IN-CAR FINANCIAL ACCESS APPLICATION

OF

ROYAL BANK OF CANADA

Project #3a: Industry Client Project

Course: CIS6930 User Experience Design

Instructor:
Dr. Lisa Anthony

Team - Group 2:
Amanpreet Kapoor
Mythili Shanmugam
Nikita Soni
Shanthini Velan

Table of Contents

1. Introduction

Royal Bank of Canada (RBC) is a global conglomerate that is interested in exploring the future of financial services and accesses in a connected world. They are trying to integrate financial services to a car's operating system or the infotainment system. RBC would like to discover user-centered use cases that can take advantage of real time systems and internet connectivity within automobiles. Our design team, in this document, will present a prototype for an in-car application that will allow users to access financial services on the go, in the most safe and efficient manner.

2. Executive Summary

The design team started the process by analyzing data obtained through user research, client's existing products research and the perfect competitors or similar products in the market. The main user needs were identified that included performing very basic financial transactions on the go such as viewing balance and pending transactions, scheduling appointments to meet bank representatives, locating an ATM or branch, getting alerts on deductions in balance, transferring money in a secured way, accessing the application in a safe manner, getting alerts on maintenance, managing their road trip finance and limiting their money to minimize expenditure. The team started working on these user needs to design an application through a rigorous and iterative design process, to ensure customer satisfaction and meet the demands of the client's customers.

3. Process

3.1 Client and Similar Products Research

RBC is a leading diversified financial services company of North America that provides banking, wealth management, insurance and capital markets services on a global basis. Its vision is "always earning the right to be our clients' first choice" through the values - service, teamwork, responsibility, diversity and integrity. The existing RBC products such as their official website, the RBC mobile banking application, RBC internet banking and mobile wallet have a very simple, formal and sophisticated interface. They use a minimal color scheme of blue, white and gold in all their products to create uniformity and most of the functions are accessible to the users once they are signed-in in a secure manner because it is a banking application.

There are no other applications as of yet to perform financial transactions while driving but some of the in-car operating systems include Android auto, Apple CarPlay and Blackberry QNX. These systems are platforms that enable applications to run on them. The team used the information harnessed by these systems in their design process such as the capability to detect an automobiles resources like oil and gas information or the car's connectivity to the internet/GPS.

3.2 User Research

The team conducted user research to collect information on the user needs and identify the target users for our client's application. We conducted four focus groups that included four, three, five and four people respectively and a pilot study consisting of one student. We also interviewed 6 people. Apart from this, an online survey was conducted which was taken by 12 people.

3.2.1 Focus Groups

The team conducted four focus groups and a pilot study comprising a total of 17 participants. The idea was to incorporate different users from an eclectic background. The facilitator asked the members to share their bad experiences, their expectations and both open ended and closed ended questions.
Some of the sample questions that were asked to the participants are shown in table 1.

Warm Up Questions	Main Questions
Do you have a bank account?	How do you perform banking functions?
Do you use mobile banking?	Do you use mobile banking? If no, why not?
Do you own/drive a car?	What banking functions do you most frequently perform?
Does your car have an infotainment system? If yes, what do you use it for?	What are the difficulties you encounter while using your banking application – internet or mobile?
What purpose do you use your car for?	When do you usually perform your banking functions?
How much time do you spend on traveling on a daily basis?	What difficulty you have in managing your finances like overspending?
What are your opinions on multiple layers of security?	Do you perform financial transactions on mobile banking in your car? If yes, which ones?

Table 1. User Research Questions

Note: The focus groups that were conducted did not had any participants who are RBC Customers but it is an application for the client who had this as a prerequisite. The participants had accounts in different banks. The focus group had two business banking users who invested money in stocks and mutual funds, and the rest fifteen people were personal banking users. While sixteen were some sought of expert users of technology, one was a naïve user. Fifteen people owned a car and twelve of them were primary drivers.

3.2.2 Interviews and Online Surveys

The team interviewed six people currently enrolled in University of Florida and asked them to fill a questionnaire, which contained general demographical information and also their experiences and

expectations. An online survey was also floated which was undertaken by 12 people. Some of the analysis of the survey is shown in Fig. 1 to Fig. 5.
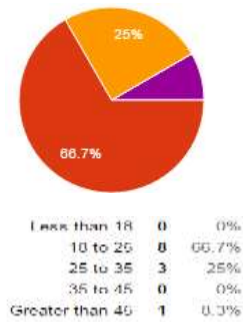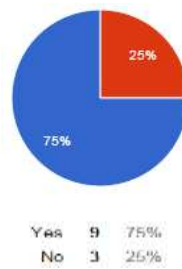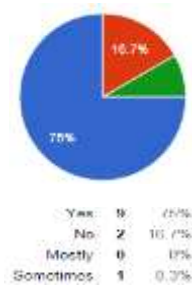

Less than 18	0	0%
18 to 25	8	66.7%
25 to 35	3	25%
35 to 45	0	0%
Greater than 45	1	0.3%

Fig 1. Age

Yes	9	75%
No	3	25%

Fig 2. Car Ownership

Yes	9	75%
No	2	16.7%
Mostly	0	0%
Sometimes	1	0.3%

Fig 3. Primary Driver

How do you perform banking functions?

Go to a bank	5	41.7%
Use mobile banking	10	83.3%
Use internet banking	11	91.7%
Telebanking	1	8.3%
Other	1	8.3%
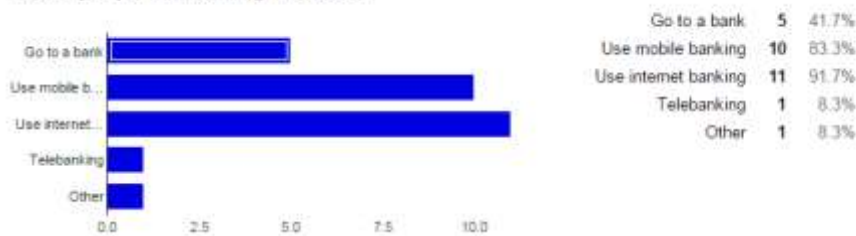
Fig 4. Performing Banking Functions

What financial transactions do you most frequently use?

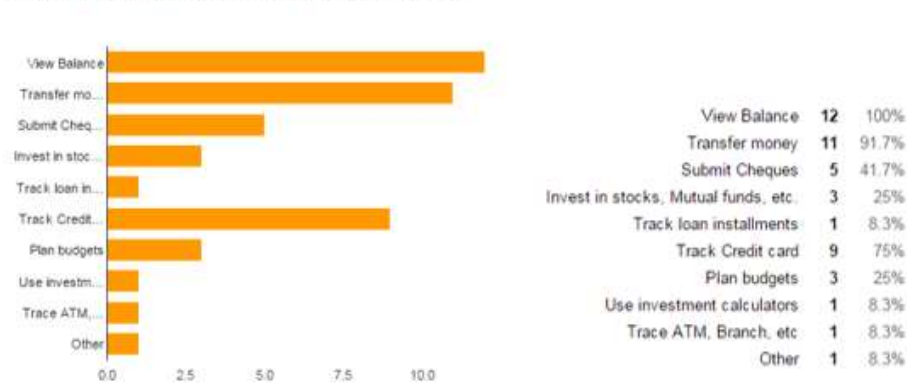| View Balance	12	100%
Transfer money	11	91.7%
Submit Cheques	5	41.7%
Invest in stocks, Mutual funds, etc.	3	25%
Track loan installments	1	8.3%
Track Credit card	9	75%
Plan budgets	3	25%
Use investment calculators	1	8.3%
Trace ATM, Branch, etc	1	8.3%
Other	1	8.3%

Fig 5. Most Used Banking Operations

3.2.3 Analysis of User Research

Based on the focus groups, survey and the interviews, the team identified the potential target users of the in-car financial access application. They include all the customers of Royal Bank of Canada constituting four categories:-

- Operator - Primary Driver or a Co Passenger
- Type of Banking Operation - Personal Banking or Business Banking
- Expertise with technology – a Novice or an Expert
- Expertise with existing RBC products such as Mobile Wallet/Mobile Banking – Familiar or Unfamiliar

The team concluded from the user research that the potential users have the following requirements:-

- Check their account balance without the hassles of complicated authentications from the system.
- To interact with the car's infotainment system in a non-distracting manner.
- To keep track of their expenses on a road trip.
- To keep track of their fuel expenses.
- To know about the real time stock prices.
- To listen to music in their cars infotainment system.
- Not to wait at a bank for representative.
- Find where the nearest ATM is located.
- To get alerted for fraudulent transactions or overdraft fees.
- When is the due date for car maintenance or car loan payments?
- To set spending limits so that they withhold extensive expenditure.
- To perform transactions securely.
- Get to know about events taking place around them.

3.3 Design Process

3.3.1   Brainstorming

The best practices for designing such applications is to create a user friendly application that is simple to understand, focusing on minimum viable product, create fluid screens, formal structure because it is a banking application and to create experiences that users' want, not what they ask for. The design cycle needs to be agile and iterative. The inputs and feedback from the focus group and interviews were compiled together and categorized together as below.

Fig 6. Affinity Diagram

3.3.2 Personas, Scenarios and Storyboards

Based on research from the focus group and interviews, personas were identified as the target audience for the In-car financial access application. The scenarios and storyboards were crafted such that each of the user persona's possible real life situations would be covered.

1. **Jake**

JAKE

"oh, how do I keep track of how much money I've spent on my road trip? I don't want to exceed my budget, but I also don't want to keep doing the math! I want to enjoy my trip!"

Background	Motivations	Frustrations	Goals
Senior year undergrad student, loves cars	Drive down and explore new places on road trips	- How much money have I spent on fuel so far? - How much money is left on my budget? Can I afford this souvenir?	Enjoy road trips without having to constantly keep track of funds

Jake is a senior year undergrad student who is passionate about cars. He is tech savvy and is up to date with the latest technology. Unlike most people his age, he loves driving the stick shift and hence has a car with manual transmission and also an infotainment system. Jake also loves to visit new places and often, during his leisure time goes on road trips, doing two things he loves the most- driving and exploring!

Often on these trips, Jake has trouble managing his finances and he hasn't yet figured out an efficient way to keep track of all his expenditures and the available funds in a single place. This hassle gets in the way of him having fun without worrying on his trips.

What makes him a unique persona?
Jake has a very specific financial service requirement in cars- managing finances when on a road trip. This goes beyond the basic features such as transfers and account statements.

Scenario: Student on a road trip   (Function in the Application- Budget Planner : Road Trip)

Jake's summer break starts in a week and he is planning a road trip to Miami. He checks his account balance and decides to allocate $300 for the road trip. In the app, he categorizes the funds and allots $150 for the road trip. He now drives to the fuel station to fill the tank and when he pays through his card, the amount is deducted from his road trip budget. On the way, bills for food and accommodation are similarly handled. At any instant, Jake only has to open his app in the car's infotainment system to view "Remaining road trip balance". Jake's problem of keeping track of funds on road trip is overcome and he can have a hassle-free vacation!

Jake is planning a 3 day trip to Miami. He allocates 300$ for the road trip on his RBC app

On the road trip Jake starts the road trip planner in his car's RBC app

He decides to have lunch at a bistro on highway

Jake gets notified about a Coldplay concert nearby and purchases tickets worth 75$

The lunch bill and concert tickets are deducted from the road trip budget

Jake has an enjoyable road trip without having to worry about managing his budget

2. **James Mishra**

James Mishra

"All I care is about money. I want to multiply money on the go."

Background	Motivations	Frustrations	Goals
A businessman, venture capitalist and investor. Frequent traveller. Knows how to drive proficiently. Has a car with an existing infotainment system. (expert user)	To increase his money and invest on the go. To perform transactions easily while driving	- can't operate a system while driving - Wasting time at the bank waiting for a representative - Synchronisation between all his devices	- Save time - to get notified on performing large financial transactions - to invest money while driving easily

Mishra is a businessman, investor and venture capitalist in Gainesville who owns an Audi A8. He has a lot of money and his only concern is to balloon his existing net worth every second. He is frugal minded and an extrovert who just thinks about his investments all the time. He travels a lot to meet the business ends and loves to drive. But sometimes he gets frustrated as he can't interact with his cellphone while driving and check the real time balances on his investments or make further investments. He wants to buy and sell stocks, mutual funds, ETFs and options on the go, access real-time account and holdings details and be updated to market information and news. He regularly visits the bank to get approvals for his business goals,

What makes him unique persona?

He is managing too many things in his mind at the same time. He wants to take advantages of his time while travelling. He is just looking to earn money, save time and is proficient with banking operations and uses his smartphone unsatisfactorily, to achieve his goals.

Scenario: Businessman going to his office   (Function in the Application- Meet Us and Stock Viewing)

It's a regular business working day in the life of Mishra. He drives to his office at 8:00 from his home which is about 20 minutes from his location. While driving he starts interacting with his Audi A8's QNX car infotainment system. He asks the assistant about the "RBC Stock price". It tells him the current trading pricing of the stock. He decides to transfer 1000$ to his stockbroker and the system reconfirms "Is it 1000$"? Then the system wants his authentication by saying a word. Meanwhile, he remembers he needs to meet a bank representative for loan. So he is looking to save his waiting time at the bank. He uses the "Meet Us" option and successfully schedules an appointment. He reaches the bank and meets the representative eventually without waiting. He is happy that his loan got approved and his time got saved too.

The above scenario lead the design team to incorporate Meet Us and Stock Viewing feature. A voice assistant gets active when driving above 10mph to ensure driver's safety.

3. Mike Anderson

Mike Anderson

"I often forget my due dates and I am fined. How to keep track of these dates? And I don't find time to go to banks and perfrom financial transactions"

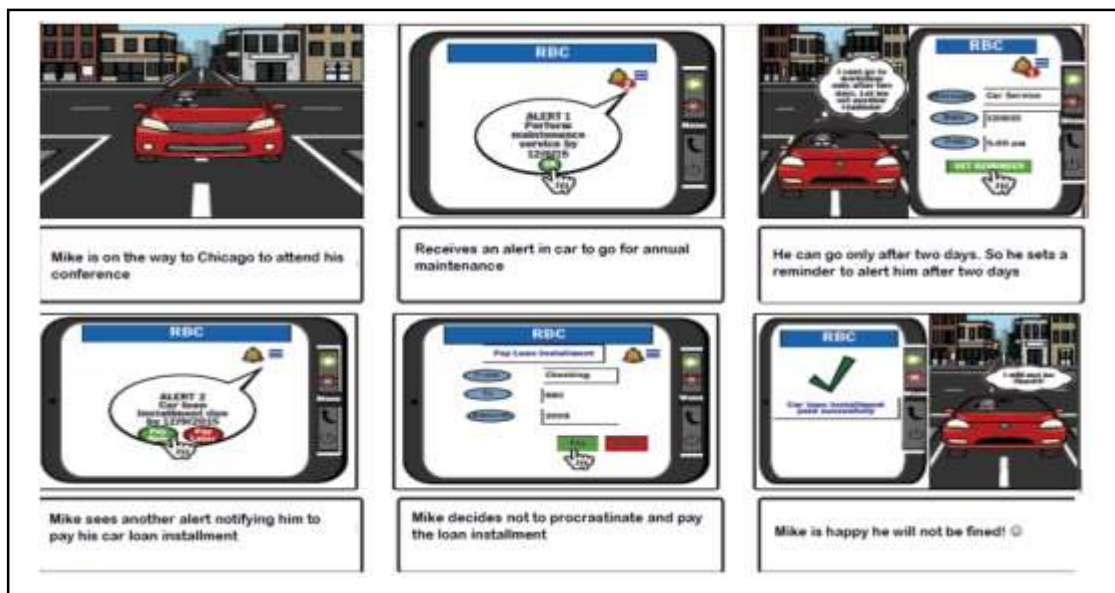| Background	Motivations	Frustrations	Goals
- 52 years old - general manager of an organization - spends lot of time in travelling to attend conferences - recently got a car loan from RBC - enjoys trekking and spending time with family	- to refrain from paying fine - to use time efficiently	- to remember the due dates - to stand in queues to pay loan installments	- to keep track of due dates - to easily pay loan installments without wasting time

Mike works as a General Manager in a private firm. He spends much of his time travelling in his car as he has to inspect branches, attend meetings and conferences at various places. But he ensures that he spends good time with his family and friends on weekends to maintain work-life balance. He recently got a car loan from RBC. Due to his hectic schedule, he is not able to keep track of when are the due dates for paying next loan installment, renewal of insurance and next car maintenance service. He gets frustrated when he has to pay fine for not recording payment before the due dates. Moreover, standing in queue to perform these financial transactions annoys him as it ruins his leisure time. He wonders how he could remember due dates and easily perform transactions without wasting much time.

What makes him unique persona? Mike is a customer who wants to refrain from being charged by paying his loan intallments well in advance. And he wants to use his time efficiently because of his hectic schedule.

Scenario: Busy Guy who can't keep track of his car activities

(Function in the Application- Know My Car and Alerts)

Mike is on the way to Chicago to attend a conference. He receives alerts from RBC app installed in his car's infotainment system. He views the first alert message which states that it's time to perform maintenance service for his car. Since he is out of station he will be able to go to the workshop only after two days. So he sets an alert message to remind him about the car maintenance service after two days. Mike is reminded that his car loan installment should be paid in next three days through the second alert message. He decides not to procrastinate and makes the payment via the app. He is happy that he has avoided the circumstance of being fined by making the payment well in advance.


Mike is on the way to Chicago to attend his conference

Receives an alert in car to go for annual maintenance

He can go only after two days. So he sets a reminder to alert him after two days

Mike sees another alert notifying him to pay his car loan installment

Mike decides not to procrastinate and pay the loan installment

Mike is happy he will not be fined! ☺

The above scenario lead the design team to incorporate Car Loan Alerts and Car Maintenance.

4. Intermediate Design Solution

4.1 Task flow

The system shown in fig.7 provides the following functions which are elaborated in the diagram itself:-
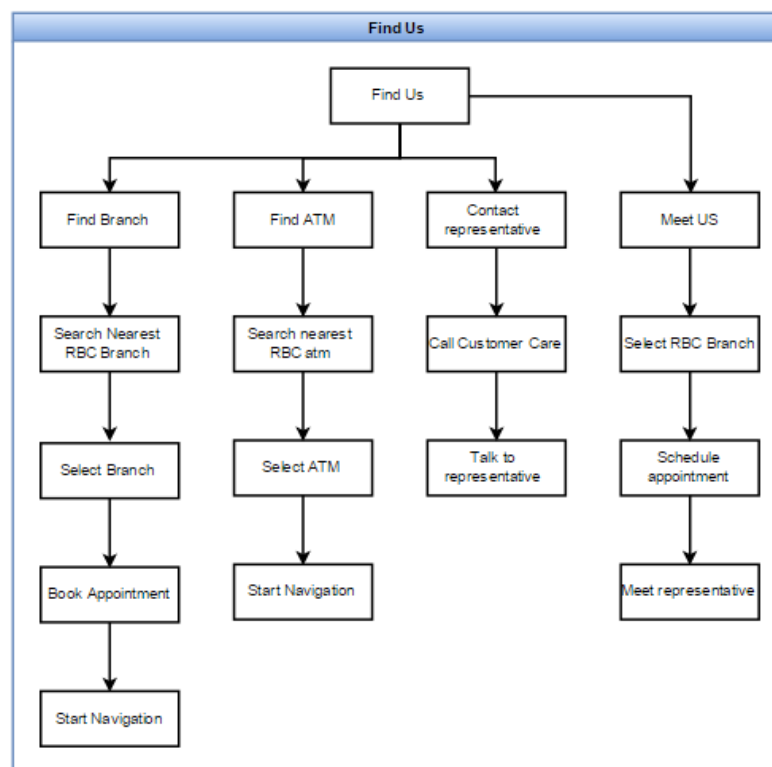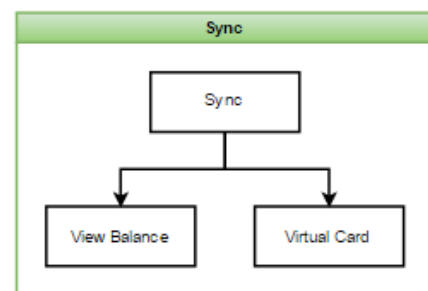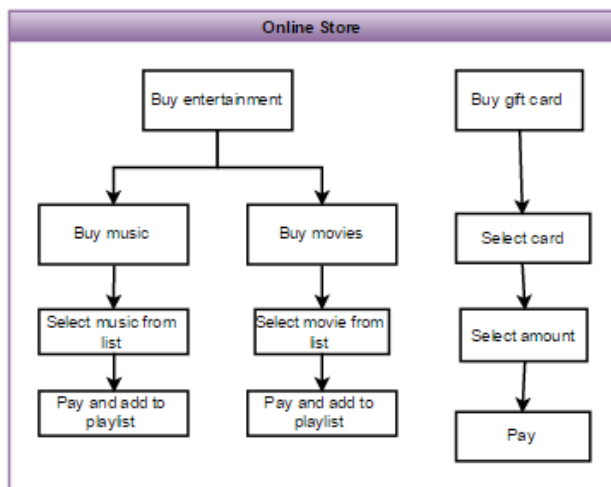
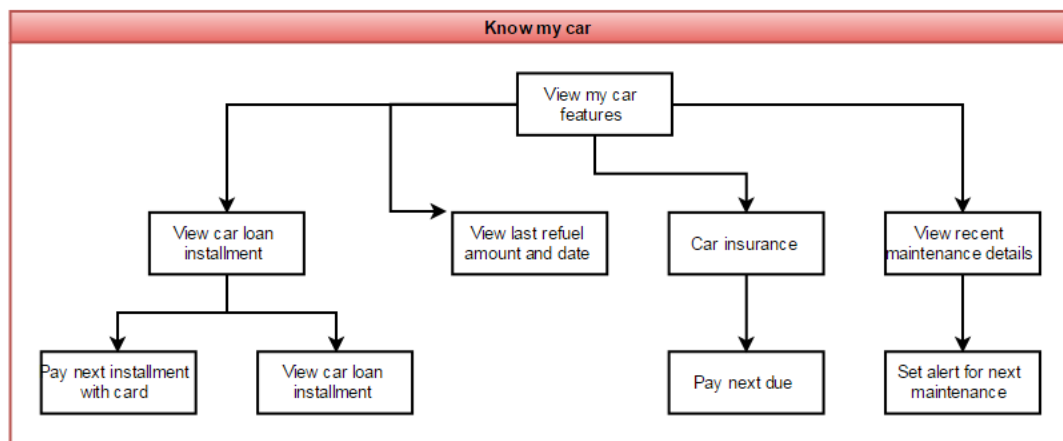- Personal Banking
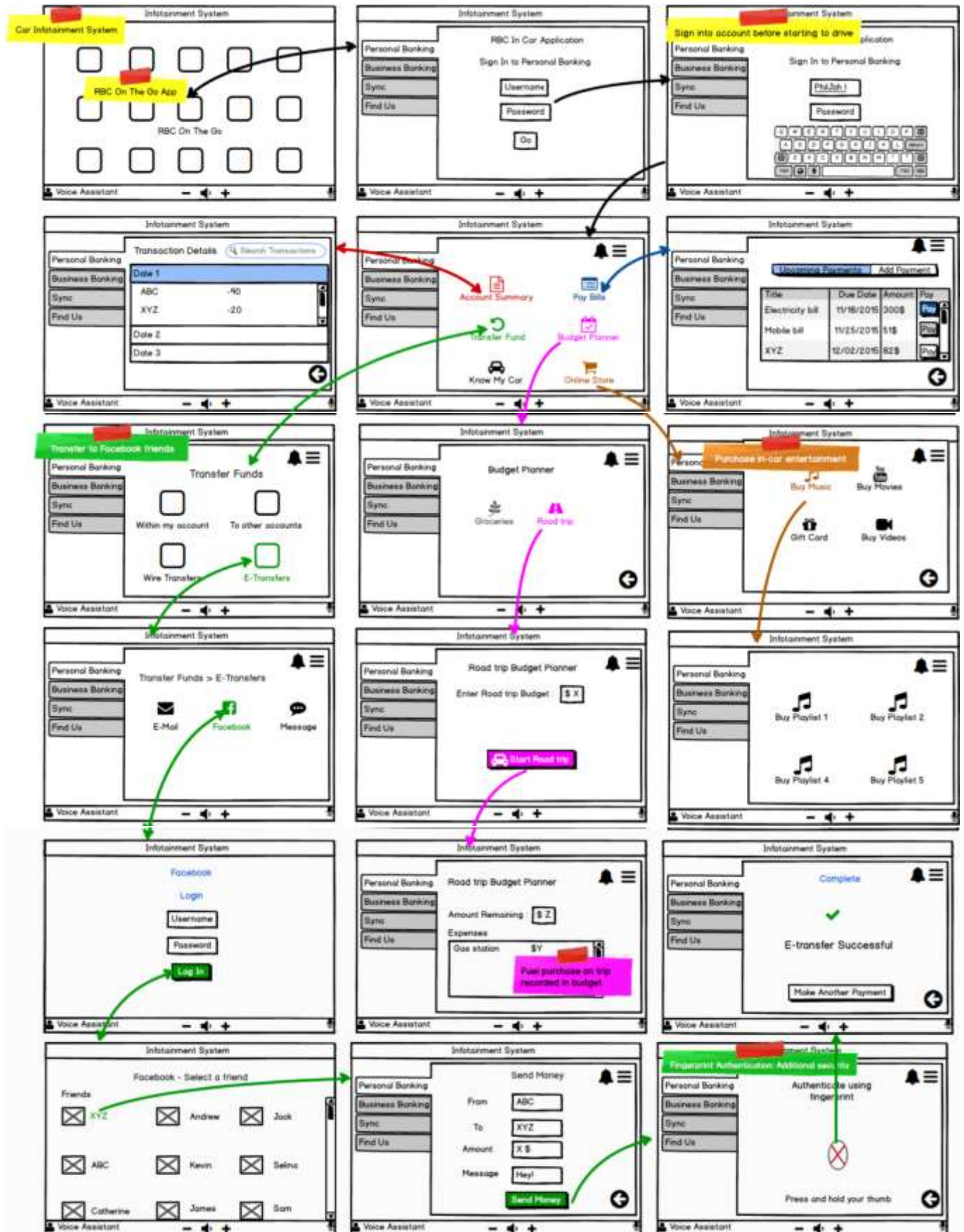- Business Banking
- Sync
- Find Us
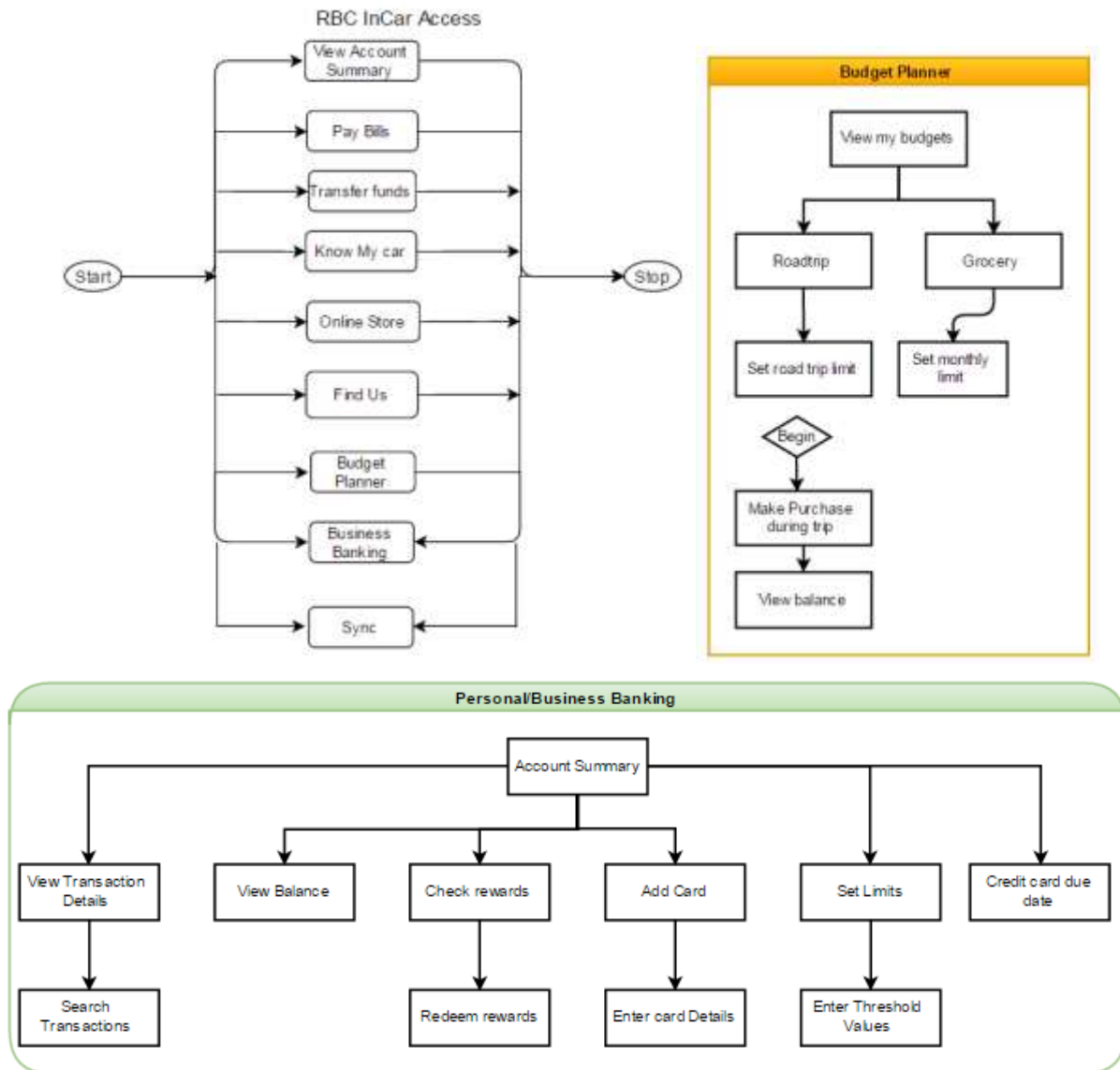
Fig 7. Task Flow for RBC In-Car Financial Access

4.2 Intermediate Solution Wireframes

The team used Balsamiq to create wireframes to show how the application will actually look like. The best features that were construed as per the user requirements include:-

- Opportunity to view stocks on the go for business users (as shown below),
- Schedule meeting with a representative (as shown below),
- Know My Car, providing alerts on car loan, car insurance and maintenance (as shown below),
- Road Trip Budget Planner to track expenses (as shown above),
- Add/Remove Widgets or Personalization to make the interface simpler (as shown below),
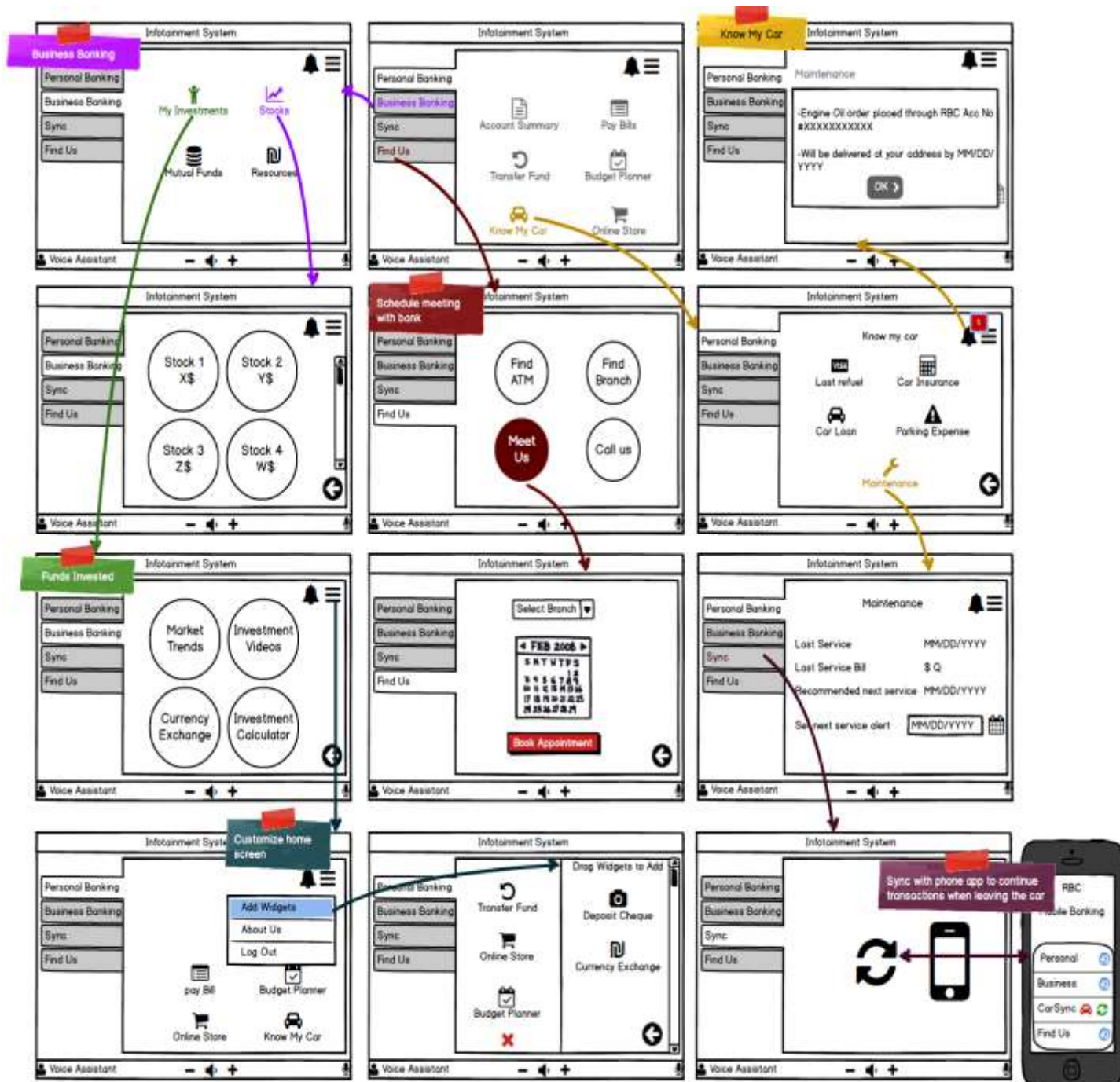
4.3 Intermediate Solution

The team conducted user research and crafted a design solution after extensive brainstorming. The key features of the solution are:

- Opportunity to view stocks and schedule meeting with a representative for business users
- Know My Car, providing alerts on car loan, car insurance and maintenance
- Road Trip Budget Planner to track expenses on a road trip

4.4 Feedback

Before refining the application and reiterating the process, a review session from the client and peers was conducted. A lot of positive comments were given to Booking Appointment, Investment Videos Know My Car and Road Trip Budget Planner feature. Some of the constructive criticism from the peers included cluttered wireframes, too many functions for a car application and the client suggested to change the security mechanism from fingerprint to something that's more advanced as well as to allow the system to talk to other RBC products or create some sort of unification or uniformity.

5. Final Design Solution

5.1 Revised Design Proposal

The design cycle was reiterated to review and analyze prior user research. Brainstorming was done to meet the tradeoffs between the client's demands and those of the users. The team refined the personas, scenarios and storyboard. The following changes were anonymously approved by the design team:

- To incorporate the client's demand, finger authentication was remove and voice authentication was added for paying bills or performing any financial transaction.
- The screens were made more uniform to include circular icons which were asked by the client and users. Application of Gestalt's Principles lead to a simple and non-distracting interface.
- Event notification under the Road Trip Planner was added as the users wanted to know more about events and purchase tickets when they travel to a new location.
- The feature to Sync the phone was enhanced and the users can now view account balance directly without logging in after syncing their phone to the cars infotainment system.
- A feature to create virtual cards with limits and adding it to the RBC Mobile Wallet was added to meet the client's demand of the applications communication with existing RBC products and the users' demand of limiting their extraneous expenditure.

5.2 Final Solution Wireframes
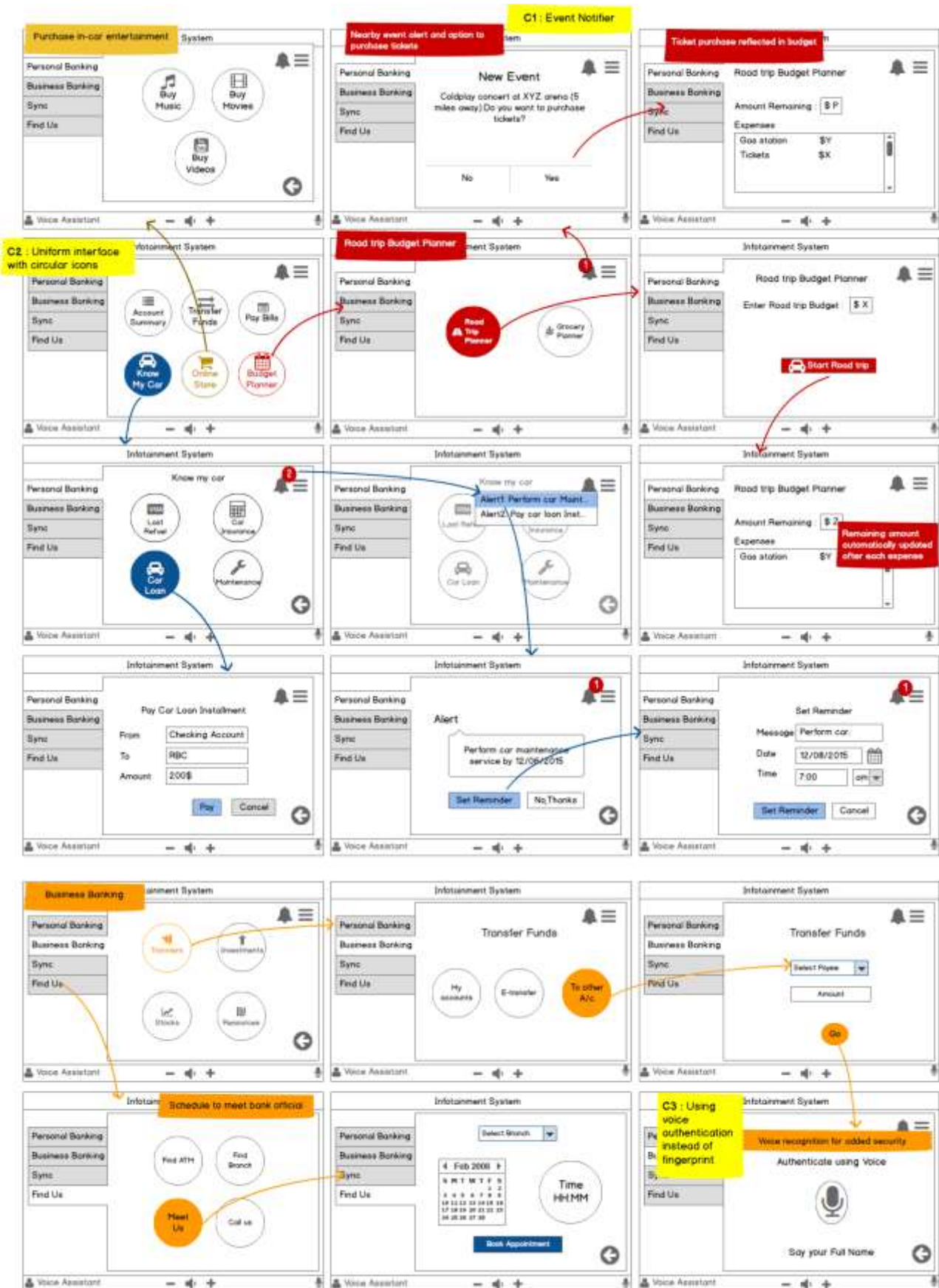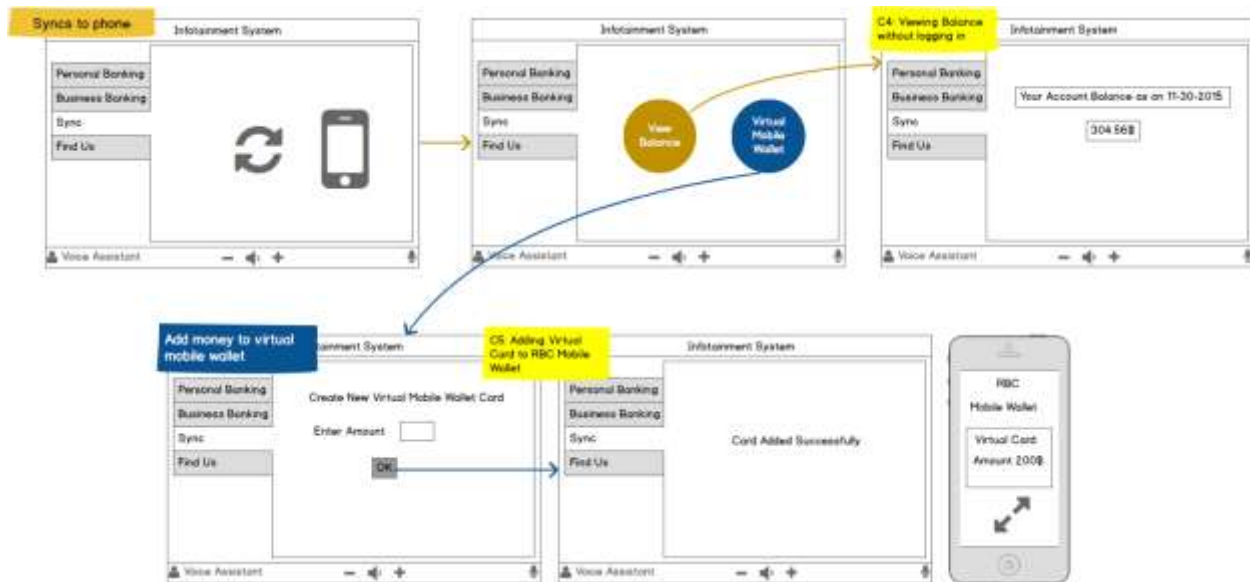
5.3 Interactive Prototype

The team created various versions of the prototype at different stages of design cycle which are shown below. These include the initial solution (Fig. 8), the refined solution (Fig. 9) to make the interface more uniform and non-distracting as per the needs of the user, creating a low fidelity prototype (Fig. 10) taking into consideration the client's existing color schemes, and existing products, creating a high fidelity pixel-perfect prototype (Fig. 11) using Axure and making it interactive using MS Powerpoint to make it look like the actual product.
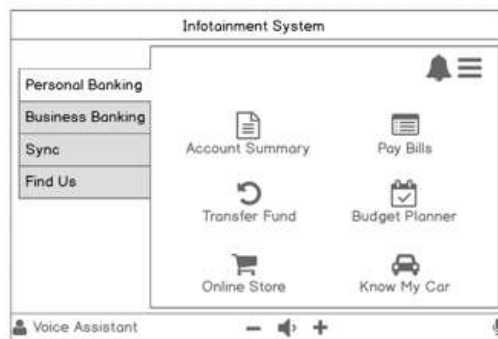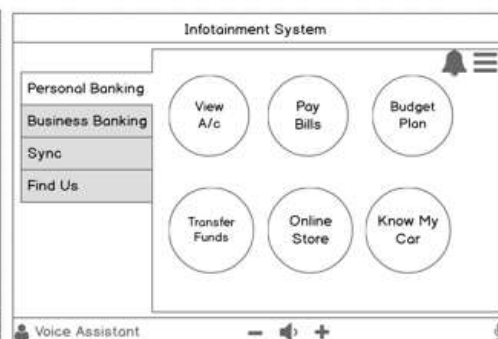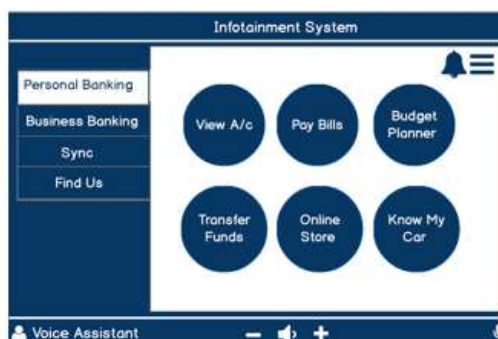

Fig. 8 Initial Solution

Fig. 9 Refined Solution

Fig. 10 Low Fidelity Prototype

Fig. 11 High Fidelity Pixel Perfect Prototype

5.4 Think-aloud of Interactive Prototype

A think-aloud test of the Interactive prototype was conducted. A UF Ph.D. student, who owns a car, was the participant and he was given a brief introduction of the application. He was given a task to pay for his car insurance. The user easily logged in to the system and saw the options but he couldn't find the icon on the home screen easily. Then he clicked on pay bills but did not found the option. So he pressed the back button and went inside Know My Car to find Car Insurance. He clicked and paid the insurance easily.

The user found the interface very user friendly but he wished for more scaffolding or aids for first time users so that they can know about the functionalities. He also wished for lesser and more frequently used functions on the home screen for which a customization (Add/Remove Widgets) had already been implemented on the lower fidelity prototype.

Fig. 12 User interacting with the Prototype in the Think Aloud Test

6. Conclusion

The design solution for the In-Car Financial Access Application for RBC was achieved using a complex iterative process to ensure the needs of the users are met without disappointing the client. The process started by getting to know the target audience and analyzing their thoughts, and needs, developing personas in order to frame the user's portrait, crafting the best scenarios, making scenarios visual by constructing the storyboards, building the task flow, creating wireframes and then refining the wireframes after repeating the same cycle. An interactive prototype was also created along with a video that demonstrates the application or promotion of the application. The application has been designed so that the RBC customers can perform financial transactions on the go, considering the safety of the user.