

# Channeling Creativity: Using Storyboards and Claims to Encourage Collaborative Design

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## ABSTRACT

Storyboards and claims are two distinct artifacts used for system design in HCI. In this paper, we propose that these artifacts provide greater design value if they are used in combination. We first investigate the relative strengths and weaknesses of storyboards and claims in supporting design. Then, we present an exploratory study conducted to assess the potential value of combining these two techniques, suggesting that combining the techniques leads to a richer, more grounded, and more creative design solution. Finally, we speculate on ways that tools should support the iterative creation of design ideas, the sharing of representations that can be easily understood and modified, and collaborative negotiation and discussion during design.

## Author Keywords

Storyboard, claim, collaboration, design

## ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## INTRODUCTION

Design has long been looked upon as a creative process benefiting from the conjunction of the diverse perspectives of a collaborative design team. As the design process becomes digitized through supportive software tools, developers must strive to understand how best to represent, manipulate, and collaborate with respect to design artifacts. One method of attaining a holistic view of the work being done is to center collaborative efforts around a design representation. A design representation can drive the design process and facilitate the communication that must

take place among designers [5]. We believe that the representation impacts the way designers think about the system. Among the many concerns, an understanding of system goals, features, task flow, and rationale can aid designers in formulating a critical understanding of a system. Simultaneously, the representation must allow for the exploration of creative solutions to design issues.

In this work, we explore a design representation technique that combines two different types of artifacts: storyboards and claims. Storyboarding is the process of illustrating and narrating user interaction with a system feature [4]. Claims analysis is the process of identifying system features within scenarios and evaluating the positive and negative impacts those features have on the user [1]. Each method has unique advantages and disadvantages that impact design. Our understanding of the pros and cons of each method led us to raise the question of whether there is additive value and/or diminished drawback in a design approach that combines these artifacts. We present an exploratory study to observe design using storyboards and claims, discussing their impacts on designers. In particular, we explore a tension between creativity enabled by pictures and textual rationale.

Extending from this investigation are design ideas on how to create effective software tools to support a design process combining storyboards and claims. We build on this study by raising the issue of how we can support the collaborative development of this representation. Thus, we discuss key elements a tool would require to complement our artifacts.

## BACKGROUND

### Design Representations and Collaboration

There are many forms of design representations that strive to capture the specifics of a system. Each form or model provides a perspective that emphasizes concerns of a system. For example, focusing on sketches can emphasize concerns such as creativity and innovation [6] while relying on decision-making can emphasize rationale [1]. A common representation permits designers to maintain an understanding of the current state of the system, track

changes that were made over time, and introduce the system to others.

Because design teams often rely on collaboration, it is safe to assume that many of these representations will be developed collaboratively. The collaboration can involve creating and sharing design artifacts that mold their way into the design. Another key aspect is the communication and negotiation that must take place among team members to agree on the specifics of a project. These discussions can often revolve around design artifacts that make up the representation.

### **Storyboards**

Storyboarding is a design mechanism borrowed from outside the realm of computing. Historically, they have been used primarily in the movie and advertising industry. In HCI, storyboarding has been adopted as a tool for illustrating key sequences of user-system interaction. Storyboarding is the process of describing a user's interaction with the system over time through a series of graphical depictions and units of textual narrative. Key aspects of a storyboard are the portrayal of time, the inclusion of people and emotions, the inclusion of text, and the level of detail [3].

### **Claims**

Claims analysis was developed as a key strategy in Scenario-Based Design (SBD) [1]. SBD is based upon the creations of scenarios – narratives that describe how a user interacts with a system in completing a task – to drive interactive system design. Claims analysis is closely coupled with scenario creation. It is a process by which the main system features implied by a scenario are identified and their positive and negative impacts on the user are hypothesized. The result of claims analysis is a list of statements, or “claims,” about the consequences of a feature, with each statement preceded by a ‘+’ or ‘-’ sign to indicate whether the effect is positive or negative to the user (see Figure 1). An important aspect of claims is that they have been shown to be valid units of design reuse [2]. The resulting implications are that the labor of claims analysis completed in past design endeavors can be reused as we create new designs to not only save time, but to also preserve and build upon previously elicited knowledge.

### **CHANNELING CREATIVITY**

Claims and storyboards are design artifacts that present several advantages and disadvantages. On the positive end of the spectrum, storyboards are presented in a common visual language that can be “read” and understood, to an extent, universally. In addition, storyboards support visual thinking, which is vital to the creative process. In particular, visualization of user-system interactions supports designer empathy for the user and their situation. On the other end of the spectrum, the style of the artists’ rendition influences the perception of the narrative being described,

with the effect of skewed perception of the intended message [4].

As tools for design, claims have several inherent advantages and disadvantages. Claims analysis promotes a balanced view of design decision tradeoffs, allowing designers to practically evaluate their designs. Additionally, claims motivate design reasoning as designers become aware of the balance between positive and negative impacts and strive to maximize the former and minimize the latter. However, there are two potential disadvantages when using claims. The cost of creating a claim involves identifying and verifying the feature tradeoffs, potentially introducing unwanted overhead to designers. The other issue to consider is how claims can depict task flow. A list of claims is often not enough to represent how a task would be performed in a system.

Our belief that there is potential in exploring the use of both artifacts together stems from our observation that both artifacts can alleviate downsides of the other. A design representation utilizing this approach would need to be able to associate claims and storyboard elements to each other. Storyboards are beneficial when expressing the task flow of a system. Graphical depictions of a series of pictures linked by an ongoing narrative, or scenario, emphasize how the system acts. However, relying solely on images and a narrative ignores the need for a designer to actively consider the impact of the design choices. Claims associated with each image show potential in articulating the rationale behind the elements in the storyboard. With this in mind, our goal is to explore how the use of both these artifacts influences design choices and representations.

### **STUDY**

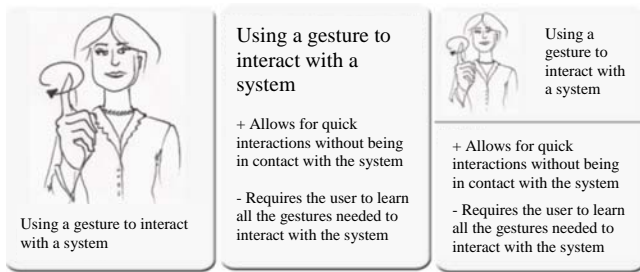
To further understand the benefits of storyboarding and claims analysis and to learn about the implications of blending the two, we developed a study that would examine the impact of these design techniques on the choices made during the design process. We expected to observe a difference in design choices made and design rationale provided as a direct result of the design technique the participants were exposed to.

### **Participants**

The study was administered to 38 undergraduate Computer Science majors enrolled in an introductory HCI course. These students had been introduced to both methods of design and had practiced claims analysis routinely in the previous two months of the course.

### **Materials**

Students were given materials to aid them in designing a notification system. Note that notification systems are a class of systems that deliver monitored information in dual-task situations. System design choices were laid out for the participants in a series of five “panels” that presented system features. The first and fifth panels began and ended



**Figure 1: Example panels from the experiment showing picture-only, claims-only, and pictures with claims conditions. Participants and participant groups used one of the conditions in creating a new design. Our analysis examines the creativity of the efforts that emerged from groups in each condition.**

a generic notification scenario and were provided purely to help guide the students. The middle three panels presented the participants with several choices of interchangeable system features corresponding to the system’s physical display mechanism, information display method, and user-system interaction method. The contents of these panels were varied to create three different experimental conditions such that panels represented system features with pictures only, claims only, or with both pictures and claims (see Figure 1). In addition to these design pages, students were given a questionnaire to assess the rationale behind the students’ design decisions.

### Procedure

The study took place during the course of the students’ regular class period. As an introduction to the study, a brief presentation was given concerning storyboarding, claims analysis, and notification systems. Students then received study materials, placing 13 of them in each of the claims-only and pictures-only conditions, and 12 in the pictures with claims condition.

Students were instructed to design a notification system that alerts a user of breaking news. They were given the goals of making this system support low-interruption and high-comprehension. Students designed the system by choosing the three middle panels to describe system functionality and by filling in a corresponding scenario. Finally, students completed a two-page questionnaire about design rationale.

### Experimental Results

Early results of the study indicate the emergence of a few key themes. We expected to see both a difference in panel selections and design rationale between the three different cases. Instead, we found that there was insignificant variation in the panel choices of the students, regardless of their experimental condition. There was, however, a marked difference in the participants’ reflection on their design decisions.

We looked at three different aspects of the reflections made by the participants and used them to compare the three different conditions they were under: 1) the claims that students used to justify their design decisions, 2) the words

that students used to describe their system design, and 3) the confidence that students had that their design could be easily related to another designer.

In terms of the design rationalizations made by each student, those in the claims-only condition used self-defined claims in addition to those we provided them. This may be an indication of the “design reasoning” mindset that Carroll and Rosson attributed to claims analysis [1]. In addition, these students used fewer arguments to rationalize their decisions than did those in the other conditions. This is telling of the ability of claims to speak for themselves and of a disparity in creative inspiration between the claims-only case and the picture-containing cases.

There were interesting statistical patterns seen when we analyzed the written responses of the participants. The most apparent of these was the total number of words and the total number of unique words that participants used to describe the design decisions. We see an increasing trend, with those in the claims-only condition at the low end of the spectrum, and those in the pictures condition at the high end. So, as the prominence of the picture increases in the design process and the prominence of words decreases, there is an increase of total and unique words contributed in rationale per user. This upward trend can be attributed to the confining and less vision-inspiring nature of textual information as opposed to the open-ended, creativity-inspiring nature of pictorial representations.

Finally, there was a difference in participant confidence that their selected panels and narrative could communicate the system design and its consequences effectively to another person. Confidence in each of these areas increased from the claims-only condition to the pictures with claims condition. This implies that claims or storyboards alone are not as rich and readily-communicable as a combination of the two.

There are two initial concerns that were raised by this study: 1) that claims do not currently provide sufficient support for accurate depiction of tradeoffs, and 2) that pictures overshadow the claims when the two are combined in system design.

The first concern is derived from our observation that those participants in the claims-only condition made design decisions based upon the claims we provided them as well as claims they self-identified at nearly equal rates. This substantial reliance on new claims as opposed to tried-and-true claims by virtue of claims reuse could potentially lead to over-emphasized or inaccurate claims hypotheses, thus degrading the quality of the resulting system design.

The second concern stems from our observation that, when pictures and claims were used together to design a system, participants paid more attention to the pictures than to the claims. We noticed that, for each panel there was always a marked increase between the claims-only and pictures with claims conditions in the number of self-identified claims

used in system justification; however, this was not the case with the claims that we provided. So, there is no perceived increase in usage of the claims we provided to participants when combining pictures with claims. Again, this could potentially degrade the quality of the system by limiting the positive influence of claims reuse.

The study participants were asked to assess the designs of others, debating with design partners the relative merits of each design. While we have not yet fully analyzed this part of our study, the extensive discussions that emerged suggest our approach can be useful in encouraging collaboration.

Our early analysis suggests storyboards and claims do, indeed, have the ability to impact the designer, and thus the resulting system design, in a positive way. Capturing each technique appropriately in a collaborative design tool could channel creative design of interfaces.

### **TOWARD TOOL SUPPORT**

We speculate that appropriate tools that can support the development and use of claims and storyboards. We emphasize the need to accurately and easily develop a representation and enable the collaboration a design team must rely upon. Based on our exploratory study and literature review, we present the following as points to focus on for the development of such a tool:

- Iterative development of claims and storyboard pictures is needed to capture design ideas in a common and understandable form and to channel creative ideas through rationale. Iterative development of the artifacts over time can promote improved quality in the work.
- Facilitating the sharing of claims and storyboard elements can improve consideration of alternative artifacts. Appropriate presentation of images and text can help designers understand, reuse, and modify for new design contexts.
- Design ideas must be presented so as to support negotiation on design artifacts. Images help promote rapid understanding of interface elements, and claims encourage consideration and debate of best approaches. Lightweight, effective mechanisms such as discussions and voting targeting specific artifacts are needed.

### **CONCLUSIONS AND FUTURE WORK**

Our work is based on the investigation of the combined use of storyboarding and claims. A design representation

utilizing both techniques supports increased benefits to design teams as opposed to using either of these models separately. This new hybrid approach would maintain the benefits of the foundational methods, such as the design reasoning mindset influenced by claims and the creativity and visualization of storyboards. Supporting this approach requires the development of tools that leverage the collaborative nature of the design process.

To further investigate this approach, we plan to continue analysis of our data and to conduct interviews with HCI researchers to gain professional understanding of our findings. It is our ultimate goal to create a software tool that enables this form of design practice while minimizing the artifact-related concerns noted above. We must carefully construct a collaboration framework that allows for effective design creation, justification, sharing, and negotiation. If done well, claims can be checked and rectified by effective group collaboration. We must also be careful to create a design representation and methods of manipulation that accurately and strategically embody the storyboard and claims artifacts. If successful we can mitigate concerns regarding claims being potentially overshadowed by the use of pictures. With an appropriate software tool, the benefits of a combined storyboards and claims approach have the potential to truly enrich the endeavor of quality system design.

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