Phase 4

Final Report

Team MakeItRain

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Abstract

Online banking has many different implementations, that may make it difficult for users to achieve their banking needs if they have accounts across different institutions. OneBank is a solution towards online banking that wants to aggregate the information from different banks into one web bank system. Users no longer have to access different pages and learn different systems in order to accomplish their user tasks.

The research proposes a banking solution to the users that simplifies online banking without the need of switching banks or accounts and allows the user to perform a variety of tasks on the OneBank webpage. User requirements were gathered using surveys and structured interviews, and through prototyping tools we developed high-fidelity mock-up of the system that allowed us to gather user feedback. By implementing a usability study group in a controlled setting we were able to receive user feedback about the system in the moment that we will use to improve the OneBank web application. OneBank's feedback was primarily positive and although there are many legal limitations with the implementation of OneBank, it has the possibility of simplifying online banking for a whole variety of users.

Introduction

Online Banking is a revolutionary system that has changed the way people manage their finances. Unfortunately, the current implementations that exist are a direct translation from traditional banking solutions, while not taking full advantage of available technology. As a result, overall usability and user experience of online banking have suffered. Banking institutions have also been working independently on their services which has aggravated the problem. OneBank, a platform to allow banking institutions to integrate with others, looks to solve the problem of online banking experience.

OneBank's aim is to unite the online banking experience by linking multiple banking accounts and aggregating relevant information for the users. Users who have banking

accounts across multiple banks would greatly benefit from OneBank. Users will no longer need to access multiple websites or applications to have a grasp of their financial standing. OneBank is designed from the ground up while considering usability and user experience at every corner of the product to provide a pleasant and intuitive online banking experience.

Literature Review

5.1 Inconsistency and Unusability of Current Banking Websites

A group of chinese researchers conducted a study to analyse the usability of online bank interfaces by tracking eye movements (Yuan, X., Guo, M., Ren, F., & Peng, F, 2014). Three banking website's homepage and personal banking login interface were chosen for the experiment. The websites had noticeable differences in their user interface. College students aged between 20 and 35 were chosen at random. The experiment was divided into 4 stages: Explaining the tasks, calibration of eyes, performing the tasks, and inquiry about the impression. While the tasks were being performed, the eye trajectories, heatmap and clusters were tracked using the software. Analyses of the eye movements, blinks, and gazes was performed after the experiment and the overall results were fascinating. One of the login pages had the credential form and navigation fixated towards the top-left section of the screen which allowed the user to locate them quicker than the other login pages. Gaze and blink analysis of the different pages also suggested that showing too much information increased the time to complete the tasks as it distracted the user. Through inquiry, they found that the users preferred the website with clear navigation, moderate amount of information and warm style settings. The conclusion was that the key information of a banking website should be placed around the top-left region with appropriate proportion, reasonable font size and comfortable styles otherwise the user may get distracted and take more time to perform the intended task.

5.2 The Rise of Paperless Banking

Doug Bruce, the Director of Research for the Canadian Federation of Independent business, analyzed the results of a survey which reflected the views of small business owners in Canada on banking issues. At quick glance, Bruce (2007) gene\\\\\\\\\ralizes that "the banking sector is not making significant strides towards better serving the small business sector" (p. 1). Though the product is initially designed for personal financing, it may be seen in the nearby future to aid small business owners as well. What was interesting about this article was that there were nine performance indicators used to rate by small business owners. It was based on a four point scale which included their feedback on online banking and rated their access to full-service branches of their personal banks. There appears to be a need for this product, as the latest findings indicated that apart from two banks, most major banks had dwindled when compared to previous years. A major need of small business owners is asking for loans. Some may argue that this process must require an account manager, however it has actually become, according to Doug (2007), a "widespread automated credit scoring among the banks to assess

business owner's credit applications" (p. 9). This indicates that local bank branches are not the ones deciding, simply passing along information that user could submit instead. This seems inconvenient, as users should have the opportunity to submit paperwork online, allowing them to bypass appointments required for simple paperwork.

5.3 Sluggish Canadian Payment Solution

Shaikh and Karjaluoto (2015) conducted a literature review on various research articles which focused their research on mobile banking. According to them, the use of mobile phones to conduct banking transactions and access other financial information in mature markets has not widely been adopted. Factors like ease of use, usefulness, trust and social influence affect whether people will use a banking application. Ease of use and the usefulness of the banking applications were significant factors affecting the attitude of users towards using the apps. Their research concurs with Pellegrini 's (2015) article in the Financial Post which states that Canadians have not been clamoring to use their smartphones to make payments and that in fact, the number of Canadians making payments with their cellphones have been so slow that the statistics wouldn't even register. Standardization, integration, consistency and portability are important aspects in order to have a usable application. Unfortunately, for banking apps, there are no existing industry wide standards regarding UI that they must all adhere to. Bank application also lack consistency amongst each other and between the same bank's web and mobile apps. If you look at Figure 4, the navigation bar is to the left however the RBC app's navigation is at the bottom. It is important to have a UI that is consistent across industry and all the banking apps and Canadian banks lack that as of now.

Problem Statement/Research Question

Current banking solutions are inconsistent in terms of their user interface and experience. Once you sign into online banking websites, each of them have a distinct way of accessing and displaying account balances, transaction history and payment methods. Moreover, there are very limited ways of visualizing the information in order to perform quality analysis. OneBank's main goal is to allow customers to easily access, visualize and analyse their financial data from all their accounts. The following is a list of the features and improvements that OneBank will provide:

I. Dashboard:
   A. Cumulative balance of accounts (native language)
   B. Asset distribution (pie chart)
   C. Expenditure forecast (line graph)

   The simplistic dashboard with various illustrations will cumulate and summarize the finances of a user, promoting ease of access to information.

II. Autopayments setup for bills (phone, internet, utility) with customizations:
   A. Waterfall prioritization of accounts

B. Distribution across accounts

Users who spread their finances across different banks will now have the ability to conveniently choose between them to autopay each bill.

III. Transfer money to people with customizations similar to autopayments.

IV. Visualizations for transaction history:
   A. Stacked bar chart of categories by time period
   B. Heat map of transaction based on location and amount

   Providing illustrations of users finances will allow them to comprehend and analyse effectively.

V. Aggregated list of transactions history with functionality to:
   A. Display additional details of specific transaction (category, location)
   B. Sort
   C. Search
   D. Filter

   With current banking websites, you cannot do much with the transaction history other than just scroll down.

Gathering of User Requirements

To gather user feedback was a two step process for our research. The first step consisted of a general approach to gathering requirements with a survey, whereas we wanted to limit our requirements more by conducting interviews.

Surveys are scalable so we can have many responses and aggregate the data without much effort. We have gathered 44 responses to our survey, which are sufficient to allow us to have a quick and simple understanding of user requirements. However, survey questions are either binary or are some sort of a scale from 1-10, so there's no nuance when answering the questions. Longer response questions in surveys may not be answered to the full extent, due to the effort that goes into writing the responses, therefore limiting our survey questions to two types; It limits the users, unable to fully express their thoughts.

Comparatively, the interviews are not as scalable as the survey, but it allows us to gather more detailed and nuanced responses. To illustrate, in a question such as "what do you think about feature X", the user can answer with much more detail and clarity, without the same effort as responding in the survey. Furthermore an interview may also fall off its structure and allow feedback and comments that may otherwise be missed with a survey. This is one of the reasons an interview was needed in conjunction with the surveys.

By combining the complementing strengths of the survey and the interview, we are able to gather a more in-depth view into the user requirements. The surveys gave us the large magnitude of responses whereas the interview is able to give minute details about the requirements.

Prototype

The prototype for OneBank was a prototype of the web based application that OneBank will be representing. The prototype was created using a mixture of Balsamiq, and html bootstrap 3, in order to give our high fidelity prototype a web page feel with all the functionality that Balsamiq provides.

Throughout the prototype any of the fields the user needs to fill out were auto-filled, partly due to the limitations of Balsamiq which does not allow editable text fields for the implementation, but also to make it easier for the user to test out the system. The prototype has a sleek website design, with the dashboard simulating a widget based dashboard. The user was only able to access parts of the site that were part of the three tasks that they had to complete, which unfortunately did not leave much for the users to explore.

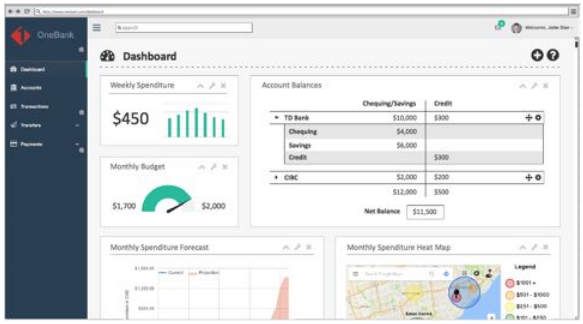

Figure 1: Dashboard

The high-fidelity prototype allowed to user to visualise OneBank and its functions in its entirety, and furthermore the benefits to web banking of the implementation.

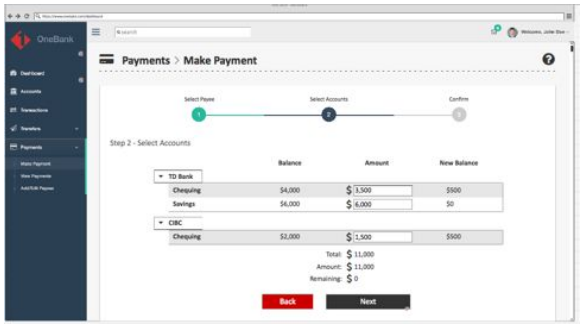

Figure 2: UofT Payment from Multiple Banks

Figure 2 is a screenshot of the user paying their tuition for UofT via multiple banks. In This case, they're using some money from TD Bank and some money from CIBC to pay it in one go.

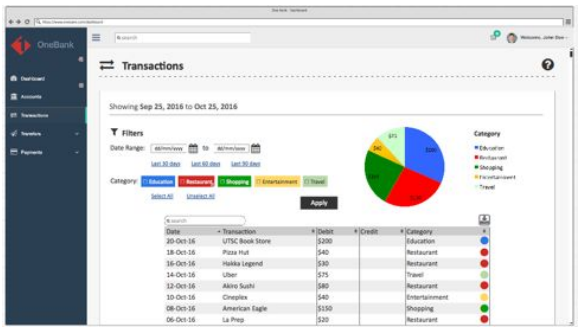

Figure 3: Transaction history for October

In Figure 3, the user is viewing their transaction history for the month of October,2016. They also have a visualization in the form of a pie chart for a quick overview of their expenditures.

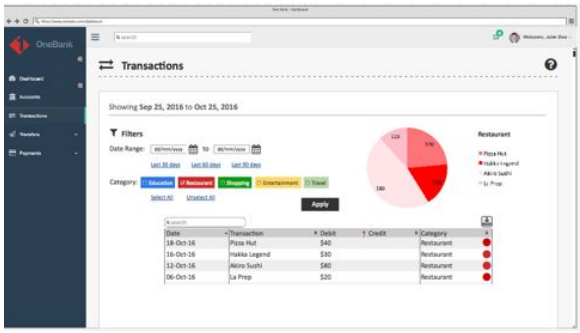

Figure 4: Transaction history sorted by category

In Figure 4, the transaction history is sorted by the “Restaurant” category so the user can only see what they have spent on restaurants in the month of October.

Usability Study

The method we chose to evaluate the OneBank application was to do it via a focus group of 5 participants. On the contrary to an interview or questionnaires, a focus group will provide qualitative feedback in the moment. We chose a focus group because it is a good medium between the questionnaire and interview. The questionnaire is not detailed enough and does not let us ask followup questions whereas the interview setting does not allow the users to talk amongst themselves and discuss the features of the application. In a focus group, we were able to ask 5 people what they think of certain features. This then let the users give us their feedback and they discussed the pros and cons of the features amongst themselves and came up with certain ideas they would not otherwise have if it was just a one on one interview setting. Sometimes, in the interview setting the interviewer may unintentionally affect the answers of the users without realizing it. A focus group is a much more relaxed setting and the users may feel they can provide more critical feedback and not offend the people conducting the focus group. A focus group is not as rigid as a questionnaire and let us collect more nuanced detail about the application. For example, a user can tell us they do not like a certain UI element of a small part of a page and give us feedback for improvement. In a questionnaire they can only answer yes or no and not provide very detailed feedback.

The usability testing was conducted in a controlled setting. We let the 5 participants use one computer and gave them 3 tasks to complete. The three tasks were to to create an account a link a bank to it, pay tuition with different banking accounts and to find out the most expensive meal they purchased in the current month. Within each task, we told users what to do within each task. For example, in creating an account and linking a bank to it, we gave the following instructions:

1. Start on the homepage. If you are not there then go to it and signup for an account.
2. Enter your basic information as required by the forms.
3. Link the TD Bank to your account.
4. Now you will be at the dashboard with your account information.

The same type of instructions were given for the other two tasks. We told the users the three tasks to do with steps on how to do them and they completed the tasks together. If something was confusing to them or did not make any sense, they gave us feedback on it immediately.

After the users completed the three tasks, we asked them their feedback on the app, what features they liked the most, what they disliked about the app and how can it improve. There were many times where the users discussed amongst themselves their thoughts on the app and they bounced feedback off of each other about the app.

Results from Data Analysis

After conducting our usability study we took the feedback of the users seriously. Our results were concluded using several factors in the group: Time it took to complete tasks and feedback from the users. Since the users were working together on the tasks, completion of tasks was fairly quick, but a lot of it depended on the interaction between the different users.

During the completion of task 1 the users were still getting familiar, but as the users continued with each of the tasks, they became more efficient at using the OneBank system. There were not many times in the other tasks where the users were stuck in the process, but they had to refer to the task descriptions a few times. The users also did a lot of clicking around the screen outside of following the given tasks. The interface must have been appealing if the user wanted to explore it further.

Much of the confusion that users had was for the concept of the project. The study group was conducted with people who were not part of the interviews when gathering user requirements. Contrary to our user requirements, many of the users that were part of the study did not see the usefulness of the application. Based on our user requirement research we had more than 50% of people that had more than one bank account, to whom the solution would be catered towards. After the explanation the users felt more comfortable with the solution, and the concept it is based on. In addition the legal limitations of our solution is another aspect that our users pointed out.

Our OneBank solution was well received by most of the users in our study, and will be a solution that can change the future of electronic banking.

Limitations

During the study, we ran into technical problems with Balsamiq. Due to these problems, instead of having one computer for one participant in the usability testing, we were forced to let all five participants use one computer. This may have changed the results of the usability testing because when the participants ran into some confusion or trouble with using the app, they were able to help each other out. For example, when one participant was trying to find a certain button, he was unable to find it and was helped by another participant. If each participant was to use the app on one computer by themselves, they might have gotten

more frustrated and may have had a different opinion of the app.

Another limitation of the study was the fact that the study was conducted in a controlled setting. Most people conduct their online banking in the privacy of their own home and usually do it by themselves. Since we were in a controlled setting, the behaviour of the participants may have been different than a natural setting.

A final limitation of the study is that no software was used to track user behaviour. So we were unable to get more specific detail like the error rate, how frustrated the users got or how much time they took to complete each feature or what specific parts of the app was the bottleneck.

Future Work

The OneBank solution is a solution that is very versatile for the future. Many people are using online banking, and the need to aggregate all that information onto one platform will become a necessity in the future.

Though because of the limitations discussed earlier, there will be difficulties implementing OneBank. Each bank has their own solution for web based banking and it may be difficult to convince them to work with OneBank. Moreover because there are many different sites that may not be completely legitimate that asks users for their personal banking information, it may also be difficult to establish OneBank's identity on the web without the help of the banks that may not want to work with us.

As a result much of OneBank's future work would be improving the system and also establishing a good base for customers to get to know the product and all its benefits. Part of improving the system would be conducting research on a larger scale with different demographic groups as well. Our research was mostly focused on a student demographic, and it would be interesting to see if the requirements, or features would be different among different demographic groups. OneBank's as a solution could solve many of the different issues that arise when having multiple banking accounts.

Appendix A: References

- Bruce, Doug. (2007). Banking matters: survey results of small business owners on banking issues. *Canadian Federation of Independent Business. (*Nov. 2007), 1-12.
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Appendix B: Sample Consent Form

CSCC10H3: Human-Computer Interaction (Fall 2016)

Usability Study – Informed Consent Form

Title: The Future of Banking
Investigators: Jai Sughand, Parag Bhandari, Yuya Iwabuchi, Gerrit Steinbach

I _____ hereby consent to participate in a usability study conducted by the Investigators (listed above) as part of a Fall 2016 project for **CSCC10, Human-Computer Interaction**, a course offered by the Department of Computer & Mathematical Sciences at the University of Toronto Scarborough.

I **agree** to participate in this study and the purpose of this study is to understand and improve usability of our OneBank application.

I **understand** that:
- The procedures to be used are a focus group usability study.
- There are no major risks incurred by participating in the study.
- I will receive no compensation for my participation.
- I am free to withdraw at any time during the study without the need to give any explanation or penalty.
- All materials and results will be kept confidential, and, in particular, that my name and any identifying or identified information will not be associated with the data.
- I can contact the course instructor, Naureen Nizam (nnizam@cs.utoronto.edu) with any questions or concerns.

PARTICIPANT

Name (please print) _____

Signature _____

Date: _____

INVESTIGATOR(s)

Name _____

Signature_____

Date: _____

Appendix C: Focus Group Notes

Questions to ask during focus group:

1. **Give us feedback**

- worried about this app being linked to the different banks, security issues

- when sorting transaction history it doesn't say from which bank you made the payment from

- want notifications (???)

- looks good overall

- look option for widgets so you don't move them accidentally

- skeptical about the multiple banks, don't see it as too useful

- to link account maybe take a picture of a check to do so

- like the logo and the colour scheme

2. Which features do you like the most?

- likes the analytics, very clear

- like heatmap and the statistics

- good visuals and know at a glance what's going on

- some filters might be useless

- fairly easy to log in and create an account

- breakdown by category useful, so you can know how you spent money per category (i.e. food, entertainment)

3. What do you dislike?

- bank shouldn't be able to remember user name and password

- shouldn't allow autofill

- wouldn't use a heat map , doesn't see how it's useful

4. How could it improve?

dedicated log in page (i.e. instead of click in the corner, can just save it as bookmark so it gives you the home screen at the bank app as opposed to clicking login , saves you an extra click)

budget warnings (if you're too close to your budget it should give you a warning)

Appendix D: Interview notes

INTERVIEW #1

Generic Questions

1. How do you feel about online banking?

- Online websites a little hard to use

2. What features do you think online banks are lacking?

- A nicer way to see transaction history

3. Do you prefer mobile or web banking? Why?

- Mobile for on the go and web when I am at home

4. What do you think of the concept of OneBank?

- An interesting idea

5. Check out these Dashboards (included in Appendix A). Which one do you prefer? Why?

- B because it reminds me of mobile apps which have their menu on the left side.

6. Check out these Visualizations (included in Appendix A).
   Rank them and provide reason for it.

- In order from most liked to least liked: pie chart, line chart, stacked bar chart and heat map.

Task-Related Questions

1. Let's assume you had multiple bank accounts, how would you find the total balance of those accounts?

- Log in each website and add the numbers up

2. Let 's say you spent $1000 last month. How would you categorize and sort your transactions?

- Categorize by where I spent it (like walmart, amazon etc) and sort by date

3. Let's say you had 3 different Bank accounts A, B, and C with a balance of $500, $300, $200 respectively. If you had a bill for $900, how would you pay that bill?

- Transfer $100 from C to A and transfer $300 from C to A and then pay the bill from A.

4. Let's say you have 2 bank accounts A and B. How would you compare the amount spent in the month X and month Y?

- Don't understand the question

5. Can you think of any other tasks that can be improved upon?

- Able to sort transaction history.

INTERVIEW #2:

Generic Questions

1. How do you feel about online banking?

- Useful

2. What features do you think online banks are lacking?

- Can't see transaction history from previous months so I manually have to add what I spent where on excel, time consuming and annoying

3. Do you prefer mobile or web banking? Why?

- Mobile banking because the app is easier to use than the website

4. What do you think of the concept of OneBank?

- Interesting idea but i'm skeptical due to security reasons

5. Check out these Dashboards (included in Appendix A). Which one do you prefer? Why?

- Dashboard B because I like the widgets. Dashboard A is confusing

6. Check out these Visualizations (included in Appendix A).
   Rank them and provide reason for it.

- D, C, B, A.
- I like D because I like the stacked bar chart
- I like C because it seems useful to see history over a long period of time and I like the projection
- B I like but it doesn't give you enough detail
- I don't like A because I find it very creepy

Task-Related Questions

1. Let's assume you had multiple bank accounts, how would you find the total balance of those accounts?

- I use an excel file to keep track of my money so I will just go on that and add the two numbers up.

2. Let 's say you spent $1000 last month. How would you categorize and sort your transactions?

- In my excel file I sort everything by date and categorize under words like: Clothes, food, school expenses, entertainment etc
-

3. Let's say you had 3 different Bank accounts A, B, and C with a balance of $500, $300, $200 respectively. If you had a bill for $900, how would you pay that bill?

- I will transfer $200 from B and C and put it in A and then pay from there.

4. Let's say you have 2 bank accounts A and B. How would you compare the amount spent in the month X and month Y?

- Sort by month X in account A and sort by month Y in account B (do both in excel) and then compare how much I spent in each month

5. Can you think of any other tasks that can be improved upon?

- Budget projections and a warning when you are near your budget limit for the day, week, month etc..

INTERVIEW #3

Generic Questions

1. How do you feel about online banking?

- It's okay

2. What features do you think online banks are lacking?

- Budget projections

3. Do you prefer mobile or web banking? Why?

- Web because I can use my computer

4. What do you think of the concept of OneBank?

- I only have 1 bank account so I'm not sure if feature

5. Check out these Dashboards (included in Appendix A). Which one do you prefer? Why?

- Dashboard B because I like the navigation menu on the left side

6. Check out these Visualizations (included in Appendix A).
Rank them and provide reason for it.

- B, C, D and A
- B is good because it gives brief description
- C is okay as it goes a little more detail
- D is good but it gives too much detail
- A is least liked because I don't really care for heatrmaps

Task-Related Questions

1. Let's assume you had multiple bank accounts, how would you find the total balance of those accounts?

- Add two totals up

2. Let 's say you spent $1000 last month. How would you categorize and sort your transactions?

- I would sort it by most to least expensive transaction

3. Let's say you had 3 different Bank accounts A, B, and C with a balance of $500, $300, $200 respectively. If you had a bill for $900, how would you pay that bill?

- Put everything in C and pay from therel

4. Let's say you have 2 bank accounts A and B. How would you compare the amount spent in the month X and month Y?

- Add in B and C and compare beteen X and Yl

5. Can you think of any other tasks that can be improved upon?

- Better user interface