Introduction

In the field of user interface (UI) design, receiving periodic feedback from colleagues and clients is critical for creating user-friendly applications. When face-to-face (FtF) options are not available, designers often rely on computer-mediated communication (CMC) methods such as email and chat to share designs and receive feedback. However, purely text-based methods are problematic because they are unable to capture spatial information about the visual design being shared. Drawing tools, such as those provided in Microsoft Word and PowerPoint, help alleviate this issue by allowing users to overlay call-outs and shapes directly on the design. Still, these tools do not provide a platform for aggregating feedback from multiple providers. A computer-mediated solution that combines the ease-of-use of email, the spatial considerations of drawing programs, and the information organization of surveys would allow UI designers to effectively exchange design-related feedback remotely.

Motivation

When developing an interface, UI designers frequently solicit feedback from other user experience professionals in order to identify potential usability issues. This type of peer evaluation could be considered to be a very informal version of a heuristic evaluation, whichNielson defines to be a “systematic inspection of a user interface design for usability.” (Nielson, 1993) Heuristic evaluations have been shown to be extremely effective at finding usability problems, particularly when multiple experts are involved. (Nielson, 1993)
Today, UI designers often rely on F2F meetings with colleagues, supervisors, or clients to receive feedback about a design. In this environment, the individuals providing feedback are able to physically point to sections on the design in order clarify their comments. When individuals are not available to provide feedback in person, the efficiency and the effectiveness of the communication declines substantially.

Remote feedback providers will frequently send purely textual feedback in the form of email or chat because these methods are fast, easy, and familiar. However, feedback providers must be extremely detailed in their description in order to avoid being misinterpreted. For example, if there are two sets of tabs on the design, the feedback provider will need to first describe which set he is referring to (for example, “the tab set in the upper left-hand corner of the screen”) before making his comment. The reverse translation must also be done by the UI designer when he receives feedback from his colleagues.

Another option, which better mimics F2F exchange, is the use of an application such as Word, PowerPoint, SnagIt, or Photoshop to digitally overlay comments onto the design. All of the Microsoft Office products include a palette of drawing tools that make it possible to place circles, rectangles, arrows, and text call-out boxes onto an image. SnagIt and Photoshop also provide drawing and text tools that can result in similar output.

Drawing programs, while arguably the best remote option available for exchanging feedback on visual designs today, do not have a built-in mechanism for aggregating feedback from multiple feedback providers in a useful way. Different formats makes it time consuming and tedious to try to aggregate the opinions and ideas presented in a way that draws out common themes.
Design Considerations

Using current computer-supported cooperative work (CSCW) applications to provide feedback forces those providing the feedback to perform a large amount of work to which they receive little benefit. Grudin (1988) refers to this disparity between those who do the work and those who get the benefit as a primary reason for the failure of many CSCW applications. One solution to reducing this disparity is minimizing the extra work required of the users of a CSCW application. (Grudin, 1988) For those providing feedback, this involves providing an easy way to draw comments on the design itself. For those reviewing the comments, this involves decreasing the amount of overhead involved in aggregating feedback. These requirements are the foundation of our design.

At the heart of our design is a central artifact that serves to frame the context and content of the communication within the system. By building around UI designs (in the form of images) and enabling users to simply leave comments for the design poster, we are dramatically reducing the clutter seen in productivity software and drawing programs. Gay et al. (1999) point out that annotation models centered around an artifact provide a better forum for contribution because the artifact itself enables users to engage in relevant communication more easily.

Building on top of UI designs, we next considered the implications of using spatial annotations. One noteworthy example of work in spatial annotations is the Webbed Footnotes project in the Sociable Media Group at the MIT Media Lab. (Golder and Donath, 2005) From this project and insight gained from other spatial commenters, we designed a simple comment tool that could directly annotate a design by drawing a rectangle over a specific area and associating text with that area.
Based on an informal survey of UI designers in the School of Information, we found that providing design security and control of comment visibility were essential components of the system infrastructure. By requiring users to register and authenticate to view and provide feedback, we could ensure the security of the design and effectively track comments in the system. Our survey results revealed that allowing every commenter to view each other's feedback might bias the comments. One participant stated, “you want to get individual feedback and make sure that everyone isn't just jumping on the bandwagon.”

A similar problem of group bias has been found to exist with focus groups and may indeed be a concern for our application as well if comments are made visible among all participants. Nielson states “the moderator needs to guard against having the opinions of any single participant dominate unduly.” (Nielson, 1993) Our application, without a moderator, would not be able to ensure that one commenter (particularly someone of high status or position) would not dampen the opinions of other participants.

We decided to give the power of controlling comment visibility to the UI design poster. As pointed out by Nelson (2000), technology is adapted to fit into the culture of an organization, not the other way around. In some cultures, viewing others' comments could help avoid duplication and help build insights off of previous comments. However, in other cultures this could result in status effects, freeloading, and bandwagon effects. By allowing the poster to determine whether contributors can see all of the comments on their design (and potentially the identity tied to each comment), our design can take on different roles in different cultures. We believe this supports the argument that CSCW solutions will be most successful when they are clearly aligned with the goals of the organization employing the system. (Lococo & Yen, 1998)
Diana 1.0 and Future Directions

Based on our research in CMC and CSCW, we were able to design and implement the first version of our solution for providing spatial feedback on UI designs. Affectionately called “Diana,” our application allows users to leave comments on a colleague's UI design and provides a fully functional interface for designers to upload new designs, invite colleagues through traditional email, and view the comments left their designs. Our system currently only allows contributors to view the comments they make and does not allow a poster to comment on their own design. Although this meets our original design requirements, we realize now that it restricts communication from flowing between the UI Designer and the feedback contributors. Colleagues can provide feedback to UI designers but there is no opportunity for rebuttal.

Thus, in addition to providing various levels of comment and identity visibility, we also see that the next version of Diana could allow the design poster to respond to comments left on his design. This would help foster the growth of Diana as a CMC application centered around UI design artifacts. Also, there is an opportunity for adding a visualization of comments based on their location on the design screen. These comment “hot spots” could help UI Designers quickly recognize the popular components of their design and then drill down to read the actual comments associated with the area.

Diana is nearly ready to be used by students in the School of Information (and beyond) to receive feedback on their UI designs. In the appendices to this paper are detailed descriptions on how to upload new designs, invite colleagues, and make comments to a UI design. We believe that Diana effectively embodies the salient points of the research we performed and also satisfies the needs of UI Designers.
References


Appendix A – Demo Diana

Comment -

To test Diana, navigate to

URL:  http://groups.ischool.berkeley.edu/diana/commenterLogin?dID=4887085009
Design Code:  Ligh90

If you have never used Diana before, you will have to create a login.  You can follow the link below or click “register” from the above link.  After entering an email address and password, you will also need to provide the design code.

Register:  http://groups.ischool.berkeley.edu/diana/register.php?dID=4887085009

Upload a New Design:

To upload a new design, navigate to http://groups.ischool.berkeley.edu/diana/ and login.  If you have never used Diana before, you will have to create a login.  After doing this, you will be directly linked to the Upload Design page.

Once you upload your new design, you can send a custom “DianaMail” to your colleagues by copying the sample text provided to your email client.  Anybody who receives the email will be able to comment on your design by providing their login and design code.
Appendix B – Diana Screenshots

User Scenario 1 – Commenting on a Colleague's UI Design

![Commenter Login](image)

**Figure 1: Commenter Login (for LightsOn)**
Figure 2: Commenter Interface – Creating a comment
Figure 3: Commenter Interface – Rolling over saved comment
User Scenario 2 – Poster Reviewing Comments on Design

**Figure 4:** Poster reviewing all comments
Figure 5: Displaying comments of specific contributors
User Scenario 3 – Posting a UI Design for Commenting

**Diana**

**About Diana**

Diana is a free web-based application that allows designers to share their mockups with colleagues or clients for the purpose of collecting feedback. Unlike email, invited users can annotate the design directly by placing comments on top of the components they are interesting. As a designer, you can quickly see what areas of the design need your attention based on where comments are placed.

**How it Works**

1. Upload a design
2. Send out an email invitation
3. People view the design and leave feedback
4. You login and view the results

**Log In**

**User Scenario 3 – Posting a UI Design for Commenting**

**Figure 6: Main Login for Diana** ([http://groups.ischool.berkeley.edu/diana/](http://groups.ischool.berkeley.edu/diana/))
Figure 7: Manager Interface
**Post a New Design**

Design Name

Comment Visibility: Commenters see only their own comments

**Upload Images**

Upload up to 5 different images for your design. Images will automatically be scaled to a width of 950px.

Image 1: Browse... 
Title (Optional): 

Image 2: Browse... 
Title (Optional): 

Image 3: Browse... 
Title (Optional): 

Image 4: Browse... 
Title (Optional): 

Image 5: Browse... 
Title (Optional): 

Upload

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**Figure 8: Upload Design Interface**
**Invitation Template for: LightsOn**

Copy the text below into the body of an email and send it out to the colleagues, clients and friends that you want to receive feedback from.

Dear Colleague,

I have just uploaded my design called LightsOn to a design annotation tool where you can leave me comments. Diana is a free, web-based application that allows designers to share their mockups with colleagues or clients for the purpose of collecting feedback.

Please use the link and code below to access my design.

URL: http://groups.ischool.berkeley.edu/diana/comment/LoghX766C-4097065609

Design Code: LoghX766C

If you have not used Diana before, you will have to create a login. You can do that here and log in directly to my design:

http://groups.ischool.berkeley.edu/register.php7dWx4987065609

Your feedback is very important to me, and I appreciate your time.

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**Figure 9: Diana Mail Invitation Template**
Appendix C – Entity Relationship Diagram for Diana

```
<table>
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<th>Table</th>
<th>Attributes</th>
</tr>
</thead>
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<td>Commenter_ID: INTEGER</td>
</tr>
<tr>
<td></td>
<td>Email_Address: VARCHAR(45)</td>
</tr>
<tr>
<td></td>
<td>C_Password: VARCHAR(45)</td>
</tr>
<tr>
<td></td>
<td>Reg_Date: DATETIME</td>
</tr>
<tr>
<td></td>
<td>Last_Login: DATETIME</td>
</tr>
<tr>
<td></td>
<td>Makes (from Commenter to UIComment)</td>
</tr>
<tr>
<td>UIComment</td>
<td>UIComment_ID: INTEGER</td>
</tr>
<tr>
<td></td>
<td>Image_ID: INTEGER (FK)</td>
</tr>
<tr>
<td></td>
<td>Commenter_ID: INTEGER (FK)</td>
</tr>
<tr>
<td></td>
<td>Comment_Text: VARCHAR(255)</td>
</tr>
<tr>
<td></td>
<td>X_Pos: INTEGER</td>
</tr>
<tr>
<td></td>
<td>Y_Pos: INTEGER</td>
</tr>
<tr>
<td></td>
<td>C_Hasht: INTEGER</td>
</tr>
<tr>
<td></td>
<td>C_Length: INTEGER</td>
</tr>
<tr>
<td></td>
<td>About (from Image to Commenter)</td>
</tr>
<tr>
<td>Image</td>
<td>Image_ID: INTEGER</td>
</tr>
<tr>
<td></td>
<td>Design_ID: INTEGER (FK)</td>
</tr>
<tr>
<td></td>
<td>Image_Type: VARCHAR(45)</td>
</tr>
<tr>
<td></td>
<td>Image: MEDIUMBLOB</td>
</tr>
<tr>
<td></td>
<td>Image_Size: VARCHAR(45)</td>
</tr>
<tr>
<td></td>
<td>Image_Name: VARCHAR(45)</td>
</tr>
<tr>
<td></td>
<td>Image_Title: VARCHAR(45)</td>
</tr>
<tr>
<td></td>
<td>Represents (from Image to UIComment)</td>
</tr>
<tr>
<td>Design</td>
<td>Design_ID: INTEGER</td>
</tr>
<tr>
<td></td>
<td>Poster_ID: INTEGER</td>
</tr>
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<td></td>
<td>Visible_Com: INTEGER</td>
</tr>
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<td></td>
<td>D_Link: VARCHAR(20)</td>
</tr>
<tr>
<td></td>
<td>Code: VARCHAR(20)</td>
</tr>
</tbody>
</table>
```
Appendix D – Competitor Analysis

Also involved in our research is a look into competitors and related applications. We found four key applications:

1) Gliffy: a web-based application that allows users to collaboratively create diagrams and flow charts.

2) MyStickies: allows users to post sticky notes on web pages. These visible to the poster and no form of sharing is currently allowed.

3) Flickr: photograph sharing and social networking giant. The key related feature is the ability to select portions of a photograph and associate a note with the area.

4) Microsoft Office: a suite of desktop applications that allow users to select text and insert comments to share with author. Also contains a palette of drawing tools that can be used to overlay designs with shapes and words.
Appendix E – Survey Results

When you create your designs, what formats do you use? Examples: jpg, gif, HTML/Javascript, Visio, PowerPoint, Photoshop, Illustrator, pen and paper, other.

2. Pen and paper, then Illustrator, then, maybe, Flash or HTML.
3. I usually start with pen/paper.. and then I code it up using html. I actually like to see how it looks on a browser and interact with it. doing it all in photoshop wouldn't give me an accurate feel of the interaction.
4. This summer I used a few tools, mostly Photoshop, Illustrator and Visio.

Take Aways: Photoshop, Illustrator, Visio, Pen & Paper, HTML, Flash

Are your designs typically a single page or a set of interrelated pages?

1. Depends on the type of designs. I've done both many times.
2. Several pages, usually one file though.
3. Mostly single pages.. with maybe a details page. Typically, the first page is displays a lot of general information and the second page is the drill down.
4. Some of each, but more often it is a set of pages.

Take Aways: Both individual and sets are used. It sounds like offering a comparison (design A or B) to people is useful.

Do you share your designs with other people to receive feedback? If so, who do you share them with? Examples: co-workers, other UI designers, superiors, friends, family, classmates.

1. Again, depends on the project. At work, I typically have meetings w/ a UED team (UI designers, user researchers, visual designers, and web developers) and often with the larger project team (product managers, engineers, etc). Both with superiors & peers. for school work, I typically just design on my own, unless I get stuck or need feedback. Then I'll ask friends for an outside opinion.
2. I share them with other designers. Usually don't share them with the client until they're a little ways along. I share them with people who know how to interpret “works-in-progress.”
3. Sometimes I ask my brother (who is a designer) for feedback. I don't mind asking people, but sometimes the problem is that i don't know many qualified people to get good feedback from.
4. Yes, other UI designers, mostly.

Take Aways: They share with other UI designers mostly and sometimes with the larger project team.
**Through what medium or method do you share them?**

1. I've used all methods. meetings (in person & video conf.), email, IM.
2. We may be chatting, and then send the files over email (too big for IM).
3. Link to the design
4. In person. Often at a group meeting.

**Take Aways:** In person, email, IM are used to share designs.

**What format do you save the design in to share it?**

1. depends on what I'm using to create it and what type of design it is. when I'm doing mocks, line drawings tend to come out better (and w/ a smaller file size) when saved as a .gif more complicated mocks are saved as .jps. I usually save illustrator files as .ai if the people I'm sharing with have illustrator. otherwise I'll save it as a PDF. HTML mocks are saved as HTML from whatever program I'm using. or, I'll take screenshots and annotate them in word. this works if I'm discussing mocks with someone over email (since it's hard to point things out without the ability to circle and comment)
2. .png or the illustrator file if they have it. Sometimes pdf.
3. If I save it and want to share it it would definitely be a .jpg or .gif.
4. Export to a gif/jpg.

**Take Aways:** JPG, GIF or PDF mostly.

**How do people give you feedback? Are you satisfied with this method? Why or why not?**

1. I tend to prefer reviewing designs in person. I find this to be the quickest way to discuss designs which tend to be abstract comments that take a lot of back & forth to reach decisions. I often make design choices for a variety of reasons and find that people's comments or concerns need to be discussed to reach a resolution. Email works well when you want to have a physical copy of an exchange. I've used this method when discussing feedback with large groups, so everyone can add on thoughts. Email typically works fine if its in the later stages of a design process (when people are just adding quick comments). It depends on who I'm sharing my work with, but i tend to shy away from using excel, PowerPoint, or word to collect feedback. these programs usually imply that the other party will be making changes and sending the file back for review. I would never encourage a non-UED person to construct or change the designs on their own.
2. Chat or phone.
3. They would just respond over email or IM. I usually give them a choice: do you like a. or b. and if they respond with an answer, then yes, i am satisfied.
4. Again, face to face. Either in a small 1-on-1 meeting, or in a larger group review.

**Take Aways:** In person, chat, phone, email
Has anyone every drawn notes on a print out of the design or used a drawing program to put comments directly on the design? Or do most people just give you a list of suggestions that describe what part of the design they are referring to?

1. Yes. I've also done this for others. I like it when people circle pieces of a design & add comments since it keeps the feedback very focused and concrete. For example, it is much more helpful to know that a specific button is pushed too close to the text then to be told that the page needs to have more 'white-space' or feel 'airier.'
2. Often get written feedback from the client. Sometimes they write on print-outs of the design for more detailed comments. It depends on what type of feedback they're trying to offer... e.g. general feelings vs. specific comments about details of the design.
3. No. No one has ever drawn notes on a design that I have sent them electronically. This has happened when I have shown them paper drawings. Most people just write out suggestions or give me a list. The list is fine, as long as I can make out what they are saying.
4. Nope. I will sometimes print things out to take my own notes on.

Take Aways: Sometimes.

If there were an application that let you upload your design and send an invitation out to your colleagues/friends so that they can leave feedback, would you use it? Why? (It would allow users to place comments directly on the design and you could see individual/aggregate views)

1. I might use it in certain circumstances. Again, it is much easier to collect design feedback in person especially in the early stages of a design process. However, it might be a nice way to get final approval or sign-off on designs and a good way to track bugs.
2. Maybe. What benefit would I get over my current method? Maybe it would be nice to have a single place to accumulate the feedback?
3. Maybe. If it was fast to upload image and send, then I would. Also, if I could compare multiple design examples it would be helpful. Again, usually when I ask for feedback, it is because I want to know which one of the two (usually really different) directions I should pursue. I do think this application could be really helpful. Also, I think this could be great for clients/business. I could see a scenario, where during the first round of design. The design company sends a link to the client (secure, of course) for the client’s review and suggestions. Really cool idea!
4. I would use it, but I worry that the feedback givers might not. It is easy to ignore an email. At a meeting, you know you have their undivided attention.

Take Aways: Maybe, if it was fast and easy.
How secure would the application need to be? Would it need to be password protected so that only people you invite can view your design? Or would a random URL (with no password protection) be sufficient?

1. If I was using it at work, it would have to be an internal program. for my personal work, a random URL would be fine (as long as i can delete the uploaded document & URL when I'm finished)
2. Uhm... not sure. Depends on the client I guess.
3. very secure... (password protected) because of what i said about clients and design firms from above... If I wanted to send a client a new design.. I don't want anyone else to see it or know that we are working on a new project.
4. It would need a password and hosted internally.

Take Aways: Would definitely need to be secure and maybe even internal for some companies

Do you think it would be useful for the people commenting if they could see each others' comments and perhaps join onto a thread to agree/disagree/provide an alternative solution? Should this be the default or should it be a preference option? Under what circumstances would you want them NOT to see other peoples' comments?

1. This should be an option. its sometimes nice for people to generate ideas based on others' comments. Other times you want to get individual feedback & make sure that everyone isn't just jumping on the bandwagon. This might also be a nice way to gather votes for different designs - in which case an individual view would be best.
2. I'm worried about bias based on whoever makes the first comments.
3. Yes.......! there should be a history and a blog like feature. so.. seeing comments could influence people on what they think. so that would be bad. so, maybe initially, you couldn't see the comments until everyone responded, and then you could go back and comment, it would depend on the situation, but you should be able to turn on/off this feature this is sweet!
4. I think I would prefer if others were not able to see others' comments. It might help eliminate the fixation on a single feature that can occur during a group review.

Take Aways: Most think that sharing would bias the feedback in a negative way.