PRD: MBTA Charlie App

Date last updated: 04/14/2019

Vision

We want to bring a smarter way to travel with greater access for everyone!
For those who take MBTA as their daily commute are prone to missing the train a lot of times because they are reloading their Charlie Card in queue at the station, or there is a change in train schedule due to some maintenance or they don't know what platform to go to.
Our product is a new way to reload MBTA Charlie Card that permits online payments to the Charlie card. Unlike the current scenario where you reload the card or buy tickets on the vending machine in the station, we offer an Application to buy the tickets or reload the MBTA card directly without going into the station.
Furthermore, we envision our app to eventually help people with maps and directions, live status of trains and finally be an obvious choice if you take the T. Through this app we wish to make lives easy and choices on the go.

Motivation

Customer Segments

A vast customer base of MBTA is one of the main reasons why this app is needed and would be a successful venture. MBTA touches approximately 80 percent of total population of Massachusetts out of which, 13% are daily active users.
Our surveys indicate that Students and Office Workers will be the key customer segments

We conducted surveys to find out how often people take the T vs how do they buy the ticket.
Majority of people buy tickets on vending machine and would be more than happy to do it online if possible.
Early adopters would be techno-friendly students whereas mainstream users such as daily commuters to office might take some time to adopt and get to know the app. Depending on the age group they belong to and the frequency of their travel we have 4 personas:

Persona	**Age & Customer Segment**	**Mainstream vs Early Adopters**

Student	16 - 23, Daily Commuter looking for best online deals	Early Adopter
Officers	24-35, Daily commuter with a lot of responsibilities looking to save time	Early Adopter and Mainstream
Visitors	Any age, short term passes	-

Unmet Needs

Student : We believe Students experience missed train or being late when they tend to forget their charlie cards at home and miss the morning class. Students have lot to do and mostly they tend to be forgetful, having the functionality of using a digital pass will save them a lot of time and make taking the T hassle free.

Office Crowd : Since there is no digitisation as of now, the office going crowd who takes a lot of business trips using commuter rail faces a problem in reimbursement from company. This happens because it's difficult to keep all the paper receipts whose ink fade after a few hours. Having an online record of all the trips they took with the amount charged could dramatically save them big bucks.

Visitors : Travellers from various countries and states who are not familiar with the route options are troubled a lot. They have to stop, look for a map, try to understand the map and analyze which platform to go to, what line to take? to take A,B,C,D or E line. This often leaves them frustrated and anxious. Our app would provide a solution that caters to all these problems making Tourism in Mass easy and on the go.

We conducted surveys at different T stations with different people trying to find and learn the problems of someone who takes the T. We then went on to quantify our results using data from the MBTA website and data that we collected.

Existing Solutions

Current existing solutions the target customers relied on, fall into two categories; the first is official ticket service provided by MBTA, the second is traveling schedule service.

Ticket Service:

1. The vending machine at T station:

Currently, most of the customers reload and buy tickets in the station using the vending machine. Based on our interview, most of the customers have missed the approaching train due to waiting to reload their card or buying tickets in the station, they are willing to switch to a new system which can reload card or buy tickets online if it can save time and meet their needs.

2. M-Ticket App

This app supports purchasing Commuter Rail & Ferry tickets online, but only has Commuter Rail & Ferry schedules, no real-time tracking. From the customer review in the App Store, we can know that customers do really need a real-time tracking function because the reliability of MBTA service is not high, also customers would like this app to support more transit type such as bus and T.

Travel Schedule:

1. Transit App

This app provides real-time tracking of transit and helps customers to make a plan ahead. It serves 125+ cities in the US and EU. Customers can also request uber or lyft by it. But there is no ticket service for MBTA transit.

2. ProximiT App

This app has a map of nearby T stations and real-time tracking of subway and buses. But the user experience is not good and it only supports two kinds of transit, which are subway and buses.

Differentiation

We being the residents of Massachusetts have the most accurate knowledge of the Routes, options and costs associated with it. Moreover, we first verified our hunches by learning history, surveys, data from MBTA.

Furthermore, belonging to the technology field, we have the knowledge of both backend and the frontend of the product. We can tackle the issues, program the app with least cost and high profits since it's high time we digitise the MBTA ticketing system.

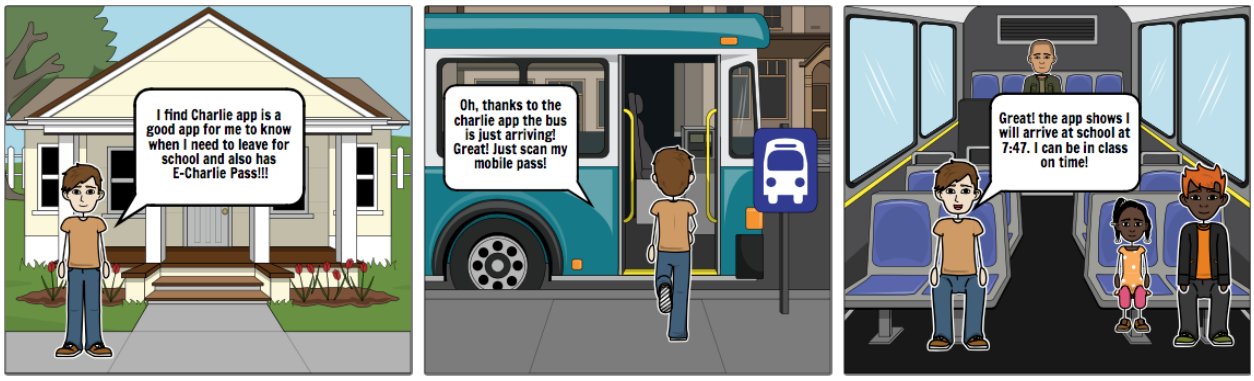
Why Now?

With growing population and existing solutions to the problem makes a very difficult commute for the passengers. With almost 450M people taking the T in 2017, we have the opportunity to speed up the boarding process of 450M people and make their lives easy. The app is an easy to use solution plus it's cheap.

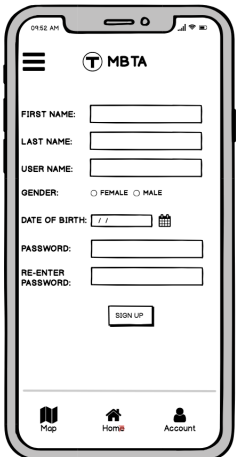
Verbal/Visual Walkthrough of Use Cases

Students:

A. John is a college student who has to go to school every day by T. He needs a monthly pass rather than purchasing tickets every time. But he has a bad memory, he often leaves his charlie card with a monthly pass home. Plus, he has morning class every day, so he should plan a time schedule ahead that when he needs to leave home and when he can get on trains and also when he can arrive at campus. Therefore, he downloads the MBTA Charlie App for a better way to manage his commute.

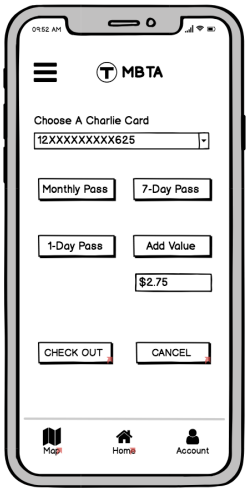


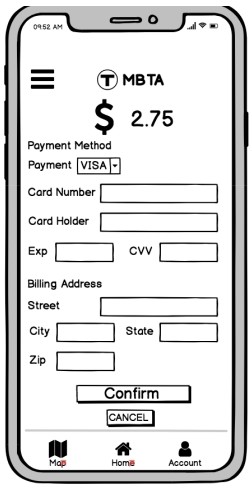
- He creates an MBTA online account.



- Gets his Charlie card online

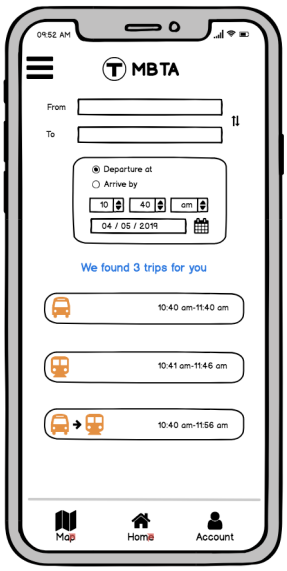
- Reloads it using the app every month.





- Clicks the Map and enter the departure place and destination

- Get the route and estimation time from his home to school every time.



- Clicks and gets his mobile pass QR-code to access the T using his smartphone, and does not worry about leaving Charlie Card home.

Officers:

B. Tod works in Boston, MA and he often goes to Providence, RI on business by commuter rails. He needs to know the rail schedule and purchase tickets ahead. After his trips, he should keep the ticket receipts to apply for reimbursement at the end of every month, but it is a trouble for him to keep all the paper receipts. So he finds the MBTA Charlie App to manage his travels.

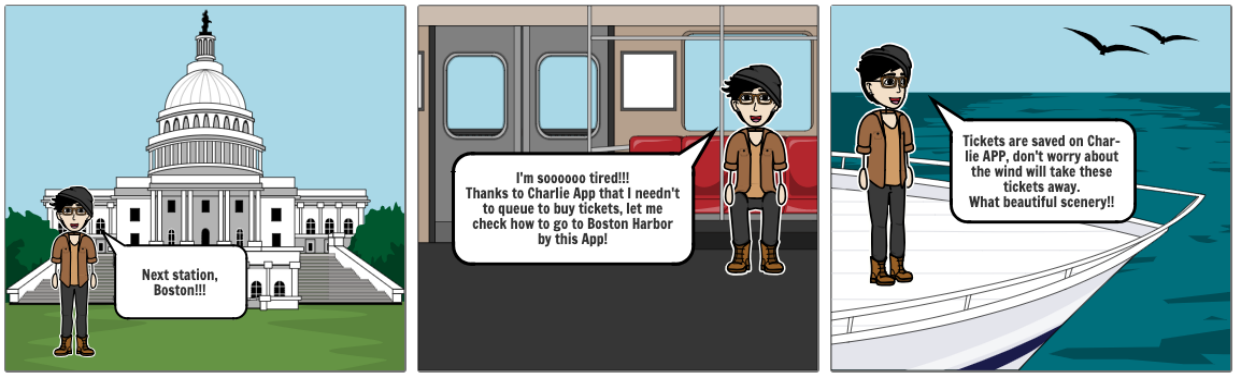
- He creates his MBTA accounts.
- Gets the time schedule of commuter rails and plans ahead
- Purchases commuter rail tickets online.
- Scans e-tickets for boarding.
- Saves his trip history and e-ticket receipts in the ticket wallet of the app.

- Selects his previous trip to have a screenshot of the tickets or print it for reimbursement.

Visitors:

C. Ming is a visitor from China and this is his first time to Massachusetts. He will stay here for some days but he is not allowed to rent a car because he is 17 years old. So MBTA service is his best choice for transit. He plans to visit Boston by trains and buses; travel to Boston harbor by ferries and go to other cities by commuter rails. He does not have a Charlie card, and it is difficult for him to manage paper tickets which are easily damaged and he also needs a travel planner. So he searches and downloads the MBTA Charlie App to manage his transit.

- He creates an MBTA online account.
- Checks transit map of MBTA
- Purchases his weekly pass and commuter rail, ferry tickets online.
- Clicks the trip planner to get the route suggestion.
- Uses the e-ticket wallet to manage his tickets.
- Clicks to generate mobile pass QR-code to access or shows the e-tickets at gates.
- Finds his trip history and takes the ticket screenshot as a memorial.



Detailed Design & Features Description

Design Principles : For MBTA Charlie app we are targeting 5 most important but overarching

design principles, these principles are easier said than done.

- **A standardized backend** :
  for our app, we are willing to let go of some very complex features in trade of a standardized code. Design of backend should cover corner cases and so that same logic is followed for same problem no matter what customer segment. Implementing lean concepts to achieve this will be a task at hand all times

- **A Scalable solution** :
  as the market size of the app grows and we get more customers, it is extremely necessary that the solution we write(programming codes) is scalable, i.e. can handle large amount of data input without breaking

- **Fast & Responsive**:
  No one wants to use a service which is slow and takes forever to load. Fast rendering pages is a high priority design principle for our product.

- **Keep it clutter free** :
  show the user only what they need to see and keep everything away, we do not want to confuse users with a lot of things on screen

- **A Great UX** :
  it cannot be stressed how important a good and consistent User experience is, almost 80% of the apps launched in the market fail because of a poor inconsistent user interface. The functional, visual and external UX of the app has to be same throughout

Features/information architecture [draft]

Feature	**Detail (Also on Wireframes)**	**Dependencies**
Sign up	-Able to choose between profiles of ‘Student or traveler’ -Create account using email address and password -Security questions	Charlie app must have a own backend to handle the signing in and authentication process for customers.
Create Profile	Personal information Default Location	

Log In	The applicants will be able to login to the app with the username (or email address) and password set up by them while registering on app. The user name and password will be validated.	
Forgot Password Page	The customers will be able to reset their password in case they forget by using the registered email address, phone number or security questions	
Dashboard and Available Features	Upon logging in, the user would be able to see the following features according to their profiles: Personal Profile Maps Types of transit Payment method Reloading of Charlie card Buying E-Ticket Trip suggestion Real time tracking Chat and chat box Travel History	
Real time tracking	The exact up-to-date time of arrival of the transits is provided. A proper real time schedule is maintained.	
Reload of Charlie card	Charlie card can be reloaded with just one click. Options like a monthly pass, daily pass or a certain amount for one travel can be added. Then there is no need of the Charlie card at the station. You can enter the station by scanning phone.	

Maps and trip suggestion	The customer can mention the from and to locations to travel. A proper map to walk around will be provided and trip suggestions of the transits along with the time of arrival of the transits will be provided. GPS location of you, if on map	tie up with GPS Map of default location Map of current location Map of target location
E- tickets	You can book a ticket without standing at the vending machine. It is that quick and easy to just book a ticket for respective transit by adding amount through online payment.	Default travel or the different travel locations
Travel history	All the travel history including the amount spent is maintained.	
Chat and Chat Box	Ability to chat with current passengers travelling in the respective transit.	A booking for a specific travel
Make Payments	Users will be able to pay online for buying ticket or for reloading the Charlie card.	Tie into banks for payment info
Content pages – About us, Contact us, FAQs	The content pages such as about us, contact us and FAQs will have applicants answer their queries and contact us for any technical help	
Logout	The logout link will be available on all	

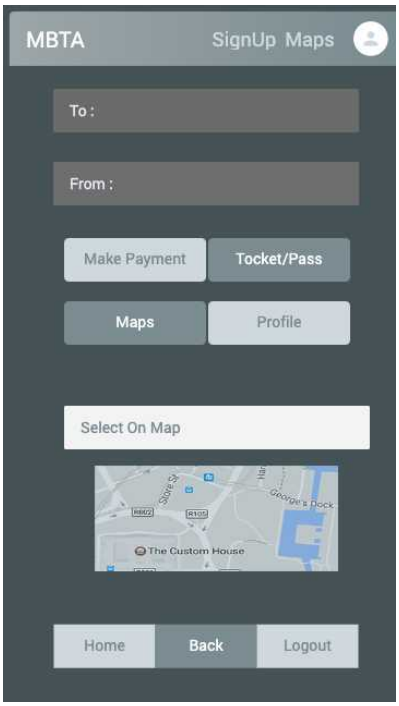
v1 aka Minimum Viable Product (MVP)

The minimum viable product should essentially has features broken down by priority:

Feature	Priority

User sign up	1
Log in	1
Log Out	1
Online payment system	1
E-ticketing	1
E-passes	1
Subway Station Maps	1
Payment bank details	1
Maps and trip suggestion	1
Chat bot	2
Travel history	2

Again, for the MVP, we cannot stress enough how a pleasant user experience is essential for us. No app would survive with a difficult user interface or convolutional features. We want the app to be as clutter free as possible.



vNext

- Customers can plan a schedule for their travel in advance
- Customers can find multiple locations or get trip suggestions in profile
- Students, office employees, travellers can use banks and credit unions, not just PayPal
- Daily reminders for routine travellers

v longterm

· Introduction of iOS Application

· Exclusive collaborations with universities and offices for compensations.

· Introduce another country other than United States

Roadmap / Timing

Our App directly correlates with the MBTA system, so we are planning to align our launch with the date when we get license and develop the product from year 2019. The team will begin by defining the project scope using the feature plans herein, then specify a development timeline. After the internal demo is finished, users who are being invited will become our first batch of customers to experience our product and their feedback will be compiled in order to improve the design, and the team will start on the Beta version features outlined herein, assuming results from

the internal demo phase suggest moving forward. As beta version is lunanched, the people who are using this app to buy tickets or charge their charlie card could be a valuable resource for affordable testing, feedback, and freelance development work to help us develop the MBTA app and launch the next version of our product.

Mile Stone	Timing	Notes
Alpha version launch	April	Build MVP, basic e-tickets and e-card features enable customers to buy tickets using mobile app
Analyze metrics and incorporate feedback	May	Make changes as necessary according to feedbacks
Beta version launch	June	Improve previous features and enable mobile pass through QR code
Analyze metrics and release the third version	July	Make changes as necessary and enable real-time tracking and transit schedule in app
Stable version release and post-launch analysis and adjustment	September	Enabling chat bot between customers and promotion events according to beta version feedback analysis

Scenarios for Service Introduction

Alpha Launch: We anticipate having the product ready for internal use after one month of development time. This launch should include every screen from our wireframes, with all the functionality and features necessary for beta launch. We will provide our internal team (friends and potential users) 1 week to test the system from every angle, each user type, and log bugs into our bug tracking system. After this testing has occurred, we will take an additional week to fix all of the bugs found during Alpha.

Beta Launch: Once the Alpha bugs have been fixed, we will continue to develop new features and then launch our product Beta. This will be initially sent to individuals that have signed up via our landing page. We will not widely promote our product during beta, but allow anybody to sign up for Beta. We will send active email communications during Beta soliciting feedback from our users, and measuring their usage with Mixpanel to judge where they’re running into challenges, and where they spend the most time.

Full-launch: Once we have gathered statistically significant usage data from users, which we anticipate will take one month's time, we will set our product roadmap for full-launch of the application. Through UX critique sessions, we have already identified several modifications that we would like to adopt for previous version.

We will attempt to release features every two weeks and do A/B tests to scientifically judge how these product enhancements affect conversion rates from individuals that simply sign up, to individuals that complete their purchase on our app.

Metrics

General App Metrics

Downloads	Number of Downloads indicate app popularity
Installs	How many people installed the app after downloading
SEO Keyword Ranking	It tracks brand awareness, how optimized are your keywords for the app and at what rank does the app show up in a search result

Customer Engagement Metrics

Session Length	The amount of time a user spends in each session. This will be used to analyze if there are any crashes and how the customer engages with app. It can be easily tracked on the device and reports can be generated using that data

Retention Rate	It is the percent of customers you were able to retain. It can be calculated as: {(# of customers at the end of a period - # of new customers acquired during the period) / # of customers at the start of period} * 100
Churn Rate	It is the number of users who stopped using the app within a given period. It can be calculated as: {(#of customers who left)/ (# of customers at start of period + # of customers acquired during that period)} * 100

Revenue Metrics

Daily Active Users (DAU)	Number of daily users in the app
Customer Acquisition Cost	The cost of acquiring new customers. It is (Total Gross Revenue/Sales & Marketing Cost)
Average Revenue per User	Average amount of revenue generated by a user. It is (Lifetime Revenue / Number of Users)
Conversion Rate	Number of conversions divided by total number of users. Conversions means desired actions
Return on Investment	Return on an investment relative to the marketing cost. It is used to strengthen the marketing efforts. It is: (Gain from investment – Cost of investment)/ (Cost Of Investment)

.

International

Internationalization is not applicable in our application directly. We will be focusing on making this application available only for US but our application will support multiple languages. Our application will not be customized based on user's country, we will only directly translate the languages using in our application, but it will be easy for people to understand and use. Proven success in the US is a prerequisite for considering international expansion.

Projected Costs

In the initial stage, we will develop an MVP for small-scale testing, the estimation of development cost are as follows:

- Developer:
    - Full-time (salary: $8,000 / person / month):
        - User Interface Design Engineer x 1
        - Mobile Application (iOS) Software Engineer x 1
        - Mobile Application (Android) Software Engineer x 1
        - Backend Software Engineer x 2
        - Software Test Engineer x 2
    - Intern (salary: $5,000 / person / month):
        - User Interface Design Intern x 1
        - Mobile Application (iOS) Software Development Intern x 1
        - Mobile Application (Android) Software Development Intern x 1
        - Backend Software Intern x 2
        - Software Test Intern x 2

- Server:
  For a start-up project, using Amazon AWS service is much more beneficial than building our own server-cluster. We consider to build three environments for development, testing and production, the number of EC2 Instance is automatically increased or decreased based on the internet traffic. According to the Simple Monthly Calculator, we can get an approximate amount, which cost $9,000 per month.

Based on the past development experience, seven full-time engineers and seven interns need to work together for two and a half months to complete the development of MBTA App, and it will take two weeks to online testing and data monitoring, which means the total development time is 3 months. In order to complete the MBTA App development, it will probably cost $300,000 ($8,000 * 7 * 3 + $5,000 * 7 * 3 + $9,000 * 3).

Operational Needs

For MBTA App to be fully functional, support is needed from many areas, including:

Development Team

In order to develop the MBTA app on smartphones, a talented pool of developers/engineers is needed.

- Testing: After the MBTA app is completely developed, it needs to be tested thoroughly. A team of testers would be required to do the end-to-end testing for the app, and it also requires to do usability and feasibility testing in our App.
- Android/IOS Development: A dedicated application should be created for MBTA, and should be designed for both IOS and Android. The App will be valuable for building user awareness (for example, if somebody is searching for MBTA on Google/Safari, then he/she would be redirected to the application of MBTA, where the MBTA app can be downloaded).

Design Team

- UX Design: The UX Design team would work to increase the user control and freedom, to make Sprout more aesthetically appealing and easy to use. Good user experience will decrease support costs in later phases and drive user engagement and adoption.
- Graphic Design: A graphic design team will work on how to improve the ‘look and feel’ of the Sprout app, and ensure Sprout is visually appealing.

Marketing Team

- Market Research: Surveys, in depth interviews, and focus groups will allow the team to tailor MBTA’S features to the most prevalent use cases. This market research may be done in house, or may be outsourced.
- Marketing/Promotion: After the MBTA app is fully functional, marketing efforts will build product awareness. We plan to hire people to handle the overall 22 marketing strategy, and training staff of MBTA to use this app and let them to propagandize MBTA app in the station.

Other

- Finance/Operations: As with any business, we will also need to manage finance and operations, which will require software and infrastructure.
- Legal advice and approval: We would need to partner with 3rd party legal teams to get legal advice and approval for the terms and conditions. It is important to gain the access of to develop MBTA application, so we would also need to learn about the privacy protection acts, which we need to comply with for storing passengers’ information in our database.
- Passengers’ feedback: We are also soliciting passengers’ feedback to help improve the functionality of the MBTA app and to help solve all the major pain points of passengers in terms of charlie card reload or online-ticket purchase.

Addressing Caveats/risks

Risks	Description	Mitigants
Privacy Concerns	All user data must be protected from inappropriate use All of the user data and their records will not be provided to anyone without consent of the user. Ensure all the data storage and encryption for all customer records.	Strategies to optimize website security (not inclusive): ● Keep software up to date Error messages ● Server side validation/form validation ● Complex passwords ● Inspect all data inserted into the database ● Using security tools ● Secure sign-in and encrypted data storage
Legal compliance	Ensure compliance with all laws governing the use of private personal data and e-commerce. Reduce number of lawsuits arising from negligence or misuse of user data	Contract with law firm to ensure compliance with all federal laws and regulations.
Low Technology adoption	Users may be hesitant to adopt a different technology when they have a currently solution that works well for them	● Hire and train the MBTA staff to ensure that they can accurately convey the value of our product to passengers. ● Proper advertisement of our application inside the MBTA station. ● Provide an exceptional user experience.
Access and downtime risk	Prevent server crashes and ensure zero downtime	24-hour development and IT team to ensure data integrity and protection

High cost	Operating costs may be too high.	Operate on lean start-up model and have appropriate monetization strategy.
Availability of required 3rd-party complements	The application need the supports from Massachusetts Bay Transportation Authority and government	Contract with MBTA and government, offer them proper profit from allowing to launch this application around US.