ABSTRACT

One of the main challenges in team based design scenarios is the effective sharing of data. Within a team every person has ideas that develop and refine over a period of time, every person collects data relevant to the project, and every person maintains an idea log to record the thoughts-process. As a result, each person has an assortment of documents and files to contribute to the project: Paper sketches, Post-its, Idea Logs, File Attachments, Web Links, Documents, Pictures and Videos. All these artifacts are kept at different locations, often not visible to the entire team. Often sharing takes only place in project meetings but due to time constraints the rationale and thoughts process behind a particular idea is missing. Many of the ideas get lost as they are forgotten, can’t be found anymore, or are simply not understood by the other team members.

We are prototyping a paper-based interface to compensate some of the shortcomings mentioned above. The proposed interface utilizes the high spatial resolution and visible presence of paper as features for a display that shows ideas and artifacts that were generated during a design process. The layout of the elements on the display will be designed so that it allows for extraction of contextual information to facilitate access. As a second layer of information we propose an underlying database that is linked to the objects on the paper display. Users can therefore access the full content of the database through the paper based interface. Combining the advantage of a permanent display of “all that is out there” with the rich digital information stored in a database we think it will be able to increase performance by stimulating discussions and reflection, facilitate sharing of ideas and increased accessibility of past ideas.

HYPOTHESES

Physical presence of otherwise absent/hidden information will improve intra-group and inter-group communication by encouraging discussion, facilitating the sharing of ideas, and generating a shared awareness of the team members which in turn will increase performance.

The choice of email as input will increase amount of shared content, as it significantly reduces the overhead to share content in comparison to current wiki-based environments.

TASK ANALYSIS

The preliminary question is: Who are the users? They are designers who are co-located, working in casual or formal collaboration. We are specifically targeting a four-person design team comprising graduate students enrolled in ME310, working on an industry-sponsored design project involving the development of a personal air conditioning system.

What tasks will the user perform? ME310 members will direct their email to a group email account and use this email as a primary mode of information exchange and communication. They will typically perform tasks such as exchanging information and material, communicating about meetings or project-related activities, searching for past emails and documents, uploading and downloading shared content, etc.

Where are the tasks performed? Tasks will be performed from anywhere, but our prototype will be placed within their shared work environment in the ME310 loft – a space dedicated to the class.

What set of tools do we provide the user? A physical representation of the all of relevant ideation
documents to the project’s task. For this, we shall either provide a large sheet of paper or a large display.

**Ideation**

Three different ideas for the digital radial display of the project “database” where radial axes can be by person, document type, chronology, or estimated relevance.
File types isolated for target users, along with ways to annotate or thumbnail chosen filetypes.

Interface should be dynamic, using the metaphor of elasticity, it should stretch and condense according to how it is used and manipulated by its users.
Ideas for an implementable physical paper-based interface (here the database is sorted chronologically).

More on the radial digital display.
Two modes of information visualization juxtaposed.
Two big picture sketches that show the general “ambient” digital display adjacent to a detail screen. Users can browse and search on the visualized thumbnails on the left and “zoom in” to specific photos, documents, and videos on the right.
Looking at ways email and other databases are currently organized/categorized/sorted.

Thinking about processes such as Word’s Auto Summarize and other processes that aim to condense large amounts of information into a more manageable or even glanceable chunk.
Thinking about both formal and spatial ways to represent a large database of pictures, videos, text document etc.

Sometimes we require documents to be handled, other times we manipulate color, layout, size, and other visual elements.
EVIDENCE

We conducted interviews with students from two design classes in Mechanical Engineering: ME313 and ME310.

Students complained about the difficulties of maintaining a wiki as a platform for sharing information. In addition to the overhead costs of uploading and organizing data, information is only visible when actively looked for.

Whittaker and Schwartz [1995] compared the performance of two software development teams. One team used primarily electronic means to coordinate their work, while the other team used a wall-sized bulletin board in a shared space. They found that the board encouraged discussion; documents that arrived through email seemed less real and more easily dismissed.

FURTHER EVIDENCE

We plan to create a paper-based prototype by using the ME310 course as a test-bed. Data will be collected by following a design team of four students through a project. Due to the short timeframe of the project we are planning to use email as the sole source of data. The data collected from the emails will be manually assembled into a display and updated regularly as new data comes in.

EVALUATION PLAN

Our prototype will be mounted in the shared workspace for the ME310 course. Evaluation of usage will occur over the course of multiple weeks and can be done through interviews or monitoring the interaction with the display using a camera. The evaluation will focus on discussions around the display, access of specific items on the display, access by students other than the design team members and the direct feedback from the team through interviews and surveys. Because our evaluation sessions will be spread out over the course of multiple weeks, it will allow us to make modifications and improvements between sessions based on the feedback we receive.