

A Narrative on Collaborative Storyboarding

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ABSTRACT

Collaborative storyboarding, an emerging area of research, entails having groups of users work together to produce a sequence of user-system interactions. We conducted a study in which groups of designers were asked to construct storyboards using predetermined components. Initial analysis of the study sessions shows the emergence of a model for collaborative storyboarding, outlining the collaborative phases designers go through. The model can aid those studying design reuse and its supporting tools.

Categories and Subject Descriptors

H.5.3 [Group and Organization Interfaces]:
Evaluation/Methodology

General Terms

Experimentation, Design.

Keywords

storyboarding, collaboration

1. INTRODUCTION

Storyboarding is a design technique that first rose to prominence in the movie and advertising industry, to highlight the key aspects of a cartoon, film, or commercial in the early stages of development [2][4]. A *storyboard* typically consists of multiple panels describing actors and actions most important to a story.

In the field of human-computer interaction (HCI), storyboarding has been adopted as a tool for illustrating key sequences of user-system interaction, often through sketches [1]. Storyboarding is the process of describing a user's interaction with the system over time through a series of graphical depictions and textual narrative. Key aspects of a storyboard are the inclusion of time, people and emotions, text, and the level of detail [8].

Growing in popularity, but still not studied to a significant degree, is *collaborative storyboarding*, in which teams of designers work together to create a storyboard. We are interested in collaborative storyboarding sessions requiring participants to use some sort of templates to inspire design, such as participant ideas on note cards, pictures in a repository, or interface components from a library [5].

The goal of this work is to investigate how people work together toward collaborating on a storyboard that leverages potentially unfamiliar components without focusing on what is actually being designed. Our investigation shows a model of collaborative storyboarding is emerging through initial analysis. The potential benefits of such a model are in identifying how storyboard

representations evolve, when designers transition into different activities, and guidance for tool support structure.

2. RELATED WORK

Studies on the collaborative use of shared workspaces have been conducted. A shared workspace is an environment in which visual information about shared objects is provided [9]. They facilitate modification of the objects and observation of the effects of the modifications made by others in a transparent manner [9].

Tang and Leifer present a study in which they investigated how groups engaged in design sessions collaborate in a shared workspace [7]. They present a framework they use to analyze the workspace activity which consists of storing information, conveying ideas, representing ideas, and engaging attention. Gutwin and Greenberg present another framework intended for the awareness of small groups in shared workspaces toward aiding designers in the creation of groupware systems [3]. Although there are more examples of such work, it is important to note that collaborative storyboarding has not been studied in this manner.

3. STUDY

To investigate how groups of designers might collaboratively storyboard, we gathered 21 graduate students as participants for design sessions and divided them into 7 groups. During the sessions, they were presented with 30 cards, each displaying a picture and label of an artifact on the front and its positive and negative consequences on the back (see Figure 1). Each group was asked to create a storyboard with 4-7 panels representing a system solving a given problem. Upon completion, they were asked to write a narrative. Two investigators were present to take notes. All the sessions were recorded on video.



Figure 1. Participants took part in design sessions in which they constructed storyboards by utilizing cards depicting artifacts.

4. STORYBOARDING MODEL

We took a grounded theory approach [6] to analyzing the data from the design sessions. By using the open coding [6] technique on early video, we identified categories such as representational changes, card manipulations, and piling habits, enabling us to formulate an initial collaborative storyboarding model.

Studying the flow of storyboarding illustrates to us that there are important collaborative processes that take place. Our model suggests collaborative storyboarding may be characterized as a process where designers, or *actors*, manipulate a *representation of artifacts* to articulate a usage scenario for a system (see Figure 2). To reach this goal, actors progress through three phases during their collaboration. The representation reflects the work that is done in each phase as it evolves. The first phase, *exploring*, is characterized by actors beginning to understand the design task ahead of them. Thus, there may be limited artifact organization as actors focus on familiarizing themselves with the artifacts without necessarily thinking of design goals. In the second phase, *differentiating*, actors adopt a strategy for decision-making on the basis of some form of classification such as accept, maybe, and reject. The artifacts are subjected to the scheme through comparison and the results are reflected in the representation. The third phase, *constructing*, marks the beginning of the assembling of the artifacts to form a storyboard. Decision-making can continue to take place, while the organization from the previous phase is changed further to reflect the growing emphasis of the storyboard. Artifacts that are to be included in the storyboard are moved from regions in the representation reflecting the classification and used to construct an ordered sequence of cards.

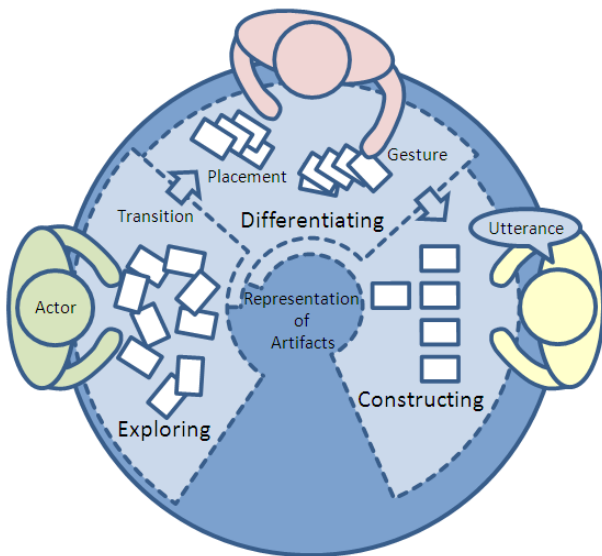


Figure 2. A collaborative storyboarding model consists of actors that transition through phases of exploring, differentiating and constructing. Communication leverages the artifacts through placements, gestures, and utterances.

Within each phase, *utterances, gestures, and placements* are used to communicate and make progress toward completing the task. Utterances made in reference to cards can cause cards placements to change within a phase. Although the same gestural actions with respect to cards are likely to be used in every phase, they are used

for different purposes depending on the phase they take place in. Actors can *transition* jointly from phase to phase. These transitions occur as a result of the actors' utterances and gestures. Often, the state of the representation acts as a catalyst for transition when it is apparent a certain subtask is complete.

5. CONCLUSIONS AND FUTURE WORK

Having such a model can potentially enable those focusing on design reuse to better characterize how groups of designers collaborate to leverage artifacts in constructing system representations. This model serves to cast light upon certain points of interest such as the evolution of the card representation from start to finish with respect to collaborative activities that take place and the mechanisms that allow for transitions from one activity to the next. In turn, this can aid design knowledge capture and reuse tools, a well-known challenge, by being aware of collaborative factors that might inhibit reuse—a team member not transitioning into the next phase with the others. Furthermore, the activities typified by the model provides impetus for why tools meant to support collaborative storyboarding should tailor and/or divide a workspace to support each phase.

As mentioned, following a grounded theory approach enabled us to identify our model. Future work consists of conducting further analysis with the goal of demonstrating how the design sessions followed our model. We will focus on using the theories of distributed cognition and common ground to interpret the changes in representation and the impact of gestures and utterances respectfully. This will provide greater weight to why eventual tool support will need to be tailored to support our model.

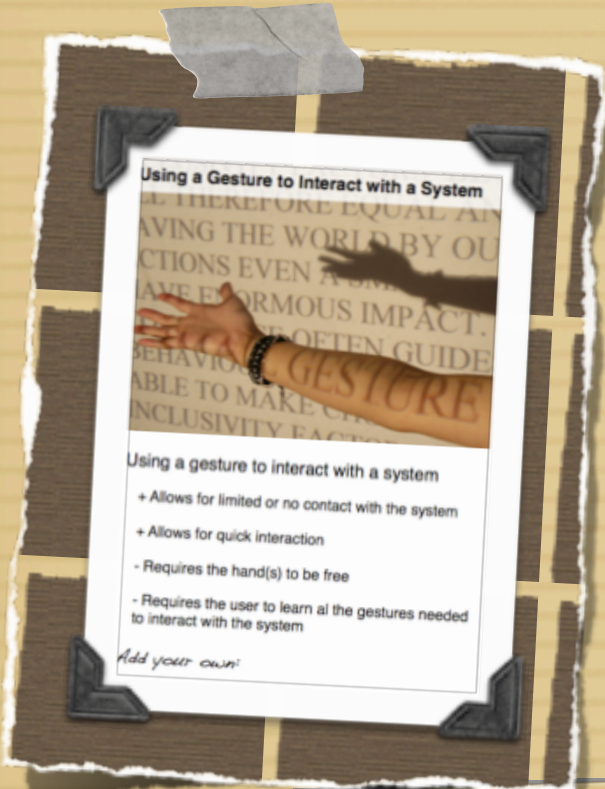
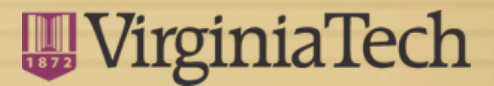
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Design artifacts--like pictures and claims--have potential to benefit the collaborative storyboarding process.

To probe this area, we observed groups of novice designers in a collaborative storyboarding activity.

Initial findings indicate that the design activity exhibited 3 phases: exploration, differentiation, and construction.

Future work lays in identifying implications for the design of complementary software tools.

Motivation

Collaborative storyboarding is becoming more prevalent as an early-prototyping design activity. This activity can benefit from leveraging design knowledge--in the form of **guiding design artifacts**--made available by a community of peers. As of yet, no studies have been conducted to understand how collaborative storyboarding takes place, a step necessary to guide development of supportive software tools.

Study

7 groups of 3 novice designers were asked to use guiding design artifacts to fashion a user interface via a low-fidelity storyboard and accompanying narrative.

Preliminary Findings

Collaborative storyboarding takes place in 3 phases:

- exploration:** discovering artifacts, limited organization
- differentiation:** making sense of artifacts, grouped artifacts
- construction:** assembling artifacts into a focused storyboard

Utterances, gestures, and artifact placement are all used uniquely in each phase to complete the design task. They are effective catalysts for transitions between phases.

Conclusions & Future Work

This work can potentially aid design of complimentary collaborative storyboarding software tools that **leverage design artifacts** while encouraging **knowledge capture** and **deliberation**.

How do collaborative storyboarders make use of design artifacts?