

A shared information environment for collaborative design and learning

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ABSTRACT

Design is a complex process, in which an artifact is created through a complex set of interactions between designer (or designers), information germane to the design and the design itself. A key factor in successful *collaborative* design and learning is shared access to, and management of, information needed to support design and learning. In this paper, we determine the requirements for a collaborative information-seeking environment for design through a scenario. We outline a design for such an environment, which extends the information seeking capabilities of the SketchTrieve tool, with support for collaborative information seeking and handling capabilities.

Keywords

Computer-supported collaborative design; e-Learning for design; information seeking; information handling.

MOTIVATION

Design¹ is a complex activity, in which a design for an “artifact” emerges through a series of interactions between members of a design team. These interactions typically involved conversations about ideas the team members develop, and information relating to the ideas of others, where a “conversation” may involve a single individual, or a group. Initially, the design process is rather open and unstructured as initial ideas are explored, and information is gathered from a variety of sources. In the middle stages, more structure is evident in the process, as the detailed design emerges, and more specific information is required. In the latter stages, finalizing and detailing documentation of a design requires access to information generated and used throughout the design process. Learning about design, through doing, and indeed most project-based and/or group learning follows broadly the same pattern. An in-

¹ Design is very broadly interpreted as any creative process, often collaborative, examples of which are: writing a paper; designing a web site; designing a product; organizing a workshop; and researching a project.

formation seeking and handling environment should provide support for all stages of the design process.

In order to support the design process, or more generally project- and group-based work and learning, a shared information environment should support:

- Shared information seeking and gathering across a broad range of resources (search engines, document collections, datasets, websites), using a broad range of search strategies and tactics;
- Shared information handling to enable retrieved information to be organized and deployed as appropriate; and
- Seamless integration with the (electronic) design/learning environment, so that information seeking and gathering is embedded within the design/learning process.

The scenario in the boxed figure below brings out some of the more detailed requirements of a collaborative information environment for design and learning, and the scenario focuses on the informational parts of the design process.

In the rest of this paper, we outline the design for a collaborative information seeking and handling environment (CERISE: Collaborative Environment for Information Seeking and Handling), based on requirements that emerge from the scenario. We argue that the SketchTrieve environment provides a good foundation for CERISE, and describe the necessary extensions required to SketchTrieve for collaborative searching in support of design and e-learning.

REQUIREMENTS FOR A SHARED INFORMATION ENVIRONMENT

The requirements for a shared information environment to support collaborative e-Learning, and specifically for design, are:

- Workspaces which support both information seeking and information handling activities;
- Shared and individual workspaces, including convenient sharing of documents (and resources) between individuals, and within groups;
- Access to a wide variety of search services and information repositories, and support for search strategies and tactics;

- Flexibility in managing searching and in organizing information, including individual personalization and group customization;
- Intelligent support for searching and organization leveraged off the collected information; and
- Seamless integration with the collaborative design/learning environment.

Background: Three students are working on a class project to design a new document browser for a handheld personal digital assistant. They are respectively students in information science, computing and business, and are expected to work collaboratively using computer-based environments and tools.

Week 0: The tutor provides initial materials for the project, including specification, documents, URLs of useful web sites, etc. In addition, she provides guidance on seeking and handling project information.

Week 1: The team search for information collaboratively using a range of search engines and search strategies supported by CERISE. The result is the electronic equivalent of piles of references and documents. The team agrees they need to organize and sift through the information they have found.

After consulting guidance notes, they opt for a tabular organization over a folder organization. A 3 x 3 table is arranged with the rows representing major aspects of the documents, and the columns the minor aspects. Documents are assigned to the cells, and they each agree to review documents appearing on a given row, and to recommend 3-4 "must read" documents.

Week 2: The "must read" documents have been posted in a shared CERISE space, and they "meet" to review the document. A consensus emerges that they should develop a speech-based browser for the visually impaired, based on the concept of query-biased summarization and scanning.

Weeks 3-5: Further research is done on various detailed aspects of the project, and organized accordingly. Meantime, based on the information collected, the CERISE system is able to provide various kinds of proactive intelligent support to the team. This could include document routing based automatically generated queries, analysis of web site addresses to determine authority sites and automatic organization of documents.

Week 6: Review progress of project with tutor, which is enabled by organization of the information.

Weeks 6-7: Report writing, which is enabled by CERISE functions that: automatically create bibliographies from document references, pro-active search agents that identify relevant passages, and overview functions

DESIGN OF COLLABORATIVE INFORMATION SEEKING AND HANDLING ENVIRONMENT

SketchTrieve is an end-user information-seeking environment, in which the main interface metaphor is the "search canvas" [1,2]. A range of search and organisational services are provided including query inputs, search engines, filtering services, folders, and notes services. Customisable icons represent services and multiple instances of each service can be created. A typical search proceeds by connecting a query service to one or more search services, and interacting with the resulting lists of retrieved docu-

ment surrogates. SketchTrieve was purposefully designed to be under-determined, and passively encourages the user to use spatial and organisational skills to plan, monitor and record search episodes. The search canvas "talks back" to the user, and enables conversations with self, concerning search strategies and tactics employed, and the information retrieved.

The CERISE system will generalize and extend SketchTrieve in the following ways:

- Development as a multi-user collaborative environment;
- Support for multiple "canvases" (or workspaces), which can be used for both shared information seeking and information handling/organization;
- Flexible sharing of the canvases between individuals and groups;
- Development of new services, and in particular support for various kinds of information organization such as folder hierarchies and tables, document piles and lists, and map/network structures;
- Document sharing supported through sharing canvases, and through multiple "document ports" which allow documents to be moved between canvases, and between CERISE and the design/learning environment; and
- Intelligent agent services supporting pro-active retrieval, document clustering and classification, and automatic workspace structuring.

Notably, CERISE will support conversations between the collaborating users, through joint activity on the shared canvases. A tutor can populate canvases with resources, and with prototypical searches. Users can communicate results of individual searching to the team. Experienced searchers can assist less experienced users in searching. Design and learning materials can be organised and annotated to maximise usefulness during the design and learning processes.

CONCLUSION

We have outlined a design for a collaborative information seeking and handling environment, intended to support design, broadly interpreted, and e-learning. Such environments are essential if we are to use effectively the plethora of digital library services that are currently available, and perhaps as important, deploy effectively the information they deliver.

REFERENCES

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