A Collaborative Interface for Managing Design Alternatives

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ABSTRACT
Generating and managing multiple ideas is a fundamental part of the creative process for both individual and teams of designers. To be useful for early design, computer tools must effectively support this common practice. This paper proposes a demonstration of a new collaborative interface for managing ideas in computer-based design tools. The core of the interface provides interactive spatial maps for creating, organizing, and reflecting on ideas. The interface was also substantially revised in response to lessons learned from a study comparing its use to the use of other tools for managing multiple ideas during early design work. The revised interface allows designers to tag and filter the idea space, arrange ideas in three distinct views, and efficiently compose and decompose content from multiple ideas.

Keywords
Creativity, Design, Multiple Ideas, Management.

ACM Classification Keywords
H.5.3 Group and Organization Interfaces: Computer-supported Cooperative Work, Theory and Models.

General Terms
Design

INTRODUCTION
Managing alternative ideas is a core part of the creative design process [1]. As computer tools are being used more often for early design work, how well the tools support idea management will have a large impact on designers’ creative performance. Common interaction models such as layered canvases (e.g., Photoshop) and tabbed interfaces (e.g., OneNote) do not adequately support idea management. For example, these models do not allow designers to view all ideas at once or capture the ongoing design situation [3].

To address the limitations, we developed a new interaction model that uses the metaphor of interactive 2D spatial maps for viewing, organizing, and reflecting on ideas. The model supports both individual and group design activity and was fully implemented in a system called TEAM STORM [3]. We have substantially revised the system based on an empirical study.

We propose to demonstrate our revised system at the conference, giving attendees a hands-on experience of how interfaces can better support multiple ideas. We envision existing tools such as Photoshop, OneNote, and Visio as well as future design tools could offer a similar interface.

BASIC INTERACTION MODEL
For the individual, TEAM STORM consists of a sketch editor and a personal workspace. An idea is represented by a sketch created with the editor and every sketch has a corresponding thumbnail that appears in the spatial map of the workspace. The workspace also provides controls for manipulating the thumbnails and the view. The thumbnails can be positioned and scaled within the map as desired to capture the design situation. For instance, as designs come in favor, they can be positioned near the center and/or scaled larger in the map (see Figure 1b).

The system also supports co-located group work. Each device running the client can connect to our server, causing a group workspace to appear in the client. The group workspace provides a spatial map and interaction similar to the personal workspace, but can be collectively edited by the group. Designs placed in the group workspace are shown on the display connected to the server machine (see Figure 1a). Designs can be shared or copied by dragging thumbnails between the personal and group workspace.

Lessons learned from our observations, empirical results, and user feedback led to a substantial revision of our tool.

ENHANCED INTERACTION MODEL
Our revised model integrates three new modules: tagging and filtering designs, arranging designs in three distinct views, and composing/decomposing designs. The modules have been implemented in our enhanced version of the tool.

Tagging and Filtering
Our model offers tags for managing, filtering and recalling multiple ideas. The user can create a tag list through the tag panel (Figure 2a) and then he or she can assign tags to the designs by dragging tags from the tag list to the designs.
The colored square blocks on the designs facilitates visual matching with the corresponding tags. The operation works in both the personal and group workspace. In the personal workspace, the tags are used to help the user organize his or her personal designs and these tags cannot be viewed by others. Once the design is shared in the group workspace, the associated tags are visible to all. Collaborative tagging in the group workspace allows team members to exchange knowledge at the category level of ideas [2].

Designers are able to toggle the visibility of a design via its assigned tags. The checkboxes on the tag panel allow users to toggle whether or not the design associated with the tag is visible (Figure 2a). This operation allows designers to filter designs and focus on specific groups of ideas.

### Three Workspace Views

The previous version of TEAM STORM only provides a reflective view (spatial view) for managing ideas in the personal and the group workspace. In our enhanced model, designers can view the workspace from three perspectives: reflective view, temporal view (designs that are organized by time of generation) and favor view (ordered by scale of designs). When users switch views, the scale of designs are kept the same to help users recognize them easily. In addition, in the group workspace, users could change the visibility of the designs separately and review them in different views without affecting other users’ views.

### Fluid Composition and Decomposition

Our last major enhancement offers the composition and decomposition operator to foster working with incremental variations to existing ideas. Users can select multiple designs in the personal or group workspace and compose them into a new design. For example, in Figure 2a, the designer has selected two designs and once the composition operator is selected, the designs would be composed into a new design and the selected designs would then be deleted. This operator facilitates managing incremental variations of the same design concept, mimicking how designers often draw variations on a single sheet of paper (and use different pages to represent different concepts). Conversely, users can select part of the content of an existing design and decompose this design into separate canvases (a new canvas would be created with the selected content and the selected content would disappear from the source design). This allows the designer to split off a variation and pursue it as a new design direction.

### REFERENCES

