

WebGuide: Guiding Cooperative Work on the Web with Perspectives and Negotiation Support

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ABSTRACT

Cooperative knowledge work typically involves a mix of individual and group activities. Computer support for both personal and team *perspectives* allows people to view and work on a central information repository in personal, subgroup, and team contexts. *Negotiation* mechanisms support the merger of information developed and proposed by individuals or subgroups into perspectives representing convergence of group ideas.

By intertwining perspective and negotiation mechanisms, a presentation or product representing group consensus can systematically be constructed from the individual results while work on personal ideas progresses within private workspaces. WEBGUIDE is a prototype system that integrates perspective and negotiation mechanisms to support web-based cooperation. It is currently being developed to support two diverse group research projects; the demo will feature the current state of these research collaborations as represented within WEBGUIDE.

WebGuide: Guiding Cooperative Work on the Web with Support for Perspectives and Negotiation

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Cooperative knowledge work typically involves a mix of individual and group activities. Computer support for both personal and team *perspectives* allows people to view and work on a central information repository in personal, subgroup, and team contexts. *Negotiation* mechanisms support the merger of information developed and proposed by individuals or subgroups into perspectives representing convergence of group ideas.

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DESCRIPTION OF APPLICATION

WEBGUIDE supports group research efforts using the World Wide Web. It allows group members to use the web:

1. to organize information individually in their personal perspectives,
2. to negotiate the merger of information into cooperative shared perspectives,
3. to discuss personal and group information in persistent forums, as well as
4. to collect and process information available on the web generally.

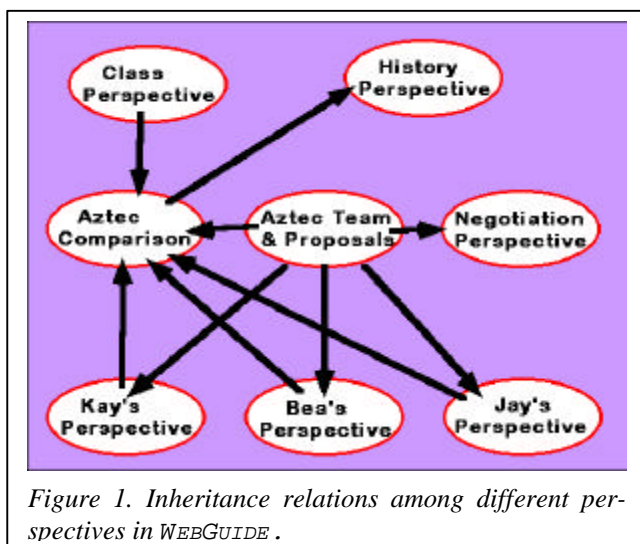
WEBGUIDE maintains an organizational memory, i.e., a shared information database that is accessed through dynamic web pages and that evolves as a direct result of

group work. WEBGUIDE demonstrates the synergy between two innovative CSCW mechanisms: perspectives and negotiation. The perspectives mechanism structures the display of information in the shared database into personal, group, and other perspectives. The mechanism is quite general and allows for hierarchies of perspectives to be structured for different applications. Individuals work primarily in their personal perspectives, where they can freely modify, restructure, supplement, and annotate any information without affecting other people's views.

Cooperating partners, subgroups, and groups can consolidate their work through processes of negotiation. While the perspectives mechanism allows individual work to proceed even during lengthy negotiations, the negotiation mechanism guides group work back to convergence. The negotiation process can be structured to complement face-to-face decision-making. It is parameterized to allow alternative negotiation policies.

Threaded discussions and annotations throughout the WEBGUIDE system promote debate from different perspectives and argumentation in support of negotiation decisions. The perspectives mechanism can be used to save the current state as a new perspective that is maintained as an historical version. In addition, a special history perspective allows someone (especially project leaders, class teachers, or groupware ethnographers) to view all contents that were ever entered to track evolution of ideas and design rationale.

The perspectives, negotiation, and discussion mechanisms make WEBGUIDE an effective groupware system for collecting, interpreting, and sharing information found on the web, including annotated URL bookmarks and successful search engine queries. In WEBGUIDE, the shared bookmarks are not simply listed or cataloged, but they are arranged in meaningful contexts that can serve as web-based presentations of cooperative research efforts.



KINDS OF WORK SUPPORTED

WEBGUIDE is designed to support ill-structured group knowledge work like research where problems must be framed, information reorganized, different opinions formulated, and alternative approaches debated. Specifically, it supports group research carried out on the web: much of the information comes from the web generally, work in WEBGUIDE takes place in a web browser, and the final presentation is available on the web. Although group research has a tendency to generate divergent results, WEBGUIDE includes mechanisms to encourage participants to coordinate their results and seek consensus – or at least to understand where they have agreed to disagree.

DISTINGUISHING APPROACH

WEBGUIDE incorporates two important CSCW mechanisms: perspectives and negotiation support. Significantly, it intertwines the use of these mechanisms so that each overcomes the central weakness of the other: perspectives allows work to continue while negotiations are underway and negotiation allows divergent personal research results to be brought together in mutually acceptable group products.

The perspectives mechanism goes beyond simple views, fixed alternative representations, and personal workspaces with a flexible inheritance mechanism. New perspectives can be defined and they can inherit all the content from multiple existing perspectives. Thus, I can define a personal project perspective and start out my work in there with all the content from perspectives I select representing various domain knowledge, particular other individuals' work, or current subgroup products. The hierarchy of perspectives is flexible to allow different applications to structure the flow of information appropriately. Figure 1

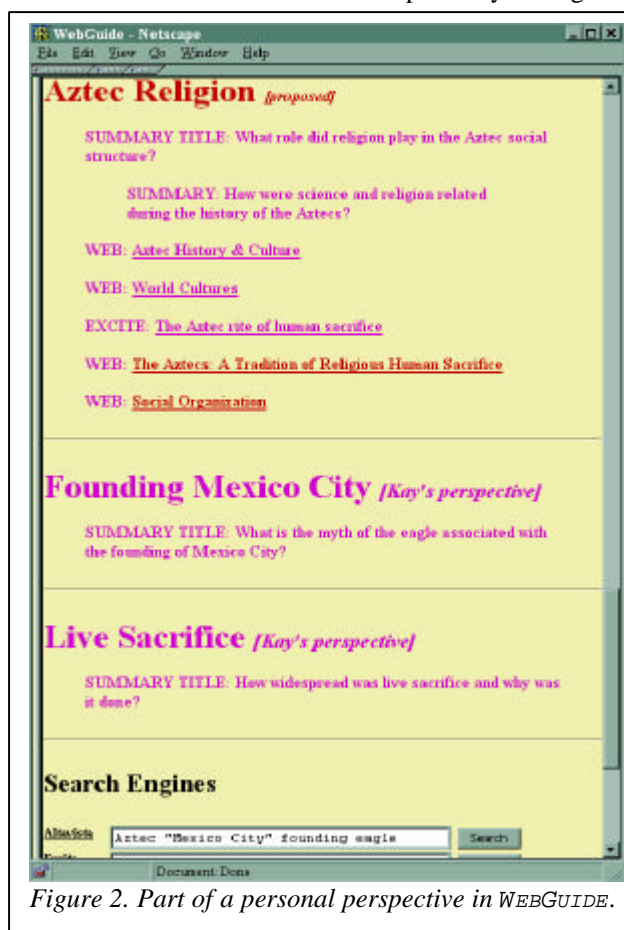
illustrates the hierarchy used by members of the Aztec research team in a current WEBGUIDE application.

The negotiation mechanism is optimized for small groups. It is parameterized to allow the selection of alternative negotiation policies. It supports both asynchronous (web-based) and synchronous (face-to-face) discussion of negotiation decisions. Its uniqueness comes from its integration with perspectives.

THE DEMO

Two applications of WEBGUIDE will be demonstrated:

1. A public policy research team is exploring the issue of water pollution by mines in the Colorado Rockies. WEBGUIDE is used as a medium for people representing different interests – mine owners, local community, environmental groups, governmental agencies – to formulate their own perspectives and then to enter into dialogue with other perspectives.
2. A set of cultural research teams is investigating controversial questions about the ancient civilizations of Meso-America. They are gathering their information on different civilizations – Aztec, Maya, Inca, Anastasi – and different issues primarily through web



searches. WEBGUIDE helps them to organize, discuss, and consolidate their findings. (See Figure 2.)

These two applications will be shown, including the various perspectives that researchers use to view their work and to negotiate group agreements. The structure of the perspectives hierarchy and negotiation parameters in these two applications will be explained and contrasted. The generality for other kinds of CSCW contexts will be discussed.

THE PRESENTERS

Gerry Stahl is a Researcher at Colorado's Center for LifeLong Learning and Design. His research includes the use of perspectives in organizational memories for organizational learning. He has implemented perspectives mechanisms and other personalization techniques in several systems. WEBGUIDE is his first web-based implementation of perspectives. He is a PI in two projects using WEBGUIDE.

Thomas Herrmann is a Professor at Dortmund's Informatik und Gesellschaft (computers and society) group. His research includes the support of negotiation in CSCW systems. He designed the negotiation support in WEBGUIDE during a stay in Boulder.

Rogério dePaula is a graduate student at Colorado and a Research Assistant on the WEBGUIDE project.

Kai-Uwe Loser is a graduate student at Dortmund currently visiting Boulder, where he is working on the WEBGUIDE project.

EQUIPMENT NEEDS

The WEBGUIDE demo needs a computer running an Internet browser: Mac or PC running IE or Netscape, with web connectivity.