

Project Part 4 – Results and Analysis

Description of Evaluation Techniques

Our Evaluation Criteria would include the assessment of the following:

1. *Visibility of tasks* - Can the user choose which tasks he/she wants to do? Are all possible choices clearly displayed? With our application, the user can select his/her preferences as soon as the application is set up. The user would have the choice between a pop up display, where the geographical location of the user would ping and display the event occurring at that location in the closest time frame, and a tabular view where the user could further select which events he would like to go to from all the events listed in the application.
2. *Transparency* - The system should always keep users informed about what is going on, through appropriate feedback within reasonable time. In our pop up version the user would receive live feedback based on live geographical location feedback. In our tabular view, the events would be listed out based on user preferences and on the selection of each preference the user would receive the appropriate feedback. For example, if a user implies that they would like to only attend free food events then the application would ask if they were sure about their decision and if they would like to ignore certain pertinent events like information sessions.
3. *Feedback Mechanism* - The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. The system should incorporate natural mapping where possible. Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution so that even novice users can be able to use the application without much difficulty.
4. *Ease of Remembrance and Recognizability of Instructions* - Instructions for use of the system should be visible or easily retrievable whenever appropriate. The user should not have to memorize a certain set of instructions. The user should be able to view all appropriate instructions again or in our case revisit their settings and refresh them.
5. *Relatability of the Application* - The system should understand and speak the users' language i.e. with words, phrases and concepts familiar to the user, as opposed to system-oriented terms. The application should also follow real world conventions like making backgrounds have a high transparency or making information appear in a logical manner.
6. *Controllability, Navigation and Ease of Use* - Users often choose certain functionality by mistake, thus our application should have a clearly marked 'Back; or 'Undo'

functionality. In our case, we will have a set of preferences that the user can edit at any given time.

7. *Consistency of Information* - Users should not have to wonder whether different words, situations, or actions mean the same thing. Our application aims to follow platform conventions to maintain uniformity. All background and text colors should be relatively consistent throughout the application. Most pictures would remain uniform in size and the passive or active voice, whichever we choose to implement, will be consistent throughout the application.
8. *Error prevention* - Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action. In the event that errors do occur, error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.
9. *Aesthetic and minimalist design* - Our application design will be streamlined with basic colors and serif and sans serif font. Our application aims to be as concise as possible.

Evaluation Technique Rationale

The reason we choose the questions that we did was because they were the closest in definition to our Evaluation Plan. We incorporated Don Norman's design principles when we were setting evaluation parameters for our survey. We have ensured that our survey evaluates the following design principles:

1. *Principle of Visibility* - We want to confirm that users are able to see what the design is for, what they have to do at each step and the choices available to them. We wanted to make sure that no functionality or capability was hidden from the user.
2. *Principle of Feedback* - We want to ensure that users get simple, easy-to-understand feedback for any actions. For example, clicking on the more-info tab, open up a new screen with more information about an event. Similarly error messages are also easy to understand. No code.
3. *Principle of Mapping* - We also wanted to ensure there is some connection between user actions and aspects of our design. We asked the users whether they felt that changing the distance by moving their head up and down was intuitive or whether they had other suggestions for us to implement mapping.

4. *Principle of Reversibility* - Everyone makes mistakes, especially novice users. We intend that our design provides easy redo and undo functionality so that users are able to correct any mistakes. One of the questions on our survey specifically asks users whether the back button was easily visible to them.
5. *Conceptual Model* - We also want to know if our design can help users foster an appropriate conceptual model. When users go through our application, are they able to develop a mental model of what our application does? To ensure this, we asked the users whether they understood how each action affected the final design.
6. *Simplicity and Aesthetics* - We intended to have a design which is pleasing to the user's eye. We asked our users whether they had any suggestions for improvement with respect to design flow and color.

Description of Results of Studies

We asked our users 9 questions to answer after they have ran through our demo application at least once. We asked them questions regarding usability, functionality, preferences, etc as well as we took some concrete measurements, such as how many errors they came across and how long it took them to complete certain tasks.

Raw data can be found in this link [here](https://docs.google.com/document/d/1Zna_jQXQP2-Fp4CNsFMukyvwgXu92hitgkBLyIZSv1U/edit?usp=sharing):

https://docs.google.com/document/d/1Zna_jQXQP2-Fp4CNsFMukyvwgXu92hitgkBLyIZSv1U/edit?usp=sharing

The 9 questions that were asked in the user testing survey:

1. Is the 'More Info' tab visible? If not, would do you think about a 'More Info' tab at the top of the page?
2. Our feedback mechanism for the categories of events the user would like to view was to select or highlight required fields and fade of fields that were not selected by the user. Would you prefer say a set of check off boxes instead?
3. How transparent was our application? Could you tell how certain actions affected the final application? For example, setting the distance of the application text on the glass.
4. Was the reversibility of actions clearly displayed? Did we have an undo or back button?
5. On a scale of 1 to 5, how clear was our application? Was there anything unclear about using this application? Are the instructions at the beginning of the application

understandable and clear? Is the option between whether the user selects a pop up version or an application version intuitive i.e. can the user understand the choice well enough to make an informed decision?

6. On a scale of 1-5 how useful would you find this application? What in particular did you think was useful or what wasn't?
7. On a scale of 1-5, how likely would you be to recommend this application to a friend?
8. Is there anything about this application that you would want to change?
9. Do you think our design scheme coalesce well? Do the colors superimpose? Does our design flow fluidly?

Concrete Metrics that we Measured

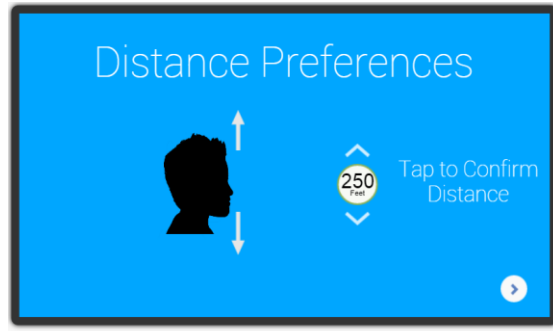
1. Time complete a task?
 - How long does it take to get to the information page?
 - How long does the user deliberate when choosing between the pop-up and the tabular view?
2. Errors that they came across?
 - Number of clarification questions asked
 - Misclick or mistap

Discussion and Analysis of Results

Survey Questions:

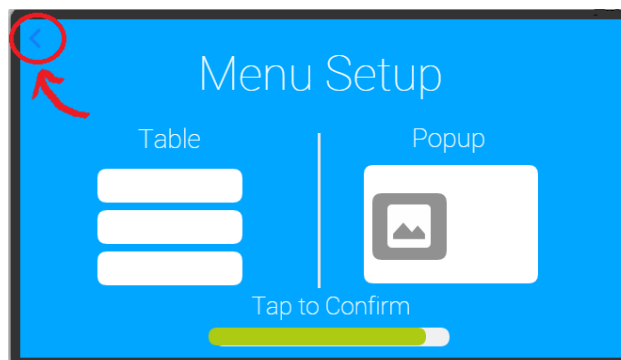
1. Is the 'More Info' tab visible? If not, would do you think about a 'More Info' tab at the top of the page?
 - Approximately half of our users said that it was visible and the other half said that that it was not clearly visible. Most said that they didn't want a "More Info" tab on every page but instead wanted it to be associated with each event.
2. Our feedback mechanism for the categories of events the user would like to view was to select or highlight required fields and fade of fields that were not selected by the user. Would you prefer say a set of check off boxes instead?
 - Most of our users said that our current design of highlighting preferred categories of events works well. Some of them said that they would prefer both check-boxes and highlighting so that it clearer.
3. How transparent was our application? Could you tell how certain actions affected the final application? For example, setting the distance of the application text on the glass.
 - Overall, the application seemed transparent. Some users were confused about the conceptual mapping in our distance slide where the user would have to move their heads up and down to increase or decrease distance accordingly. User's thought

that an arrow pointing towards the distance bubble would be helpful in indicating distance from the eye. They were also confused about what the distance in question actually meant. Our team intended it to mean the distance between the the user's eye and the text on the google glass.



4. Was the reversibility of actions clearly displayed? Did we have an undo or back button?

- Most users found it hard to find the 'back button'. They indicated that it was hidden and should have been more emphasized. Over 50% of our users, didn't even know the 'back' button existed until they were explicitly shown where it was.



5. On a scale of 1 to 5, how clear was our application ? Was there anything unclear about using this application? Are the instructions at the beginning of the application understandable and clear? Is the option between whether the user selects a pop up version or an application version intuitive i.e. can the user understand the choice well enough to make an informed decision?

- On an average, users rated our application as a 3.5/5 in terms of clarity. They believed that the distance screen and the decision screen, where the user makes a decision about whether they would prefer a pop up representation or a tabular representation, were ambiguous and required further instruction. User's also suggested making the graphical representation of the tabular view scrollable i.e. adding a scrollbar to the tabular representation to indicate the dynamic nature of our application.

6. On a scale of 1-5 how useful would you find this application? What in particular did you think was useful or what wasn't?
 - On an average users rated this application 4.4/5 in terms of usefulness. The general comments were aimed at how college students would benefit from an application that would tell them about free food availability given that most students are on tight budgets and would like to save where they can. Also, users said that getting live updates on events could be very helpful. One particularly interesting comment was how this way students would be informed about information sessions targeted at other majors. Most colleges catalog events within their own department and send it out only to those within their major. For example, a Bloomberg information session invite would most likely only go out to Computer Science, Computer Engineering and Finance or Management majors; when Industrial Engineers or International Affairs majors might also find the same information session pertinent to their needs. Without application, information would be free to see and use for all who may wish to do so.
7. On a scale of 1-5, how likely would you be to recommend this application to a friend.
 - In terms of recommending this application to a friend, users indicated an average of 4.1/5. The users that voted towards the lower registry felt that with improvements, the application's rating would definitely increase to a 5. Users found the application particularly useful in terms of free food and appreciated having all events catalogued in the same place.
8. Is there anything about this application that you would want to change?
 - In conclusion, users indicated the need to emphasize the back button, maybe make it darker or highlight it. Also, users wanted us to improve upon the distance screen and make the mapping more intuitive or add arrows to indicate the direction in which we want the users to move their head. User's also wished for a more detailed description of what the tabular view and pop-up view entailed. They also suggested that the initial slides be modified to better introduce the application.
9. Do you think our design scheme coalesce well? Do the colors superimpose? Does our design flow fluidly?
 - In terms of design, we had mixed feedback. Some users believed that the color scheme was too bright i.e. our colors were too saturated while others claimed they would like a better contrast between the text color and the background color. Some suggested making the background darker while others suggested making it lighter. This again suggests that not all users would be satisfied with our final product, but we can strive to make it as universal as possible.

Metrics:

- How long does it take to finish the application i.e. get to the information page?

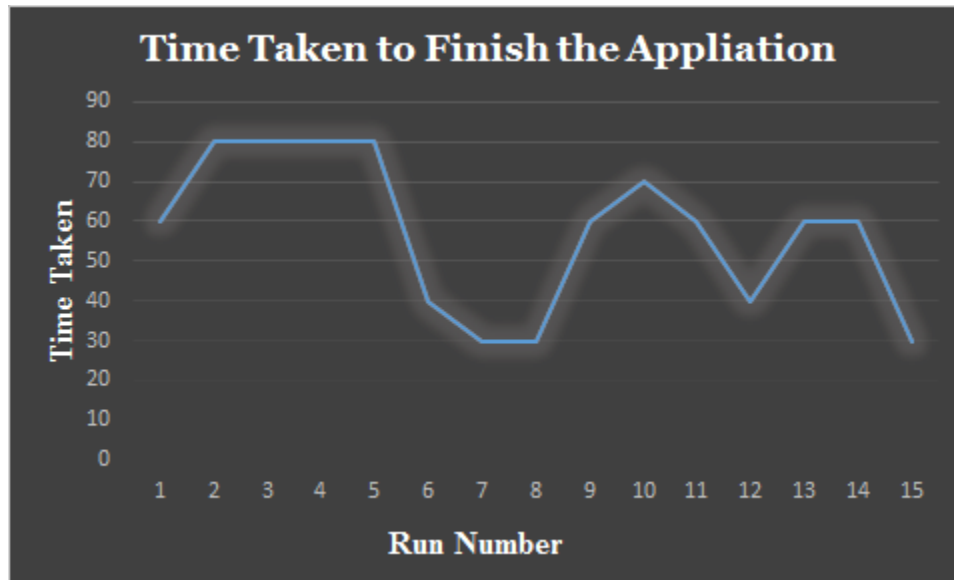


Figure 1: Time to run through Entire App

- How long does the user deliberate when choosing between the pop-up and the tabular view?

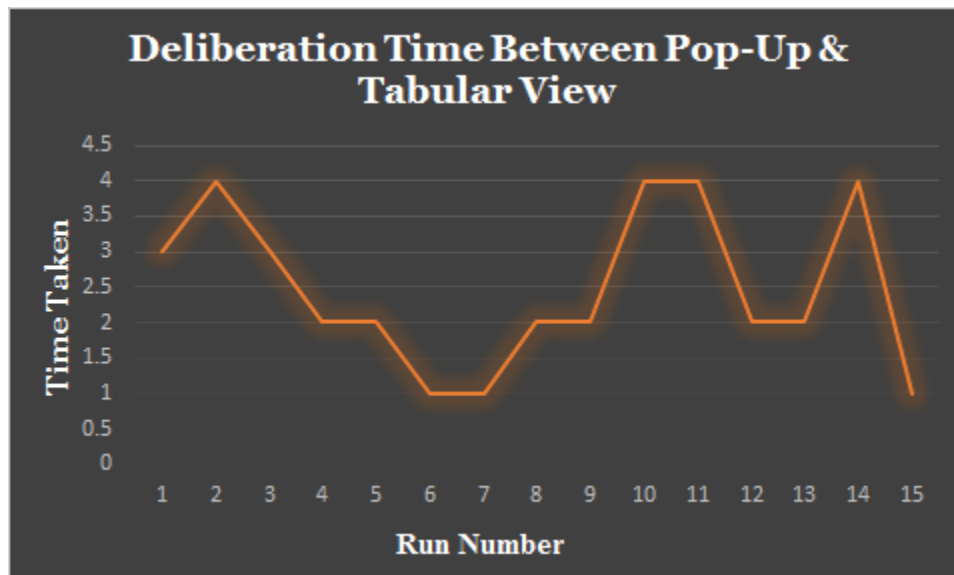


Figure 2: Deliberation Time

On average, it takes a user 57.33 seconds to finish the application i.e. go . The reason why it took some of our user more time than it took others is that some of them took a long time to deliberate between pop-up and tabular view. Also, sometimes it would take them a few seconds to find the back button in case they made an error. The average deliberation time between pop-up view and tabular view is approximately, 2.47 seconds. We also found that people who took longer to finish the application also showed a longer deliberation time when deciding between pop up and tabular representations.

What were the errors that they came across?

- Number of clarification questions asked
- Misclick or mistap

With the exception of 2, most users had an average of 1 clarification question. About 25% of our users misclicked at some point partially due to our increasing the area in which the users could click to move on to the next part of the application. Also, after going forward some users wanted to backtrack to toggle their pop-up and tabular views option.

Implications of the Results with respect to design

Since the run time for our application is at an average of 57 seconds, we believe that the application is viable and can be easily incorporated into real time. Also, our user's deliberation time between the pop up and tabular view seems too big, therefore we hope to add a line or two detailing the implications of each representation. Most of our users did not make any random mistakes, the only source of error we found was the misclicks where the user would unintentionally move on to the next page of the application. We realised our clicking area was too broad. This however was necessary, as most users would find it troublesome to click on the small arrow area.

Another area in which we found that users deliberated for longer than usual was when looking for the back button. We realized that we should make the button more visible. The most common clarification question was with regards to the distance slide. Most users didn't understand the conceptual model in which the arrows point upwards and downwards, they presume they have to shake their head instead of clicking on the arrow keys to increase and decrease distance.

After our recent user field testing for this phase of the project, we received much constructive feedback that will further improve our prototype.

1. Include mission statement
2. Have larger reversibility arrows (to go back)
3. Make the tabular menu have a scrollbar
4. Include checkboxes for the user to choose categories of the events that they are interested in.
5. Change the color scheme such that the background is made darker and the white text can be more easily visible in contrast to it.

Description of prototype design improvements

After receiving in-class feedback from our initial prototype design mockup, we redesigned our mockup prototype to address the first issues brought up. They are as follows:

1. The first main issue arose from a conflict in the prototyping platform. We originally planned on using the Google Glass as the demo device, however due to prototype software limitations, things did not work as expected, and we were forced to demo the application on a mobile device. Users of our demo were intuitively trying to tap instead of trying to swipe. and a lot of confusion resulted just because we didn't use Google Glass as the demo device. As a result, we chose to move off the Google Glass environment and into the Mobile App's instead. We made everything more fluid and smooth that is designed now for the mobile app experience.
2. We changed all swiping functionality to tap to increase reliability and we made tap location surface area larger to reduce errors.
3. We made arrows more consistent to prevent confusion and we also added tooltips to help guide user to the setup process.
4. We also removed extraneous Google Glass home screen in the beginning that confused users and didn't add value.
5. One more important thing we heard from user feedback was the fact that there lacked a progress bar to show people how far they are in the setup progress. Based on this feedback we added a green progress bar at the bottom of each setup screen that filled up from left to right as the user moved through the setup screens.

After our recent user field testing for this phase of the project, we received constructive feedback.

1. Include a mission statement
 - a. This statement will be put in the front page in bold font, allowing users to know the intended purpose of this application
2. Have larger reversibility arrows
 - a. For each screen, a large, white arrow that, when tapped, can direct to the previous page. This arrow will be placed in a consistent location so the user constantly knows how to go back.
3. Change the distance mapping i.e. draw an arrow towards the distance bubble, so that the user knows the distance we're implying is the distance between the user's eyes and the text. Also we would change the distance from feet to centimeters.
4. Make the tabular menu have a scrollbar to see the list of options
 - a. Clearly defines the function of the abular menu.
5. Include a more detailed description of what our tabular and pop-up views entail. Or have a 'more info' tab that the user could click on for a more detailed description of each view. This would make our design more universal i.e. give our users the power to choose whether they would want to have more information.
6. Make our color scheme darker so that the contrast between the white text and the dark background stand out more.

If we had more time, what would we have done differently?

The majority of our issues arose from the issues caused by the prototype platform. Our original design to use Google Glass had to be shifted to a mobile application. A longer amount of time would allow us to find a suitable prototyping platform that supported Glass UI. We would also run the project through several more iterations in order to gain better insight into how our product could develop in the best manner.

To maintain universal design principle, we would also search for a different demographic to test other than college students. Due to the time constraints, most of the data collected was from the same age group, GT students.