DesignLibs: A Scenario-Based Design Method for Ideation

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ABSTRACT
Generating potential design ideas through ideation often benefits from the spontaneity of random ideas. Having potential users participate in this process can be beneficial, but is often difficult to implement. We present a new method for generating design ideas with potential users. The method uses scenarios with missing words, which potential users fill in to generate ideas for features and attributes of new technology designs, similar to the children's game of Mad Libs. We developed three different formats of DesignLibs, including 1) "Mad Libs-style:" blanks presented before seeing the scenario, 2) "Fill-in-the-Blanks:" blanks presented within the context of the scenario, and 3) "Q&A:" blanks presented as questions and answers. We found that DesignLibs generated a number of new ideas, with the Fill-in-the-Blanks method providing the highest ratings for usefulness, feasibility, and diversity of answers. All three formats provided equal ratings for creativity.

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Scenarios; user-centered design; design methods; ideation.

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

General Terms
Design; Human Factors.

INTRODUCTION
When designing a new technology, it can be a challenge to generate ideas that are both feasible and novel. A commonly held belief among designers is that quality ideas often come from having a large quantity, and that generating wild and diverse ideas can spark creativity and innovation [8]. In fact, many designers adopt Linus Pauling's mantra [7] of, "the best way to have a good idea is to have a lot of ideas, and throw away the bad ones." The process of idea generation, or ideation, is typically accomplished through activities such as brainstorming, sketching, or storytelling, which are driven by the designers. Gaining insight from end users during ideation would be valuable, but engaging with users

requires significant planning. Thus, more lightweight methods for generating ideas with users are needed.

To help address this need, we have developed a new design method, which we call "DesignLibs." DesignLibs helps designers generate new ideas rapidly and easily while still involving users. It combines the storytelling aspects of scenarios with user involvement by leaving aspects of the scenario to be filled in by the user. To maximize the types of ideas generated by users, we developed three different formats for DesignLibs (Figure 1). The first was inspired by the children's game of Mad Libs™ (http://madlibs.com), which asks players to provide words of a certain type, such as actions, mood words, or people's names, and then inserts those into a story. The randomness of the words provided makes for humorous and often absurd scenarios. The second format of DesignLibs involves having users directly fill in blanks with the context of the story revealed at the time of the word generation. The third format has users answer a series of questions, and then inserts those responses into a story. The result of each format is a design scenario, which users are then asked to react to and on which to provide feedback. To understand how DesignLibs performs as a design method, we deployed the three different formats as interactive surveys with 240 users through Mechanical Turk (http://www.mturk.com). We then had a team of 6 designers rate the responses for feasibility, creativity, and usefulness. We found that all three methods were quick, enjoyable for users to complete, and generated unique design concepts that enabled designers to think of new and interesting approaches.

We envision DesignLibs as a part of a designer's toolbox of methods to try to inspire new ideas, such as those in IDEO's Method Cards [4], which includes methods such as scenarios [3], bodystorming [9], and experience prototyping [1]. The spontaneity of ideas generated from this process is in spirit of the spontaneity that can be achieved through randomly drawing cards to choose different methods [8]. The contributions of this work are 1) a new, easily deployable, and effective method for generating diverse ideas while involving potential users and 2) an empirical evaluation of the effectiveness and usefulness of that method.

DESIGNLIBS METHOD
We developed three different DesignLibs formats (Figure 1), where we varied the way that users entered data and whether or not they were given the context of the scenario.

Mad Libs: The first variation of DesignLibs was our original idea inspired by the children's game of Mad Libs. In this format, users are presented with blanks asking them for words such as "a person's name," "a technology device," "a mood word," or "an action word." They are then prompted to enter these into blanks without being given the context for which they would be used. The goal is that by not being given the context, many of the ideas generated may not make sense, but could be considered "wild" enough to spark a new idea in either the user or the design team.

Fill-in-the-Blanks: Although we believed that the Mad Libs scenario might generate wild ideas, we were curious what types of ideas might result from the user knowing the actual context of the scenario. In this situation, the format would be similar to the person who is asking the questions of another person in Mad Libs, where they can view the scenario with the words missing. Essentially, the users are being asked to fill in the blanks in the scenario.

Q&A: In the third variation, we wanted to explore whether users would find the task more engaging if we made the blanks more relevant to a scenario in their life. Thus, this approach asks participants to respond to a series of questions that are more like a traditional survey. This would preserve the spontaneity of the Mad Libs format, but makes the responses more specific and personal. This could result in more meaningful technology designs for the users.

Final Questions: After each method, users are provided the final completed scenario (Figure 1, bottom left) based on the words they entered. Afterwards, they are asked a series of open-ended questions to reflect upon the design scenario presented and provide feedback. This type of questioning was intended to be similar to what one might ask about a designer-generated scenario. The three questions were: 1) *What are your initial thoughts on the above scenario?* 2) *What, if anything, would you change about the technology described above?* and *3) What other ideas might you have for this type of technology or something similar?*

EVALUATION OF DESIGNLIBS

To evaluate the effectiveness of our method in generating design ideas and the participant experience, we devised a two-phase study.

Phase 1: Online Deployment of DesignLibs

We implemented DesignLibs using simple PHP scripts in an online survey format. The script randomly directed participants recruited via Amazon's Mechanical Turk to one of the three variations described above or a fourth control condition, which was a pre-completed scenario we designed. All four conditions resulted in the same base scenario and were followed by the three final questions described above. The text of the scenarios used for the experiment is shown in Figure 1 and was based on a real technology application for using mood sensing our research team was interested in designing. The blanks included the technology platform, the sensing type, moods people might want to have detected, and appropriate actions the technology might make. After completing the DesignLibs task, we also asked a set of questions to understand the participant experience of completing the task. This included six Likert scale questions on a five-point scale, ranging from 1=Strongly Disagree to 5=Strongly Agree. The six questions assessed whether the *DesignLibs task* was 1) engaging and 2) easy to complete and whether the *technology designed* was 3) not realistic, 4) boring, 5) interesting, and 6) unique. We included one final open-ended question for comments and questions on demographics.

We paid participants $.10-$.20 USD for the completion of the survey, which took about 3-5 minutes to complete. We used Mechanical Turk's internal filters to limit participants to only those from the United States with a prior task completion approval rating greater than 95%. After filtering invalid responses (e.g., blank answers, same answer across all blanks, etc.), we had a total of 240 valid responses (60 per condition). The demographics of the participants were diverse, but were skewed slightly toward younger, more educated, and more technologically-adept males.

MadLibs

1. A person's name: [____]
2. An age: [____]
3. An occupation: [____]
4. A computing device: [____]
5. A body part: [____]
6. A mood word: [____]
7. An action word: [____]

Fill in the Blanks

[____] is a [____] year old [____]
(A name) *(An age)* *(Job type)*
who has been struggling with a lot of job related stress. He/she decides to try a new application to relieve stress that runs on a/an [____] to help improve his/her mood. The
(Computing device)
application senses his/her mood through a device he/she wears on his/her [____].
(A body part)
When the device senses that he/she is [____], it responds by [____].
(A mood word)   *(An action word)*

Q&A

1. The first name of someone you know well is [____]
2. He/she is [____] years old
3. His/her occupation is [____]
4. He/she would like to own a computing device of the type [____]
5. He/she might be comfortable wearing a small computing device on his/her [____]
6. When he or she is in a/an [____] mood, you like to do [____] for them

Scenario

Joe is a **42** year old **accountant** who has been struggling with a lot of job related stress. He/she decides to try a new application to relieve stress that runs on a/an **phone** to help improve his/her mood. The application senses his/her mood through a device he/she wears on his/her **wrist** . When the device senses that he/she is **angry**, it responds by **sending him pictures of kittens**.

Figure 1: Examples of the three different formats for DesignLibs and the completed scenario.

Phase 1 Results

Based on the Likert responses (Figure 2), users rated all four task types to be equally engaging and easy, as well as the technology designed to be not boring, interesting, and unique. The only significant difference we found between conditions was in the "Not realistic" question ($U(2)=16.9$, $p<0.01$), where users found the *Mad Libs* scenarios to be less realistic than the other two categories, which makes sense given that they had no context on which to base their responses. However, it is surprising that *Q&A* method was not significantly worse than the *Fill-in-the-Blanks* method considering that users also could not see the context of their answers. Within the "Not realistic" responses, our pairwise analysis showed significant results in the *Mad Libs* vs. *Fill-in-the-Blanks* ($p<0.001$) and the *Mad Libs* vs. *Q&A* comparisons ($p<0.01$), but no other results were significant.
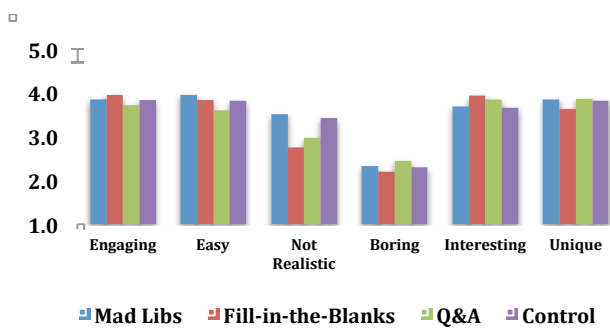

Figure 2: Participants' ratings of task and technology designs

Phase 2: Designer Evaluation of Ideas Generated

To evaluate the usefulness of the ideas generated from Phase 1, we had six members of our research lab rate the scenarios generated. Each of the six raters had experience in technology design and ideation, but they were not involved in data collection for DesignLibs. We divided Phase 1 survey responses into four sets of 46 scenarios, consisting of 15 scenarios from the three DesignLibs variations and the 1 control scenario in random order. Participants read through all 46 scenarios before they began coding. Participants then rated each scenario on a 5-point Likert scale (5 being best) for three different factors: feasibility ("*How much sense does the technology scenario make? Would it be buildable?*"), usefulness ("*How useful does the proposed technology seem? Do you think people might want to actually use it?*"), and creativity ("*How original do you think the proposed technology is? Does it seem really different from many of the other scenarios, or is it pretty typical and uninspiring?*"). Raters received a $20 Amazon.com gift card for each set rated, with 5 people rating 1 set each and 1 person coding 3 sets. Coding took between 60 and 90 minutes per set, with each set being rated by 2 researchers.

Phase 2 Results

The raters had a 60% agreement rate for feasibility, 60% for usefulness, and 72% for creativity. To evaluate significance, we averaged the two scores of the raters for each scenario (Figure 3). The scores showed a significant differ-

ence for ratings of the feasibility and usefulness of the methods. A Kruskal-Wallis H test found a main effect for ratings of feasibility ($H(2) = 44.5$, $p<.001$) and usefulness ($H(2) = 24.3$, $p<.001$), but not on the rated creativity of the ideas created ($H(2) = 1.01$, $p= .6$). A Mann-Whitney U test on the paired methods determined pairwise significance and found *Fill-in-the Blanks* to be rated as significantly more useful than both *Mad Libs* ($U=21.27$, $p<.001$) and *Q&A* ($U=6.61$, $p<.05$), with *Q&A* being rated as significantly more useful than *Mad Libs* ($U=7.87$, $p<.01$). For feasibility, *Fill-in-the-Blanks* was rated significantly more feasible than *Mad Libs* or *Q&A* ($U=36.84$, $p<.001$ & $U=23.91$, $p<.001$ respectively). *Q&A* also produced significantly more feasible ratings than *Mad Libs* ($U=6.327$, $p<.05$).
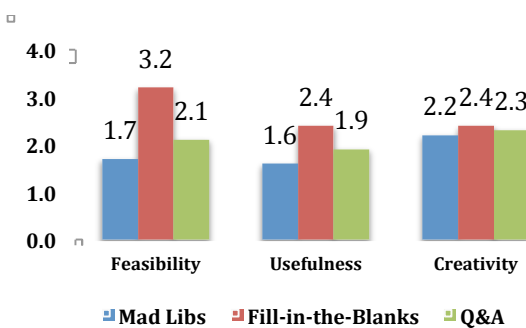

Figure 3: Average ratings for feasibility, usefulness, and creativity as rated by designers.

We also identified which method had the most "high quality" ideas as calculated by a "total quality score," which summed the ratings for each scenario across both raters, for a maximum score of 30. Among the top 25 ranked scenarios, *Fill-in-the-Blanks* overwhelmingly had the highest number of quality ideas (19), followed by *Q&A* (6), and none from *Mad Libs*. The highest total quality score for *Mad Libs* was 18, *Fill-in-the-Blanks* was 25, *Q&A* was 20, and the control scenario was 27.

The raters also provided qualitative comments on each scenario. While a number of ideas were identified as problematic, they did find many ideas interesting, creative, and inspiring from all three methods, including the *Mad Libs* condition, which often sparked new ideas. For *Mad Libs*, some reviewer comments included: *"A little odd but makes me think of building just an avatar that responds to emotions relatively passively through body language," "While not useful, or really just a very bad idea, the idea of something that responds to sadness by fighting is compelling,"* and *"Having something cook when you're glum would be lovely!"* Interesting comments on *Fill-in-the-Blanks* scenarios included: *"I wouldn't want to wear a head-laser, but I kind of like the simplicity here: if you're stressed, the device lets you know"* and *"Interesting ambient-ish feedback that seems like a sympathetic computerized response."* For the *Q&A* scenarios, some compelling comments included: *"Telling a joke in response to something that someone is*

upset is a simple and possibly effective approach," "Changing temperature in response to moods is interesting! What else can you do with that?" and **"***Suggests the idea of instigating play when the baby feels good and shouting (perhaps to alert caregivers?) when he/she feels bad. Not useful as specified but opens up other interesting ideas.***"** Despite the nonsensical nature of many responses, there were still a number of ideas and interesting avenues to explore that were raised in all three conditions.

DISCUSSION

Our findings suggest that DesignLibs is a useful method for generating a large number of ideas with minimal effort on the part of the designer. The Fill-in-the-Blanks method allowed participant to see the text of the question, making it unsurprising that it had the highest ratings for usefulness and feasibility. However, it is interesting that Q&A was rated as significantly more useful and feasible than Mad Libs, despite similarities between the two methods. The significance of this result suggests that by relying on the participants' experience when responding, the Q&A method can produce sound ideas without being mired by preconceived notions of how technology should be used. Therefore, the Q&A method could be a useful way to spur creativity by encouraging participants to reflect on their real behavior uncoupled from a technological context. While the majority of the scenarios were absurd or nonsensical they were still able to spark ideas within the raters, as illustrated by the comments. We view this method as being complimentary to existing forms of ideation and methods for engaging user.

DesignLibs builds on traditional ideation methods and complements them in a number of ways. For example, it is similar in purpose to brainstorming [10] and storytelling [2], but unlike these methods, DesignLibs creates an opportunity for designers to gain user insights quickly and easily. Other, less traditional ideation methods include bodystorming, futures and alternative nows, and science fiction prototyping. Bodystorming combines brainstorming with physical movement to generate ideas and quickly envision scenarios, such as arranging seats within an airline to accommodate sleeping [9]. Futures and Alternative Nows [8] is a method of thinking about how different values change our world and lead to very different and perhaps absurd design ideas, which may morph into more realistic design ideas. Science fiction prototyping [5] aims to use science fiction writing as a way of inspiring futuristic ideas. These methods often require the designers to generate the ideas and present them to users for feedback, and thus DesignLibs makes a unique contribution by enabling potential end-users to easily generate and contribute design ideas. Another method, future workshops and metaphorical designs [6], engages users to think of innovative designs, but require more effort and engagement than DesignLibs.

We believe DesignLibs would be easy for design teams to execute. Although the development of the surveys required PHP coding, one could imagine that a simple DesignLibs Builder application could be created for design teams without this expertise. In future work, we hope to investigate alternate ways of generating DesignLibs surveys. We also plan to conduct study that more directly compares DesignLibs to other ideation methods. We also hope to identify when each condition is most effective for various stakeholders.

CONCLUSION

We developed DesignLibs as a tool for enabling ideation with remote users, so designers can gain insight and inspiration early in the design process. We found that the *Fill-in-the-Blanks* format performed the best overall in terms of usefulness and feasibility scores, but there was not a significant difference in the creativity score across the three conditions. All three conditions led the designers who rated them to think of new ideas that had not already been considered. We envision DesignLibs as being an option in the designers' toolbox of methods that can be tried to stimulate creativity, along with other ideation methods such as bodystorming, brainstorming, or sketching. The method is quick and easy to develop and deploy, and it can engage target users in the design process in a way that may require less training and time commitment than other techniques.

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