TEAM ROCKET: ANALYSIS OF TRANSIT APPLICATIONS THROUGH HUMAN-COMPUTER INTERACTION

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ABSTRACT

Triplinx is a website that provides users a way to get around the city using different form of transportation. The overall design of Triplinx, is determined to be very poor based on the user requirements gathering conducted by Team Rocket. A couple of major fixes proposed by Team Rocket includes fixing a search bar and fixing the main page of the website. It was discovered that the main screen was over-crowded and contained unnecessary contents. The possible fix proposed by Team Rocket is to make the search bar larger and decrease the amount of elements on the main page and carry only the information needed for the user. To get the results of the design of Triplinx, surveys were conducted to verify the poor choice of Triplinx. Upon conducting surveys, it was determined that the prototype made by Team Rocket, was much improved compared to the Triplinx website. Triplinx, and Team Rocket prototype provides a good overview for those who are new to urban cities, as it gives them an idea of how to get around to places in that city.

INTRODUCTION

The objective of this project is to follow a user-centered approach to analyze an interactive system by using the following Human Computer Interaction principles and guidelines. The website, www.triplinx.ca, is a tool that is primarily used to plan trips across the GTA. It provides users with various ways to get across the city, using different public transportation services. It serves great importance to someone that is new to the city or needs to find alternative ways to get around the city. It has variety of services for the audience. Triplinx offers transit schedules and information about the fares for all the transportation. Along with the help of planning the routes, Triplinx can help find a particular stop and also, gives updates to the different services. Using the concepts of HCI we have came up solutions to the heuristic violations that have been violated through this website.

PROBLEM STATEMENT

There are several issues within Triplinx that dealt with the concept of human-computer interaction. The particular design choice of the interface became overwhelming for new and returning users. The website offers many tasks, for example - planning routes, searching on maps, getting information from different transit services. From the perspective of a new user, the contents are placed all over the main page and thus making it look congested. For example, entering the location data from origin to destination is a specific problem. The website gives a bad layout of the map and it fails to pinpoint the exact location of the route. Another problem is the lack of space when entering information because it leaves very little room for the map, which causes the user to spend more time to find a particular destination on the map. After routes are given, the website divides the screen into three different sections, thus making the interface look tightly compact due to the excessive amount of components. This website is an issue in the sense that a user who has been recently introduced to technology and the concept of trip planning will not be able to make the best use of the website's intended purpose, which is to plan trips. After analyzing TripLinx, it was clear that entering information (such as origin and destination) was difficult to find because of where the contents were placed in the tab. This would cause problems for users who are not familiar with technology. In fact, for those who with sufficient technological knowledge would need some time to locate all the elements and services, in order to use it efficiently. From the perspective of a potential customer, the website is confusing and time-consuming despite all the useful services. The website certainly shows off its usability but with its lack of poor design, the website does not rise up to the standards of the human-interactive concept. In conclusion, Triplinx was the choice of analysis by

Team Rocket due to the overall poor designs made by the website.

LITERATURE REVIEW

We used surveys as the technique we have used to gather user requirement. Using surveys is quick and cost efficient and can be distributed through a link, which we have obtained sufficient quantitative data and has assisted us with gaining results needed for the rest of the phases.

1) The technique for the surveys is having different questions of the questionnaire for different population (Preece, Sharp, & Rogers, 2016, 206), since there are different age groups and different types of users (first time users or everyday users) this will provide with better and accurate information needed for the overall project.

2) The impact of a question can be influenced by question order (Preece, Sharp, & Rogers, 2016, 206), normally when doing the survey the questions that are given earlier on can influence how an individual will answer the questions throughout the survey. So for instance, during the survey, if an individual is given a complicated question in the beginning then the individual will think about the rest of the survey as equal difficulty and the answers will be unbalanced. Hence, the decision to divide the survey was based on first time or regular users so it wouldn't confuse either of the user if their own version of survey is given and the questions will be asked accordingly.

3) Providing clear instructions on how to complete the questionnaire, when providing instruction clearly it'll be easier for the individual to answer the questions in a mannerly way.

4) Deciding on whether phrases will be all positive, all negative or mixed (Preece, Sharp, & Rogers, 2016, 206). The phrases as shown in the survey is mixed since it is preferable to gather the data based on design, contents, user satisfactions, attaining the data needed for future improvements if needed.

5) Implementing anonymity in a survey is crucial as it will get the audience to feel more confident when writing their answers knowing that their identity wouldn't be known. Many users might feel the need to not provide any negative responses if there was no promise to anonymity.

The survey's quantitative data has assisted us with the research and the overall purpose of the project by helping us figure out ways to come up with solutions or to contribute to the solutions for this project, which will be explained more further in this paper.

GATHERING OF USER REQUIREMENTS

The three types of requirements that the team aimed to explore are functional, non-functional, and user experience requirements. Consider the following as examples:

Functional Requirements:
1. Triplinx should allow its users to plan a trip from one location to another while simultaneously suggesting various means of transport (i.e. bus, streetcar, subways) as to plan the trip
2. Triplinx should allow its users to view schedules for Buses, Streetcars, GO Trains, and Subways from various transit providers such as TTC, GO, YRT/Viva etc.

Non-functional Requirements:
1. Triplinx should allow its users to access their personal accounts at any point in time in order to view their favorite stop, locations and routes, and their previously saved trips.

User Experience Requirements:
1. Triplinx should always have a visible search bar displayed at the top of the screen in order for users to search for their desired location.

To gather user requirements Team Rocket created and distributed surveys to a variety of users from different educational backgrounds, nationality, and system use (novice, expert, casual and frequent). Reasons for the team to gather user requirements using surveys are as follows:

- Reach out to larger populations because surveys were distributed online (approximately 60-70 responses)
- Questions asked to surveyors can be open or close ended

- Responses are usually received quickly as the survey required approximately 10 minutes of a user's time
- Anonymity of surveys provides participants confidence that the their identity will be kept unknown, allowing for more candid and detailed responses from their end

The types of users that the team distributed the surveys to vary in terms of familiarity with Triplinx. The participants were divided into three groups as follows:

1. **First Time Users** - that accessed Triplinx through the survey, or on their own accord
2. **Frequent Users -** users that have previously used Triplinx
3. **Accessibility Users -** users that will have difficulty making use of current Triplinx functionality

These users were further broken down into three more groups.

1. **Users from ages 10-22**: Targeted to students that need to use transit to get to university or school.
2. **Users ages 22 or older**: Targeted to users that use transit applications to get to their workplace.
3. **Tourists that visit Toronto (any age group)**: Users that visit Toronto for a vacation or other reasons that use Triplinx to plan trips throughout the GTA

Prototype
In order to receive feedback from the participants that were interviewed, Team Rocket created high-fidelity prototypes using the software Justinmind. Creating high-fidelity prototypes enabled the team to thoroughly evaluate three tasks with the help of the participants that were interviewed. The tasks that were evaluated by the users offered complete functionality as they were fully interactive, further enabling the team to make improvements to the original design of Triplinx.

The widgets of Justinmind allowed the team to create high-fidelity prototypes quickly and efficiently. The prototype caters to universal usability, as it prevents errors well in advance, and users are easily able to recover from any errors that have been made.

Usability Study
The method that was chosen to conduct the usability study was interviews, specifically, semi-structured interviews on three participants with each interview being thirty minutes in length. Team Rocket conducted semi-structured interviews because they are guided by a script which makes the responses retained from the interview useful for future replication. Also, they explore interesting issues that might not appear in structured interviews. As a result, these interviews lead to a reasonable balance between richness and replicability of results received.

The background in terms of education and nationality of the interviewees varied slightly. The interviews also focused on the users having varying experience in using transit applications (i.e. novice, frequent, and casual users). For each task that was evaluated by the participant, one team member from Team Rocket was observing and making notes as well as timing the user.

Each interview that evaluated the tasks contained both closed and open ended questions that focused primarily on obtaining qualitative data. Examples of both open and close ended questions that were asked in the interview:
- **Close ended:** Did you use the tutorial provided by Triplinx in order to better navigate through the website?
- **Open ended:** When using Triplinx, how difficult was it to complete the most basic task of planning a trip from one location to another?

The usability study was conducted in the computer science labs (BV 473) and each user used a computer to evaluate the three tasks. The interviews followed standard procedure in the sense that the participants were reassured about the ethical issues, and given with the consent form. The structure of the interviews that the team conducted was as follows: Introduction, Warm-up(easy questions), Main content, Cool-off period, and Conclusion.

The high-fidelity prototypes that Team Rocket created using Justinmind were evaluated. The three tasks are as follows:

1. **Running a tutorial** - in order to learn the basics of navigating through Triplinx. This is primarily for novice users as they would require instructions to understand and familiarize themselves with the current Triplinx interface. The issue that the team explored here is the inability of a novice user to quickly access the tutorial functionality.
2. **Searching on the map** - Excessive search bars on the main page of Triplinx causes confusion for novice users. This is because they are unaware of the functionality associated with each of the search bars. Team Rocket created a prototype to test if the user can search quickly and efficiently for their desired location.
3. **Navigating from point A to point B -** the information presented to the user upon entering the start location and end location to plan a trip is fairly overwhelming in Triplinx. This is because there are route options presented to the user at once which causes confusion and distraction from the original task of planning a simple trip.
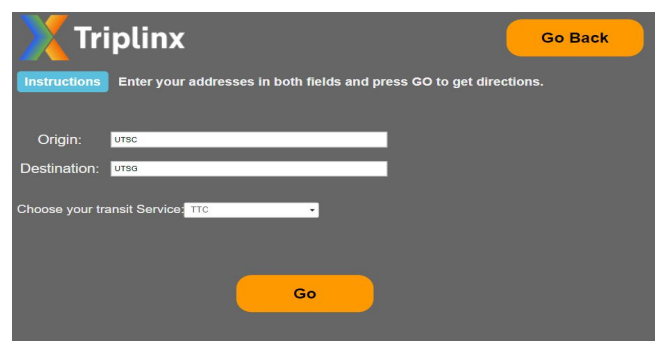
Prototypes for each task mentioned above:

Task 1: Running a tutorial
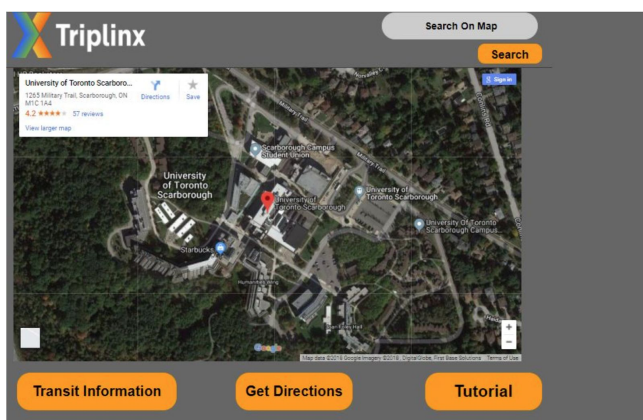
Task 2: Searching on the map
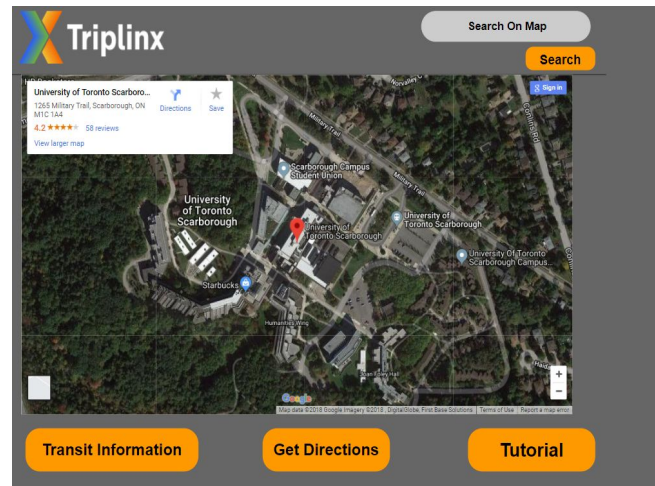
Task 3: Navigating from point A to point B

As mentioned above, Team Rocket created high-fidelity prototypes to evaluate the three tasks using Justinmind. The tasks were evaluated by interviewing three users and letting them work with Triplinx first to complete the tasks, and then the team's prototypes. A few examples of the questions asked in the interviews were:

- Do you know what steps you would need to take if you get lost on the instructions for the tutorial?
- What types of routes were you able to find?
- Did you notice any difference between triplinx and our prototype?

RESULTS
Upon conducting interviews with 3 participants regarding the prototype created by Team Rocket, the results were fairly in favor of the prototype. The questions designed for the interview asked the participants to use the Triplinx website and perform a

couple of simple tasks and then ask them to perform the same tasks on Team Rocket prototype. The results unshockingly were heavily in favor of the Team Rocket prototype, as it proved easier to use and navigate compared to the original Triplinx website.

Based on the results from the interviews, all 3 participants said that Triplinx website had too many components on one page and the elements were over-crowded, with minimal instructions on what to do next. In fact, according to one of the participants, the color combination provided on Triplinx is not very good, and causes some problems.

One of the biggest problems that the results of the interview showed is the location of the search bar. All 3 participants had a problem with the search bar, and how the users had a difficult time trying to locate the search bar and did not know what to do, when there was a mistake made in the search bar. Based on analysis of the results, it was determined that the routes provided by Triplinx also confused the user as to which routes were relative to their destination and which ones were not.

With the analysis of the results, it was also discovered that the location of the tutorial button was not present at first glance, which can be time consuming for users and becomes harder for the user to learn the functionality of the website. Finally, comparing the results from the interview questions that were regarding the Team Rocket prototype received some positive feedback. Each participant, said the placement of the buttons was good, and the search bar was located where it should perfectly visible at first glance. Along with that, the route options provided by Team Rocket Prototype was also very clear and easy for the user to follow with the functionality. The results also deemed that, when a user got lost on the protype, they had a clear idea as to what to do next and how to go back to where they started.

Problems	Triplinx	Prototype
Search Bar	Not visible at first glance	Visible at first glance
Tutorial button	Not visible at first glance	Visible at first glance, but can be placed at the top in a better location
Selecting Route Options	Couldn't find the route options	Route options were clearly stated
Placement of buttons	Poor placement of buttons	Buttons were placed in a good location
Main page	Overcrowded - excessive amount of elements	Only carried information required

Table 1. Comparison of average results of Triplinx and Team Rocket Prototype

LIMITATIONS

We had limitations of the number of people we had interviewed. We had interviewed 3 of our tutorial classmates to use and test out our prototypes. The amount of feedback we got is limited to these 3 people, and our team itself. The reason why this is a limitation is because we did not select a larger group of people to test out our prototypes and so the feedback is very limited. Along with that, the classmates that we had interviewed were also taking this course, and so they had a large amount of background to why they were being interviewed and so it made the testing more biased than if we were to interview someone who has not already taken this course or is taking it this semester. The data being collected from these interviews about our prototype seems to limited because of these reasons. There is always room for improvement, and for our prototype the same sort of phenomena applies. The amount of people that we interviewed were also limited, if we had interviewed a larger number of people it would provide us with more accurate feedback. Interviewing a larger amount of people also meant that we could get valuable feedback from people with different experiences which helps us better understand what are the pros and cons of our prototype.

Our prototype did have limitations because we were not able to get a few portion working perfectly well. For example our map on the screen that shows you the

routes you can possibly take, is not a map that can be altered, like most maps. We lacked at this because the prototyping tool was inadequate for our needs. It was not able to provide us with the right tools to have the map fully functioning. Using JustInMind, we had added the map from google maps into the main screen to satisfy the visual aspect of task that is being performed.

FUTURE WORKS

For future work on our prototype we have come up with ideas that will be more beneficial and convenient if users were to use this prototype even on a daily basis, which will also be useful and thorough for novice or experienced users. As seen in the limitation section, there were many things that could have been better in our prototype and so we suggest the improvements in this section.

1) Currently all our maps on the prototype is supported by Google Map, thurs in the future we would want to include our own base layout and design of the map.
2) Making the prototype more dynamic and aesthetic, making it simple and more cohesive looking design.
3) Implement options to change the transit services whilst on the second screen of planning routes (a map of the service that the user chose) and the app can make changes in an instant.
4) Having a specific tutorial pop up guide for the new users asking if it is their first time using this website, this is will determined if its the users first time entering the website, and then depending if the user wants a tour, the website will show the users around the website.
5) Having screenshots in the tutorial section for the users who would like to visually learn.
6) Implementing an autolist of saved entries so that when the user inputs their location, they wouldn't have to retype again.
7) Including an options at the bottom of the map for the nearest restaurants/shopping/ nearest ttc/GO.
8) Setting a reminder for the user when to leave or when they are arriving at their destination.
9) A map with different selection on how a map looks like (Base map), so that the user can view the map if they want to a hybrid view/open street map.
10) If user wants the directions sent as a text message, or through email, there will be a button on the website where they have to fill in their phone number or email and it will get sent to the users accordingly.
11) An offline version of the map, say when you type in the direction it will allow the user to save the directions offline when no WIFI is available (It allows them to follow the directions without having interruptions of not having to be connected to the internet).

Thus, these are a few of the ideas which will further improve our prototype so that the users who would use it, would benefit from it. It can also be an enhanced version of Triplinx, in terms of human-computer interaction principles.

CONCLUSION

In this work, there was an in-depth study of Triplinx.ca, which was a transit application that offers users to plan routes and give directions. The data from researching user requirements gave a good idea of the expectations for the prototype. While implementing some of the main tasks for this prototype, we came across suggestions and information from the usability study that help improve the overall user experience. Using HCI concepts, Team Rocket was able to successfully analyze, design, and propose a possible solution to improve the overall design of Triplinx.

REFERENCES

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