Human-Computer Interaction
Flight Tracker - FT Airlines

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1 Description of Project

Our application aims to provide a solution for users searching for a comprehensive mobile flight booking system for a brand new airline. While there are a number of existing applications available that attempt to manage bookings for individual airlines, none of these applications seem to meet all the requirements and needs of our researched users completely. By and large, most of our sampled users choose to use a full web browser and websites to search, compare and select flights to meet their travel needs over an airline's mobile app. This seemed to be caused by the perceived ease, visual cue quality and familiarity of use with the website / browser. Users would more often than not then choose to use the airline's own website to complete the booking and payment. Our team aims to design an application that bridges the functionality, robust visual information and versatility of booking flights through a website on a browser with the convenience and ready availability that mobile applications can provide.

1.1 Intended Audience

Our application targets Canadian mobile users who are looking to book domestic or international air travel whose search criteria for booking flights include restrictions in price, time and / or any special needs travels. As our application will provide support for only our parent airline, our intended audience will include both travelers familiar with our parent airline, and those who are booking for the first time. These users can be travelers who need to book a flight immediately or those who would like to be able to monitor the availability and pricing of flights on the go through their mobile devices.

The targeted audience for our application can be divided into three key groups: customers that want to travel, travel agencies and the company itself. Further in depth detail regarding targeted groups of users can be found in the Users section of this report, identifying our primary, secondary, tertiary and other users.

1.2 What The App Will Be Used For

Our application's primary usage is a flight booking system for an airline company, which allows users to simply search for travel deals and to book their desired flights. The application will incorporate the airline's schedule to show our users the available dates they can choose to depart and/or return from. Along with those dates it will have prices attached to them depending on the user's preferences, such as round or one-way trip, the number of people traveling, connecting flights and length of travel.

Once the user has purchased a ticket, they will have the option to check in with their reservation code 24 hours before the flight. Then, the users can select or upgrade their seats/class (first, business or economy), choose their desired meals for the flight (meat or vegetarian) and alert flight attendants of any food allergies. The users will have the option to get their boarding passes printed

out before arriving at the airport, allowing users to save time once they arrive. If the user has any baggage, they can check it in and the application will let the airline know if there is extra baggage that needs to be addressed and paid for. The users will also be able to check their flight status and confirm whether their flight has arrived and is ready to board, delayed, or canceled and the reason for any status changes.

1.3 Why People Will Want To Use Our App

Users will want to use our application because it will provide an all in one system for flight booking in the palm of their hand. Despite advancement in online booking systems, our research has shown that often several different online tools and websites are used together in combination to ensure that the ideal flight is found. The aim of our application is to meet the demand for an all inclusive, trustworthy, cleanly designed, easy to use application that does not require the user to sit at a desktop to have their desired functionality. By streamlining what would otherwise take multiple applications or browser windows to accomplish, our application will make booking flights a simple and natural process that can be done at any time with the customization and convenience of using a personal mobile device.

1.4 Context In Which Users Will Use Our App

Users will want to use our application depending if they are using it to book a flight with a desired flight date and budget, or with no intention at all. Some other users might use our application to check out all possible flight deals of our airline to use it for their own. And finally users from our own company will use it to monitor any potential errors and any functions that may be added or updated to make it better. These will be further explained in detail when we identify our primary, secondary, tertiary and other users.

2 Stakeholder Identification

2.1 Primary Users

Travelers, or people who want to buy a ticket from the airline and have a set date and budget in mind. Their domain knowledge could be minimal to expertise depending if it's their first time booking a ticket, or simply knowing how to navigate the application. Their current experience could be varied from first time users or long timer users, they are happy if the prices and dates matches their goals and budget, and that there is excellent support assistance when needed. Users who are comfortable with how the internet works will find the application easy to use and navigate because it has a simple form that lets them enter the required information to find flights.

These users will have the intention to travel in the near future, and a budget set in mind when looking for travel dates to depart and/or return from. They

can use the application to look for travel deals that can show up unexpectedly, and once they find their desired flight, the users can book it, check-in, and check their flight status. A user might use our application to book a flight if they are planning to visit their family in another country, a newlywed planning a honeymoon, a student planning a summer vacation with their friends, or a person going on a business trip. If a family member is getting married, one might have the desire to go attend and celebrate with them. If someone just got married, they will desire to have some time to celebrate their marriage in destinations considered exotic or romantic. If a university student just finished a stressful semester, it might motivate them to go on a fun trip with their friends before going back to school. The user's current and expected skill set would be the ability to navigate the application and to make a purchase using their credit cards. The application is very user friendly and basically tells them what to enter, all they need to do then after they find a flight is to make the purchase. After that they can choose to navigate to other functions such as check in and check flight status.

2.2 Secondary Users

Travel agencies who use the application to check for deals to sell on their own website. These users will also look at all other airline companies to compare prices on their domain, and they might make airline commissions if a customer makes a purchase on the travel agency's website with the associated airline. Their domain knowledge is at an expert level because they will have to be very familiar with the application in order to find all the good deals to make a sale on theirs. Their current experience can vary depending on the user's expertise. It could be difficult to analyze all flights for someone who is new to the industry, and easy to those who have years of experience.

These users will want to use our application to search for all our airline's current prices on all available dates. They use this information that they gather from our application to put it on theirs, and they do it for other airline companies as well. They do this so people could go to one application to search for all flights of all airlines. A travel agent might have a business relationship with our airline, and when the majority of potential customers go looking for flights on the travel agency's application, they can get a commission when a customer buys the airline's tickets. Travel agents are motivated by the potential sales they could get by using our application to find the best possible deals for their customers. If a customer finds that a flight is cheaper at our application than theirs, then the travel agent might use our application to confirm and could adjust to satisfy that customer by price matching or even lowering it on theirs. Their current and expected skill set would be the ability to easily navigate all our application's functions to find all flights of all prices. They also will have to be able to connect and communicate with our airline once a purchase is made on their application so the customer can view details of the flight such as flight number, departure time and gate destination.

2.3 Tertiary Users

People who are casually looking for places and cheap deals with no intention to travel at first. Their domain knowledge and experience are the same for primary users, depending if it's the first time using the application or have used it before.

These users would use our application if they are sparked interest in traveling with our airline. A user might come across an advertisement or an email from the airline, notifying them of cheap travel deals. A user might notice that Christmas or summer is coming soon and were just curious of what the prices would be, and these circumstances can motivate them to use our application. Although with no intention to plan a flight at first, after looking through the application and checking out the prices, they might want to start thinking about planning for a trip if the prices are way below their budget, and vice versa stop looking at flights if prices are way above. A user might randomly search for random dates as opposed to our primary users who have a set date in mind.

2.4 Other Users

People from the airline company who oversee the applications' design and functions. These users are not like our previous ones that have a purpose to make a purchase or a sale from our application. Instead, they are the developers who created the application, the IT team who makes sure that the application works the way it is intended. Their domain knowledge with the application is at specialist level because they are the ones who developed the application. Their current experience varies depending if the application is working as planned.

These users would use the application to see if all the functions are working properly and to see if there are any upgrades or changes that could be done to make it better. They are motivated to use the application to check for errors, ease of navigation or even desire to make it even better. When going through the application, there might be an error in the prices that are listed on the airline company's website, so the IT team can fix it to display the correct information. If the numbers on the calendar to choose a date is too small or even the buttons are too hard to navigate, they will adjust so it will be easier for the users. If they find that users are regularly contacting the airline company about a feature that is not on the application such as an option to enter a promotional code, the IT team will then can add that feature on the application. These users will regularly use the application to check for these kinds of problems, and their current skill set should not only be able to look into the coding side of the application, but also user feedback.

3 IDEO Methods

The research we conducted through the use of IDEO Methods includes a mixture of comparative research coupled with qualitative and exploratory research. Comparative research is important to identify similarities and differences be-

tween existing solutions while qualitative and exploratory research provide insight into the who what when where and how's of the flight booking experience.

Our comparative study focused on the different kinds of currently used airline booking applications. We searched for what worked well, what did not work well, and unique features. We conducted this part of our research across websites and mobile apps. We thought it was equally important to look at both types of flight booking solutions because each of them have the possibility to bring in their own unique users. Some users prefer one method over the other and being able to understand techniques from both methods will help in the design for our application.

The qualitative and exploratory research we conducted involved potential users of our application. By involving the users directly we were able to gain first hand knowledge into user preferences and frustrations. This type of research lends itself to identify key issues and variables. For our flight booking application we need to understand the users processes so we can identify these issues and variables. Involving the users in our research also diminishes the blind spot created by our own assumptions. Looking beyond our own assumptions is a critical task in identifying how our application needs to be designed.

3.1 Draw the Experience

We chose to get a method from the Ask category because we wanted to get direct information from potential users. Asking potential users to participate in an activity to gather information on their experiences with previous flight booking methods allows us to learn about their preferred processes as well as what frustrates them.

In general, people remember what excited them or frustrated them most about an experience. We chose to ask participants to draw the experience. Draw the Experience aims to get participants to visualize an experience through illustration. These illustrations can vary from participant to participant depending on how they interpret the instructions. We chose this method so that we could get visualized data about people's thought processes regarding our application.

Leading up to our research, we assumed people would draw diagrams about the steps they took to book their last flight. As technical researchers, these assumptions limited our view of the possibilities of this study. Knowing the limitations of our own ideas made us search out a variety of different participants. Conducting well-rounded research is important to the future and success of any new application. With this in mind, we found participants ranging from high school students that have never booked a flight to frequent flyers. A large part of the drawings aligned with what we assumed this research was going to look like. Conversely, we also saw results we did not expect.

Under a time constraint of 1 minute, we asked participants to draw out their last flight booking experience. Each participant was given a full piece of paper and the exact instructions provided were: "In one minute draw out your last flight booking experience". We used minimal prompting for this exercise because we wanted people to express the first things that came to their mind

when asked this question. If people insisted we would elaborate and say they could draw a diagram, picture, or what the steps they took. We did not want to skew the data by giving an example of what they could draw because we wanted each drawing to be authentic.

Many people drew diagrams with arrows outlining the processes they took along with keywords that displayed what companies they chose; as we expected. Other people however, had immediate emotional responses to this question. These emotional responses varied from excited and anxious to extreme stress. Each drawing we collected varies, but we noticed distinguishing patterns. These patterns arose mainly between different generations.

3.1.1 Results

While compiling our data from Draw the Experience we noticed that there is a divide between generations. Students and younger millennials drew detailed webpages or mobile applications, whereas older participants drew a desktop computer and included their emotional response. Some participants use travel agents or get other people to book their flights for them and depicted that by drawing people conversing. Interestingly, for one participant that has never flown they drew themselves at an airport kiosk getting a ticket and going straight to the plane.

The wide range and variety of the people that we found to participate in our research worked to our advantage by giving us many different perspectives. Each new perspective can offer new insight into what our flight booking application should include to work for as many different types of customers as possible. The results of this method included much of our assumptions but also broadened our perspective by seeing people's emotional responses. As technical researchers emotional responses were not something we originally anticipated. The widening of our perspective from the results of this research raised the bar for us to want to design an app that is an easier, stress free, experience for our users.

3.2 Competitive Product Survey

Another category we decided to use was "Learn" so that we could understand why the "Ask" and "Look" results came to be. We chose to use the competitive product survey method mixed with error analysis as our third research technique. These would allow us to analyze the common features among websites and link that to the ways the users felt when using those sites.

Competitive product survey was chosen because it allows us to determine the mandatory requirements of flight booking applications, which would be helpful in development stages. However, a larger component of competitive product survey was that we could compile commonalities and unique features between competitors. Doing so was a driving reason why we chose this method because it would allow us to see why certain applications have more users than others. This would be used with the other research methods that we picked so we could

better understand why a more frugal user liked website A or a very casual user liked website B.

We also chose to mix error analysis with the competitive product survey method. This was because they provided cohesive insights into our research user's experiences, both why they had good experiences and bad. The usage of error analysis would allow us to understand what features websites had in common or not that drove users to leave the webpage. Additionally, this would help us quantify a user's experience, rather than simply "I found A and B websites confusing" we could narrow it down to select features. Our team concluded that these two methods combined would be the best approach, as this would help create relationships between data during the triangulation phase.

With the combined approach of using the competitive product survey method with error analysis we decided to create two lists for each competitor. When analyzing a competitor we would record the main features they offered or features we noticed users point out often. With this we would attempt to keep the type of features we are looking for consistent by analyzing what a user would see or want when booking a flight. The largest constraint of this method would be understanding what is considered a feature to some users, but a limitation to other users. Keeping this constraint in mind we decided to keep in mind users of different technical, cognitive, and physical capabilities. In addition to this, we decided to consider what users expressed during the drawing and rapid ethnography research methods. Using this we could understand what a user would generally consider a feature that would bring them back to a website. We also determined that it would be beneficial to track the best metric we could find for the application, such as number of customers, site visits, or app ratings. This allows us to have a general understanding of which combination of features bring the most users to their service.

We decided to track error analysis by keeping a column of areas we thought the application could be improved or would be difficult for some users. This would be done by following steps that a user would take while attempting to book a flight. In addition to this, if we see any users follow patterns we did not predict in the rapid ethnography, we would adapt those to our error analysis. We also wanted to try to narrow down problem features by finding the relationships with other research methods, such as when users would make mistakes on an application often. Overall the use of error analysis would help us triangulate data with the other research methods, thus understanding what causes users to avoid or dislike using applications.

We decided to analyze multiple different types of plane booking services/applications to cover as many possible services users could use. The categories of each include: major airlines, discount searchers / comparators, trip planners, discount airliners travel agent, mobile applications. Choosing these sets of services would help us triangulate data more accurately. For example, if a user decides to use mobile we can still create relationships between their experience and the application data.

3.2.1 Results

We generally found that many services followed similar patterns or used the same tools to build their applications. The similar features help us triangulate data because of the limitation of our user sample size not every application will be used. Since many applications have identical features or limitations we can more easily analyze relationships with specific features and limitations. For example, multiple users had difficulties using the calendars to select their departure and return dates, but these users were on different websites that had an identical date selection feature.

The general limitations and features we found among services were:

- Features
  - Multi-city flight options
  - Multiple ways to contact support or provide feedback
  - Ability to book cars, hotels, airbnb, vacation packages
  - Easily compare prices between flights & days
  - Popular/cheapest/fastest flights shown at top
  - Special assistance options
  - Simple/understandable/predictable forms
  - Can view best deals from x city to all cities it connects to
  - Calendar for depart and return shows prices for those days
  - Track prices, price graphs
  - Share flight button
  - Shows details of flights (leg room, wifi, usb, etc)
  - "Guide"/new app tutorial (the highlight to guide you on new apps)
  - Use map to select destination, rather than typing in name
  - Many precise filter options (Exact time filter, low CO2 emission, trip duration, price limit)
  - Easily allows people to book flights without handling technology, confusing forms, etc
  - Tabs are organized into useful categories
  - Go to next available date / suggest new date if no flight that day
- Limitations
  - Difficult to switch between different classes after searching flight
  - Does not show you next available dates for trip if there is not one on specified dates
  - Busy, confusing, and slow

- Hidden menu to search for flights, not on launch page
- No baggage, seat, or plane tracking
- Limitation in airports supported for searching
- Operating system version limitations (iOS 10, for instance)
- No comparing flights
- Automatically selects returning flight for each departure flight, making it difficult to customize
- Only supporting major airlines for comparison
- No back buttons to go back in ticket booking/searching process
- Limited support for dietary restrictions
- "Need Assistance" message on top of screen only has a phone number, no IM chat or feedback form is in very small text
- Can't select baggage/extras/food/insurance details
- Confusing calendar forms (auto changes from departing to returning)
- Some form options are easy to miss (small text above large form inputs)
- Redirects you to airline, slightly confusing
- Too many clicks to do simple things like filters
- Does not show currency or flight details

Overall the largest features were ones that either removed complications such as using tabs for views, suggesting alternative dates if no flights found, or showing the cheapest/popular/fastest flights at the top. The other large features were ones that assisted people that may have troubles with using the application, such as using a map to select airports and having multiple ways to contact support.

The largest limitations were often ones that would cause confusion, clutter, or remove the ability to do what the user would want to do. For example, hidden menus for searching, no comparing flights, no back buttons, and having confusing forms or workflow. The most common limitations were making it difficult to select departure and return flights separately, confusing forms (specifically calendars), and a lack of options for contacting support. These simple problems can be enough to cause a user to become annoyed with an application or search for a new application entirely. Limitations such as making it difficult to choose specific departure and return flights can become a larger problem for users with cognitive impairments, as they could not realize they can customize it at all. Similarly, not having multiple contact methods, such as only providing a phone number, can be difficult for customers that may require instant messaging or email.

The list of features and limitations provides a general view into what users may prefer or have difficulties with. This can be used along with real user experiences and drawings to narrow down which specific features and limitations were most important to the users.

3.3 Rapid Ethnography

Our first research technique used a combination of rapid ethnography, narration and fly on the wall methodologies. We chose to use these methods in combination to provide us a clear and concise understanding of the processes, decisions and justifications that users have when interacting with an airline flight booking system.

We chose rapid ethnography because our team believed it would provide the best evidence to both support and contradict many of our existing assumptions of user behaviours. Our team believed that both of these outcomes would be useful for correcting any ideas we had for future application design. Rapid ethnography would help to give our team information on the environmental context for where and when a user would use a flight booking system. This would allow us to glimpse external factors that may affect application design and user choices. Rapid ethnography would give us insight into the relationship between different demographics of users and choices in flight booking systems. This allowed us to see how a particular user's experiences and culture may have affected their choices in where and which application they selected to solve a flight reservation problem.

While designing our rapid ethnography tests, our team did stumble upon a few limitations of the method that would affect the overall effectiveness of our research. Traditional rapid ethnography would require that we spend as much time as available with our participants to monitor and record their behaviours in their real life environment, an unrealistic task given the limited number of team members, the short length of the research period and targeted large number of required participants. Rapid ethnography would also require our testers to observe users in their natural environment, and this may have been invasive for some of our participants. To offset some of the time and access limitations we faced with rapid ethnography, we decided that a combination of methods would be best to maximize our efficiency and effort. Our team determined that the additional use of narration and fly wall on the wall methodologies would be necessary to get the most useful and accurate data from users in our rapid ethnography group.

By using the fly on the wall research methodology with rapid ethnography, our testers could increase the contextual information that they could gather, and also gather specific user process information. This combination of observation on both environment and the user's processes in real time would improve the amount and quality of information gathered per session, and counter the effects of the limited testing time for rapid ethnography. By choosing to utilize another observation method, we were able to simply expand the testers scope - what to record and monitor - without changing the design of the test from the user's perspective. This allowed us to gather more information from each participant and maximize our return from each user. The fly on the wall method allows users to demonstrate the actual ways that they used a flight booking system without any tester influence, and this data was assumed to be more accurate after being set up in the user's chosen "environment" and in their ethnographic

context.

The second method we combined with rapid ethnography was narration. Narration was an excellent supplemental method for rapid ethnography and fly on the wall. By having the participant describe and talk through the process as they walked through it, we again increased our understanding of their choices, motivations and reasoning. Narration gave us access to the the thought processes and motivations behind a users actions and choices in flight booking tasks. When combined with the observation of what the user actually did (fly on the wall) and where, when, and who they were (rapid ethnography), narration completed a circle that encapsulated the flight booking experience. In a single test scenario, our testing observers could now:

- see any discrepancies between what a user described wanting to try to do and what they did.
- hear why they made any particular choice or action
- observe what their experience and understanding of the flight booking process was.
- detect how the users chosen environment affected their execution of the task
- record how the context of the task for each user influenced their process of completing the task

With these three methods in mind, our team developed a standard set of guidelines and framework for enacting the test. Our team would provide each participant with the same simple flight booking scenario and ask them to solve the problem with whatever chosen process they wished. The scenario was designed specifically to have a user perform several flight booking tasks, but also to allow each user to add their own assumptions and needs into the process. The actual description provide was as follows:

"You need to book a vacation flight for you and one family member of your choice to fly from Calgary, Alberta to Toronto, Ontario. You can leave and return at any time and on any date between May 1, 2020 and May 10th, 2020. You can stay in Toronto for as little or as long as your flights will allow. You can only afford to spend $800 ($1500 in Scenario 2) CDN for both flights.

Describe aloud and act out the process / steps you would take to purchase these flights and to ensure they meet your travel needs:"

The process for testing each participant was governed by a few guidelines to keep the process uninfluenced and as natural as possible.

1. Users should be allowed to choose their environment to solve the task as often as possible, to the best that realistic limits would allow. This meant allowing users to choose where, how, and when they would work through the task of booking the flights whenever possible, and when not possible, getting them to describe what their normal or preferred environment for

booking a flight would be. This data would include, for example, statements such as "Normally, I would sit on my couch on my laptop at home" or "I like to use my phone while in bed" etc. For any users and testers that were able to do so, our testers would use video calling or other methods to observe the users do the task in their chosen environment.

2. Users were asked open ended questions when setting up the test observation itself. Rather than saying "what website do you use to search for flights?", testers would ask "how would you begin to solve this scenario?". This would allow users to choose a method or system without attempting to choose the "right" answer for the tester or on a system that a tester had suggested. In this way some users would answer "I would use google flights on chrome on my laptop" or 'First thing i do is check the Hopper app on my phone". This would allow the tester to setup for recording / observation after the users choice and without influencing the user's process.

3. Users were encouraged to talk through the problem and speak aloud about the reasoning behind their decisions and actions. Testers generally did not engage or converse with the users after the testing began. It was discovered in the testing process however, that users would often begin narrating and then stop as the process went on, and so it was determined that engaging questions to restart the narration would be helpful. These questions were generally aimed to be open ended and to avoid any influence on the answers. For example, after a user had stopped narrating for a length of time, a tester may ask "I noticed you chose an afternoon flight, was there any particular reason for that?" or a similar engaging question to restart the narration process. The lack of narration was noted more often when the booking process became cognitively demanding, and thus was especially important to restart to gain insight in what the user was rationalizing / thinking.

4. The scenario was left open to interpretation and when asked for more explicit or detailed instructions, tester would try and steer users back to their own context and choices. For example, the scenario describes traveling with one family member but does not specify an age or type of family member. The scenario also has no information on who's money or what is necessary for the trip. This was done so that when faced with these questions, the user could create the context from their own life and experiences. In response to questions for details, a tester would redirect the user back to their context. The question, "Does that mean I need to book for two adults?" could be redirected to "Which family member would you bring?". In cases where the user was not thinking of a family member, the tester would simply say "Book for whomever you are thinking of bringing". The aim of this was to expand the booking needs to naturally contain any special travel needs, ie for a senior or a child etc.

5. Due to the limitations on privacy and for processing payments, no users were expected to sign into any loyalty programs or use their real information when registering for a flight. No payment processing or payment information was observed. Thus the observation would only continue until the entering of payment information and end at that point. Any time a user had to login to a site they would continue as a guest account, even if they would normally use their personal account, and were asked to use false personal information in that guest login. Testers would note any time a loyalty card or member information would have been used normally by the user as a part of that user's natural flight booking process.

6. When multiple users were available at one time and place for testing, users will be tested separately and secluded from other users to limit influence on each test session.

With these guidelines and scenario in place, our goals for the combined rapid ethnography / fly on the wall / narration methods are to discover the user's:

- chosen place, time, tools and systems to be used to book a flight
- their motivations and reasoning
- the expectations and preconceived biases
- the steps in a user's process and the order they are used in to solve the scenario and its subtasks
- their perceived needs and wants from a flight booking system
- the features, functions and layouts that are most used and most avoided

3.3.1 Results

The results from the rapid ethnography / fly on the wall / narration research provided numerous insights into the use of a flight booking system, the qualities that made a system interface appealing, and the nature of the tasks users do in that system.

The first key result from rapid ethnography / fly on the wall / narration (henceforth method one) was the choice of device to book flights on. The majority of users tested prefered to use a desktop or laptop device with a full featured web browser to search for flights. The next most popular device used was a smart phone application, and only a handful of users chose to outsource the task to another user. When searching for flights through a website, the users generally fell into two categories: those users who searched on a single airline website for a flight, or users who searched and compared multiple available flights. This choice was usually affected by the users previous experience with their choice of system and their trust in the system to provide a positive experience. The task of booking flights was generally considered a stressful or challenging task when described by users, and so users attempted to select an

environment that was most comfortable and trustworthy to work in. Some users entered an incognito mode to avoid price increases or search monitoring, and often users double checked their first search results against a second alternative search to ensure they were receiving the best price. This need for confidence and comfort was also supported by some users noting that they preferred certain websites for their layouts or visual simplicity - including minimal visual information at one time, color coding details, dividing the booking process tasks into separate web pages, and displaying summary information readily.

Second key finding from method one was the understanding of the common errors that occurred during the flight booking process. Generally, errors in the process were found in the number of passengers registered for the flight, the dates chosen for flights or in misunderstanding options that the airline provided for the flight. Often the user completed the entire process and failed to notice the error, theoretically making the payment and failing to meet the criteria of the scenario. When prompted to correct the error, the user often lacked the understanding of where and how to correct the mistake. This would often result in the user completely restarting the process.

The third finding from method one was the differences in strategies for solving the scenario for older and younger users. Older users tended to immediately use trusted airline websites, almost exclusively used a desktop, were less concerned with price and more focused on ensuring the task was completed properly. Younger users, in contrast, were driven primarily by price of the flight, and even when offered a greater budget for the flights still chose the cheapest option. Younger users often chose to use a laptop or desktop, but showed more interest in using a mobile application to solve the problem. They also were more inclined to search multiple sources to find a flight that satisfied their flight needs.

3.4 IDEO Summary

3.4.1 Finding 1

Our research shows that pricing is a driving factor in all aspects of the air travel booking process. Users in IDEO method 1 generally gravitated to the best price, even when provided with additional funds to book their flights with. They also were highly aware of cost for purchasing additional features or options in a flight. This cost often discouraged utilization of those options, even when they were desired. As an example, users would often risk not getting a preferred seat by choosing not to pay for a seat, and hope to select or be placed in a desired seat just prior to booking for free. All users considered the value versus cost to them whenever customization options were presented to them, skipping insurance and other purchases during the booking process. Separating these customization tasks from within the booking task may be beneficial in our design.

Pricing also appears as a major visual element of all competitor applications, and is often positioned to appear as time sensitive and/or exclusive to the provider. Price is presented in multiple formats for user understanding, in

formats like graphs, diagrams, or charts.

When drawing their flight booking experience, users generally drew or implied cost or price, often in the context of an emotion. Dollar signs, price and price comparisons on screen, with crying or negative emotions were often drawn together.

We believe that pricing not only is one of the key drivers for selecting a flight and competing for users support but also one of the key causes of a users need for trust in the system and environment they select and any emotional memories of the experience.

3.4.2 Finding 2

To ensure user usage and trust in our application, our tasks must be presented in a way to balance between both visual simplicity and unobtrusiveness, with robustness and coverage equal to our applications competitors. Scenario test users were often frustrated when presented add-ons or options when they were in the flight booking task. The majority of our users tested chose to not to utilize any of these options, or to delay any optional purchases until after their flight was purchased. Separating these optional tasks into another individual feature silo would allow our application to focus on visual clarity and increase user confidence. Allowing users to make alterations and additions after they book a flight would also give them more time to consider the advantages and personal value of utilizing options like seat selections, baggage needs and meal selections to improve their experience. For users that are not interested in options at all, they can be avoided completely, meeting their simplified needs.

3.4.3 Finding 3

Our results from rapid ethnography showed that many users would stop using an application from a frustrating component or refuse to use an application because of past experiences. These frustrations were caused by a variety of components, such as the calendar to select departure and arrival dates working unexpectedly, or form options being small and far apart from other form elements. Simple problems like these that disrupted the user's flow would often cause them to be frustrated, and possibly find a new website. This would often cause the users to start rushing through the booking process, ignoring other features. However, a user would start using more features and advocate for the application if they easily understood the workflow of the application.

The importance of the application's user interface and workflow is also shown through the user's drawings. Users who often had problems with booking applications drew a booking website or booking in general, with sad faces or a variety of negative drawings beside it. On the other hand though, some users would draw booking sites in detail or with positive drawings around it. This shows that the user interface is a significant component of how a user remembers the experience of the booking application. These align with the information

found in the scenarios where users have expressed previous positive or negative experiences with certain applications.

User experiences gathered through the scenarios and drawings can both be found in the competitive product analysis. The general experiences, such as multiple users liking Google Flights and Hopper shows what the users prefer about those applications. For example, Hopper has a very minimal design with a very user friendly workflow, even watching flight pricings for users. Users also drew simple workflows that could be seen in websites, such as a simple four step process they take, while other users drew how the site was garbage or cluttered. These were also found in the competitive product analysis where simple websites that had few steps and predictable were popular, such as Google Flights.

4 Tasks Performed on Application

Booking: Ethel wants to book a flight for her and her husband for a two week trip to Cuba this summer.

- She selects her desired flights and continues the checkout process and pays with paypal.

Cancellations: Brett needs to cancel a previously booked flight.

- Brett requests to cancel his flight and confirms he understands he will not receive a refund for his cancellation.

Check-in: Ari has a flight that is departing within the next 24 hours and wants to check-in.

- Ari wants to verify her information, choose her seat, and print her boarding pass to her Apple Wallet.

Notifications: Fred receives a notification that his flight will be delayed by 5 hours due to unforeseen mechanical delays.

- Fred wants to contact customer support to see if there are any accomodations FT Airline can offer to rectify the inconvenience.

User Errors: Cory confirmed his booking and then realized he made an error on the dates.

- Cory wants to change his booking by pushing the dates of his flight back by one week.

User Errors: Harry got to the airport and has been told he does not have a booking for today.

- Harry wants to check his trip status.
- Harry realizes his payment was declined because his credit card expired.

- Harry immediately updates his payment information and searches for a new flight.

System Errors: Airline employee Derek cannot find Georges flight booking. George has provided his flight confirmation. The plane is about to start boarding.

- Derek wants to search Georges booking in the flight booking database so he can determine if the system made an error by overbooking the flight.
- Next Derek wants to find a new flight for George as soon as possible to get him on his way again.

System Errors: Kayla booked a flight that said it cost $299. When Kayla got her receipt it showed she was actually charged $499. Airline employee Lee realized the booking system has made an error.

- Lee wants to investigate the error and find out the actual booking price to rectify the situation.
- Lee will need to authorize a refund to Kayla.

Missing Passenger: Airline employee Ina has noticed that Joe has checked in but has not gotten on the flight and it is the last call for boarding.

- Ina wants to check what time Joe checked in and if his luggage was put on the plane or not.
- Joe's luggage was put on the plane. After the finals call Joe has not shown up to board yet.
- Ina needs to inform the airlines baggage crew whose bag needs to be found and brought off the plane before it can take off.

Missing Passenger: Nick has gotten lost in the airport. He knows his flight will be leaving soon.

- Nick wants to see a map of the airport and terminals and have it direct him to the proper terminal.