreased in the course of the project. However, the communication among users still caused problems because messages were usually exchanged via e-mail, and not all users were reading their e-mails.
periodically while they were working on the VKB project. Hence, users sometimes missed important notes, and modified objects in the workspace that should not have been altered.

2.2 Metadata
The history function proved to be useful when it was unclear why a group member made certain modifications, or when the position of objects and collections was hard to comprehend (e.g., [3]). It was rather complicated, though, to find out which user actually made the changes, which is due to the lack of metadata retained in the system.

In this experiment, the solution was to contact all users via e-mail in order to discover who the author was.

2.3 Online Collaboration
On several occasions, there was a desire to work together on the same project. Since VKB does not enable users to do this, a rather “fussy” alternative had to be found. Users A and B, for example, want to agree on a collection for a given object.

Thus, user A opens the project, modifies it, has to close it, and tells user B via e-mail that she can open it now. User B reviews the changes, adds a comment and subsequently tells user A that he can continue to work in the workspace.

3. SUGGESTIONS FOR A “WORKGROUP VERSION” OF VKB
VKB is a powerful spatial hypertext system; however, its use in a multi-user environment is limited. Therefore a few suggestions towards a “workgroup version” of VKB are made. These implications even have the potential to open up new application areas and address new target groups.

3.1 Communication
In its current version, VKB does not provide means to communicate among users although it is a very important aspect. Therefore, it is suggested that VKB offers communication facilities as part of the system.

Both synchronous and asynchronous communication can be used: if all users that want to communicate with each other are actively working in the system, a synchronous communication technique such as instant messaging is employed. Otherwise, asynchronous communication is utilised, i.e., user A “leaves a note” for user B. Next time user B opens the VKB project, all new incoming messages are displayed.

3.2 Metadata
The set of metadata stored for all objects in the workspace should be extended. Data, for instance, on who created or modified an object, when the last modification took place, the media type and address new target groups.

3.3 Online Collaboration
Another proposal is to make “online collaboration” possible. This means that several users may open one workspace at the same time. When user A modifies or creates an object, all other users working on the same project can see the changes at the very instant they are committed. Thus, the collaboration is greatly improved, and users can actually work together on a project and in a workspace.

3.4 New Application Areas
Currently, VKB is mainly used for collecting information, for taking notes, for conference organisation, and project management (e.g., [5; 6; 3]). By implementing the proposed suggestions, not only the work in user groups can be facilitated, but also new application areas may be opened up for VKB. This could make it possible, for instance, to use VKB:

• in both physical and virtual discussion rooms for exchanging and organising information in real-time;
• for taking minutes in a meeting, where all users can see and change the notes at the very instant they are generated;
• for flexible, interactive meeting support, resembling the Dolphin hypermedia system (e.g., [1]); and
• collaborative project management.

CONCLUSION
Although VKB can be used in workgroups, there is a number of problems that might be encountered, particularly in terms of communication and team work. With several changes in its architecture and improvements in its communication facilities, the usability of VKB can be greatly enhanced in multi-user environments, and new application areas could be opened up.

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