Pradyumna Mukunda

Fall 2019 – Sprint 4 Individual Report

CS 8803 Mobile Application and Services

Georgia Tech, Atlanta, Georgia, USA

Part I

1. Team Name and Members

Team Name:

Beat Harmony

Project Name:

Beat Harmony

Team Members:

- Ankit Verma (averma46@gatech.edu)
- Rishma Mendhekar rmendhekar3@gatech.edu
- Christian Graham cgraham47@gatech.edu
- Justin Higgins jhiggins@gatech.edu
- Pradyumna Mukunda pmukunda3@gatech.edu

2. Updated Project Overview

Problem Statement

Existing music platforms create echo chambers based on the music you already listen to.

- Recommendation algorithms have a hard time breaking out of the information they're fed.
- Music-heads are not connected to curators who share in their unique tastes

Pitch

Beat Harmony is a music curation service built to help users find new music through social connections. Music streaming services like Spotify, YouTube Music, etc. collect user data in order to recommend new music. This causes echo chambers of the same genres of music being recommended back to you. Services such as Spotify, try to break out of this with curated playlists tailored to your mood or activity, but in practice you're still likely to skip a song that's not in a genre you enjoy. Our team is working to recreate the organic experience of hearing a song in your friends car that you love, but existing services wouldn't recommend to you.

Current Design Pivot

Music playlists are a primarily solo activity.

- Creating playlists.
- Listening to playlists

Pivot: Redefine playlists as a living, communal affair.

- Every playlist is a living space with an owner, live chat, and an ever changing playlist of songs.
- Users can chat, link to other playlists, recommend songs to add/remove from the playlist, and more.
- With a focus on **creating** playlists, **finding** playlists, and **listening** to playlists.

Selected Approach Details

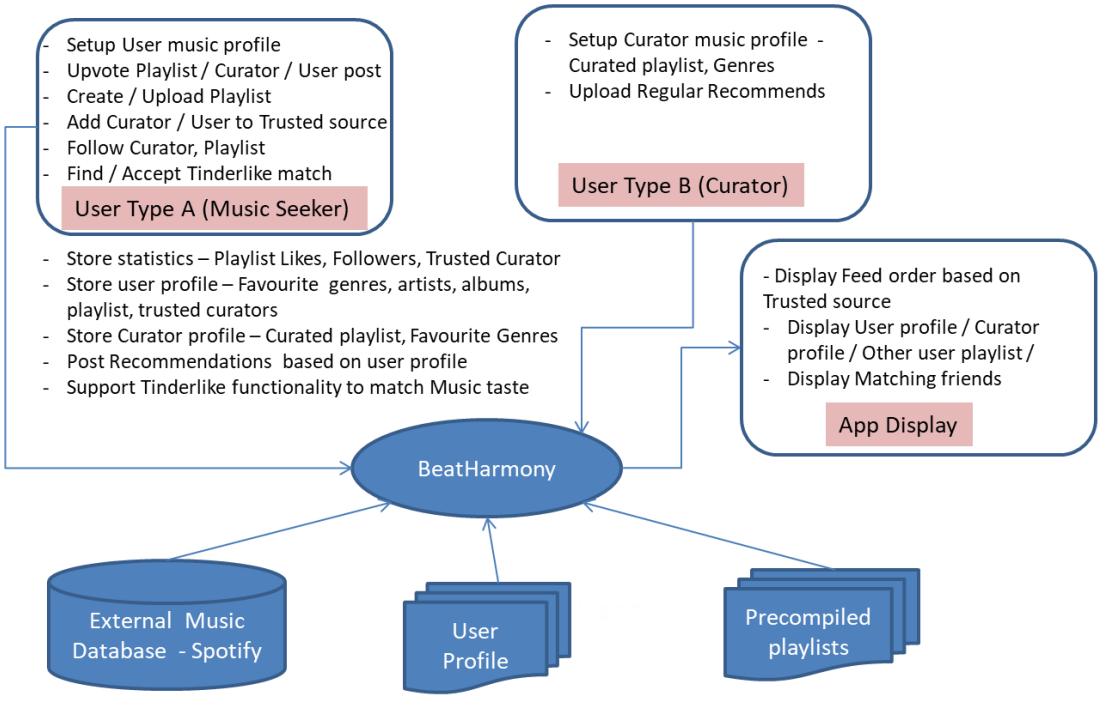
Selected Approach is a feed-focused social media style app based on sharing playlists. A user can act as a seeker or curator at any time. Users can mark other users as 'trusted' music sources and increase another user's trust rating by upvoting their posts.

Features

- Social feeds with scroll
- Trusted source recommends higher in the feed order
- Trusted source identification method
    - Explicit follow of curator
    - marked trusted source
    - number of posts listened or liked by user
- Spotify Integration
- Setup User / Curator music profile
- Up-vote Playlist / Curator / User post
- Tinder for matching users with same music taste

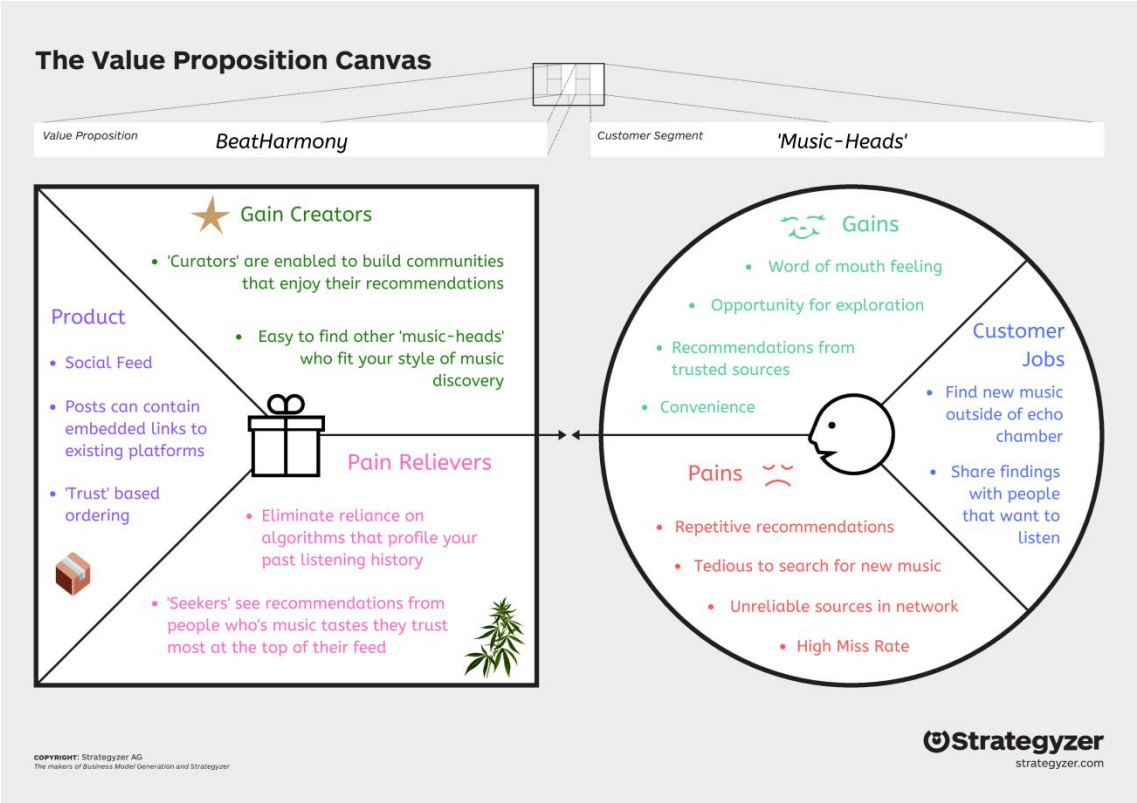
Figure below shows the conceptual view of the selected approach. It identifies the activities of Music seeker and Curator, Functions of the app and displays. It will have integration with Spotify database to play music. Local stores will include user profile and precompiled list storage.

Conceptual View



Note:
Type A User can be Curator and Type B user can be music seeker

Figure below shows the Value proposition Canvas



Value seen for customer are

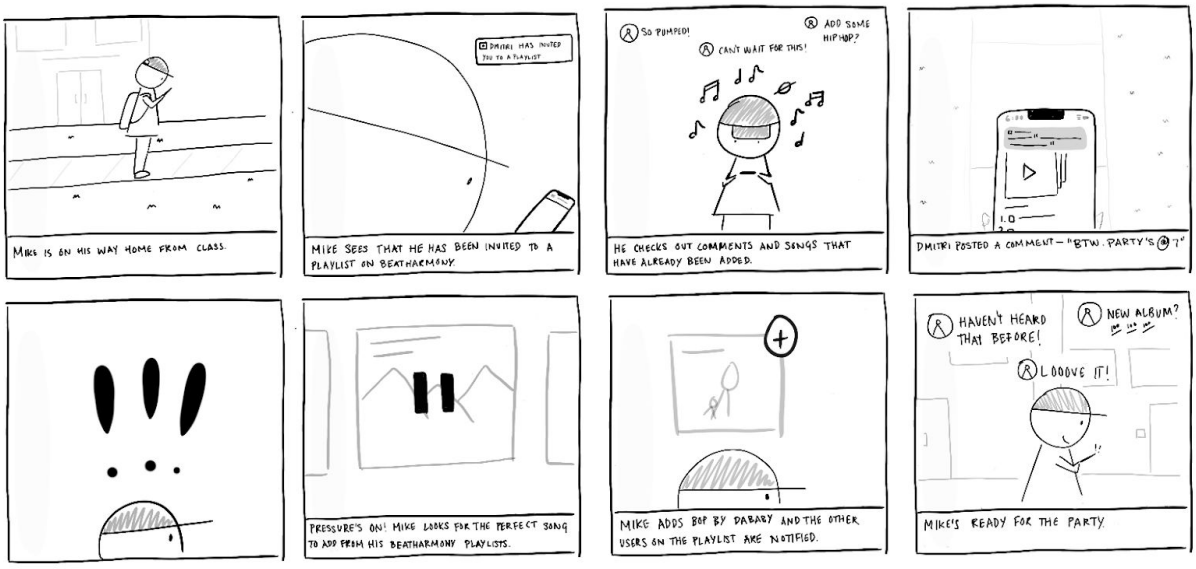
- Word of mouth feeling
- Opportunity to explore new music
- Recommendation from trusted sources
- Convenience

Business value

- Music curators are enabled to build community that enjoy their recommendations
- Easy to find music heads who fits your style of music

Storyboard

Rishma created a new storyboard based on our design pivot (collaborative playlists) and Christian's video script.



High Level Design details

by Christian Graham

The core app loop is broken up into 3 segments: finding playlists, creating playlists, and listening to playlists. All features within the application are dedicated to fulfilling 1 (or more) of these core app segments.

-*Listening* should be supported by finding and creating.
-*Creating* should be supported by listening and finding.
-*Finding* should be supported by creating and listening.

User Profile Design

User profiles are the core driving force behind the social aspect of this application. User profiles contain data specific to an individual user.

- User Data
    - Display Name
    - Username
    - Profile Picture
    - Bio
    - Followers List
    - Following List
    - Pinned Item

        - Song
        - Album
        - Artist
        - Playlist
    - Recent Activity Feed
        - Feed of created/managed playlists
            - Display the current song playing & last message sent in this playlist server.
        - Feed of followed playlists
            - Display the current song playing & last message sent in this playlist server.

Playlist Design

Playlists are privately curated, socially driven *radio* communities designed for users to interact with and contribute to.

- All playlists are public, unless set to private (invite only).
- Playlists have owners and moderators (assigned by the owner).
    - Users can see the owner of the playlist, and access their profile.
    - Owners can create moderators that can moderate chat, and add/remove music from the playlist
    - Owners/mods can name the server.
- Playlists can contain songs from all platforms.
    - Spotify
    - Soundcloud
    - Youtube Music
- Playlists have perpetual chat rooms.
    - Users can link things in chat.
        - Songs
        - Other Playlists
        - Other Users
    - Users can recommend songs to be added to the playlist.
        - This populates a list of recommend songs that the owner/mods can see.
- Users can subscribe to a playlist.

Social Feed Design

Pillar: FINDING Playlists

Pillar: LISTENING to Playlists

Pillar: SOCIALLY Driven

- See what your friends are doing.
    - What they're listening to.
    - What they subscribe to.
    - Who they follow.

Trending Tab Design

Pillar: FINDING Playlists
Pillar: LISTENING to Playlists
Pillar: SOCIALLY Driven

- See what people who aren't your friends are doing.
    - What they're listening to.
    - What they're subscribing to.
    - Who they're following.

Playlist Tab Design

Pillar: LISTENING to Playlists
Pillar: CREATING Playlists

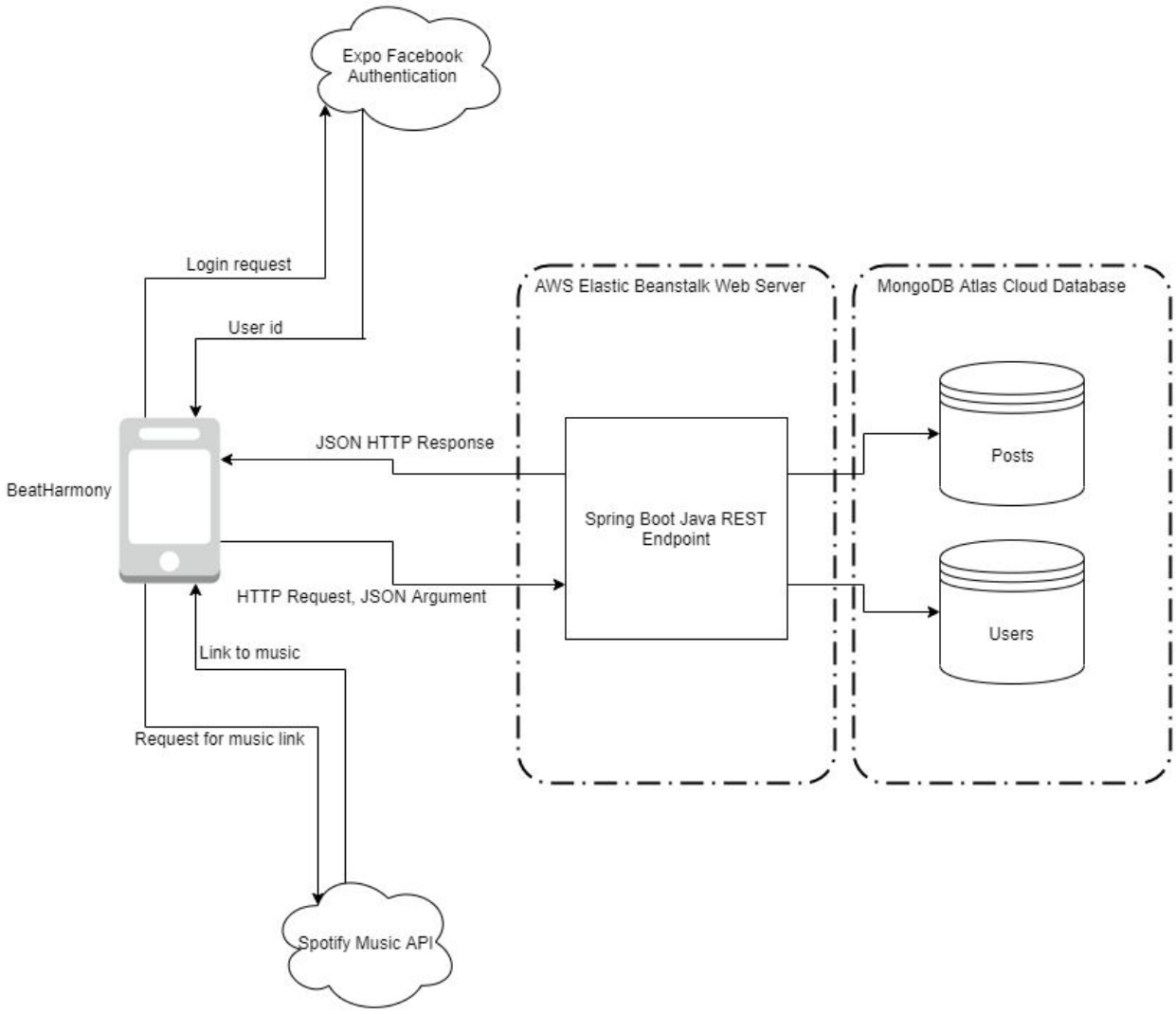
- Do things yourself.
    - Show subscribed playlist servers.
    - Find a list of private liked songs.
    - Create a playlist.

Search Tab Design

Pillar: FINDING Playlists
Pillar: LISTENING to Playlists

- Find specific playlists, users, or songs.
    - Generates a list that can be filtered by users, playlists, or songs.
    - Searching for a song can display popular playlists that this song is associated with.

Architecture details



Our architecture has been consistent since sprint two. We did, however, make a change this sprint to use Expo's built-in Facebook authentication for our app instead of sourcing authentication through Amazon Web Services. This change was made because we learned new information about Expo and how it supports Facebook authentication more conveniently than AWS Cognito, especially for prototyping purposes. Nothing else has changed from the past; we are simply continuing to create the architecture we designed and centered on. (Justin)

Backend details

Our backend architecture has been decided on for some time. We've also had a starting backend implemented. At this point, we are continuing to iterate upon the implementation and add new features. At this juncture, we have a large catalog of services available to perform most functions of the app that are required to persist. This sprint, we have:

- Made changes to the Post document storage to facilitate some frontend functionality
- Implemented liking and unliking of posts
- Cleaned up existing request logic
- Implemented compliance checking with some fields to ensure zero trust of user input (still a work in progress)

(Justin)

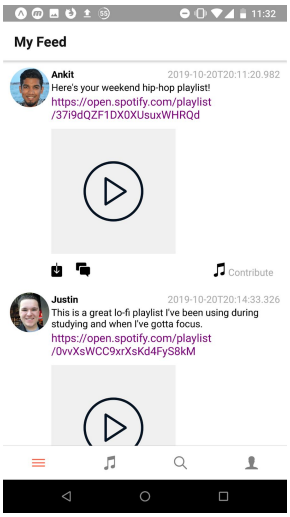
Frontend details

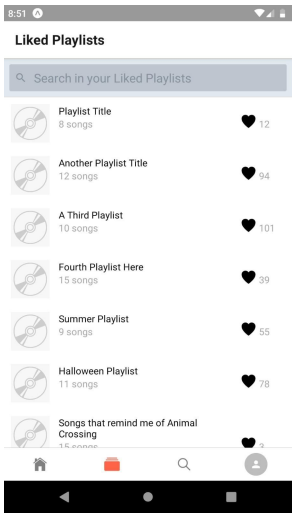
Activity on Front end has been detailed below.. (Pradyumna)

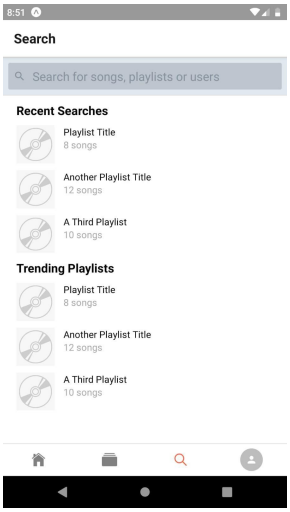
- Users can log in to BeatHarmony through their Facebook profile.
- Restructured the previous codebase into something simpler and more maintainable
- Prototype screens were created previously on Invision with exact specifications of each screen
- Used Expo Snack as a development platform
- Modeled following screens as per Invision specifications
    - My feed screen
    - Liked playlist screen
    - Search page screen
    - Profile page screen (in progress)
- For testing we used Expo client app on android phone. The app updates on the phone as you type your code in Expo Snack
- Used Tab navigator from React navigation to navigate between screens
- For icons we used Icon component from React native elements. There are many available sets of icons in different fonts such as Ionicon, FontAwesome, etc.
- We also have some custom icons created by Rishma

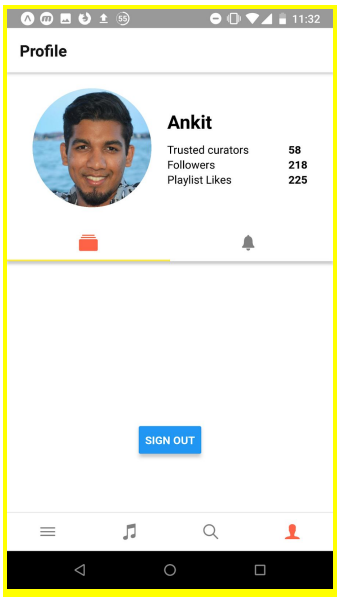
Right now, the front end application has limited functionality. Users can log into the application with their Facebook credentials, and are currently limited to viewing a feed of previous posts, switching between 4 screens, and viewing their profile. The four icons represent Home (My feed), Liked playlists, Search and Profile screens respectively, you navigate by pressing the respective icon. Each of these screens is populated with UI elements. In the future these UI elements will be made into functional buttons for liking posts, linking to other profiles, playlists, Spotify etc. Some more screens will also be added such as a Messaging screen and a Playlist description screen.

Here are some screenshots of the screens developed. For now the focus is on completing the basic layout of the screens and colors will be added in later. (Pradyumna)







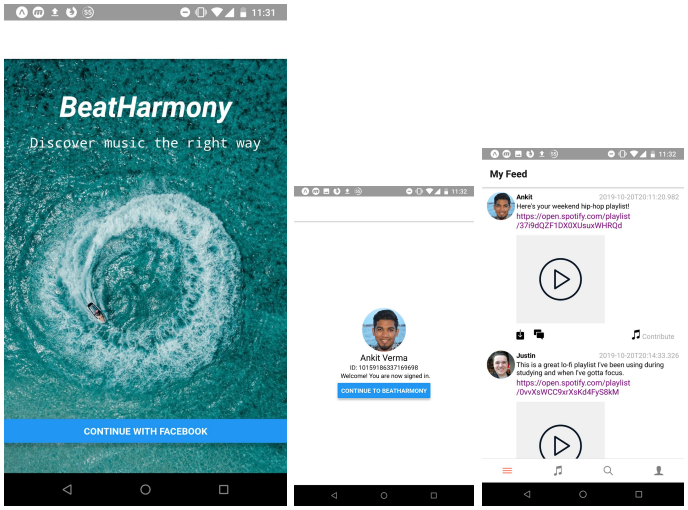


Ankit's Contributions:

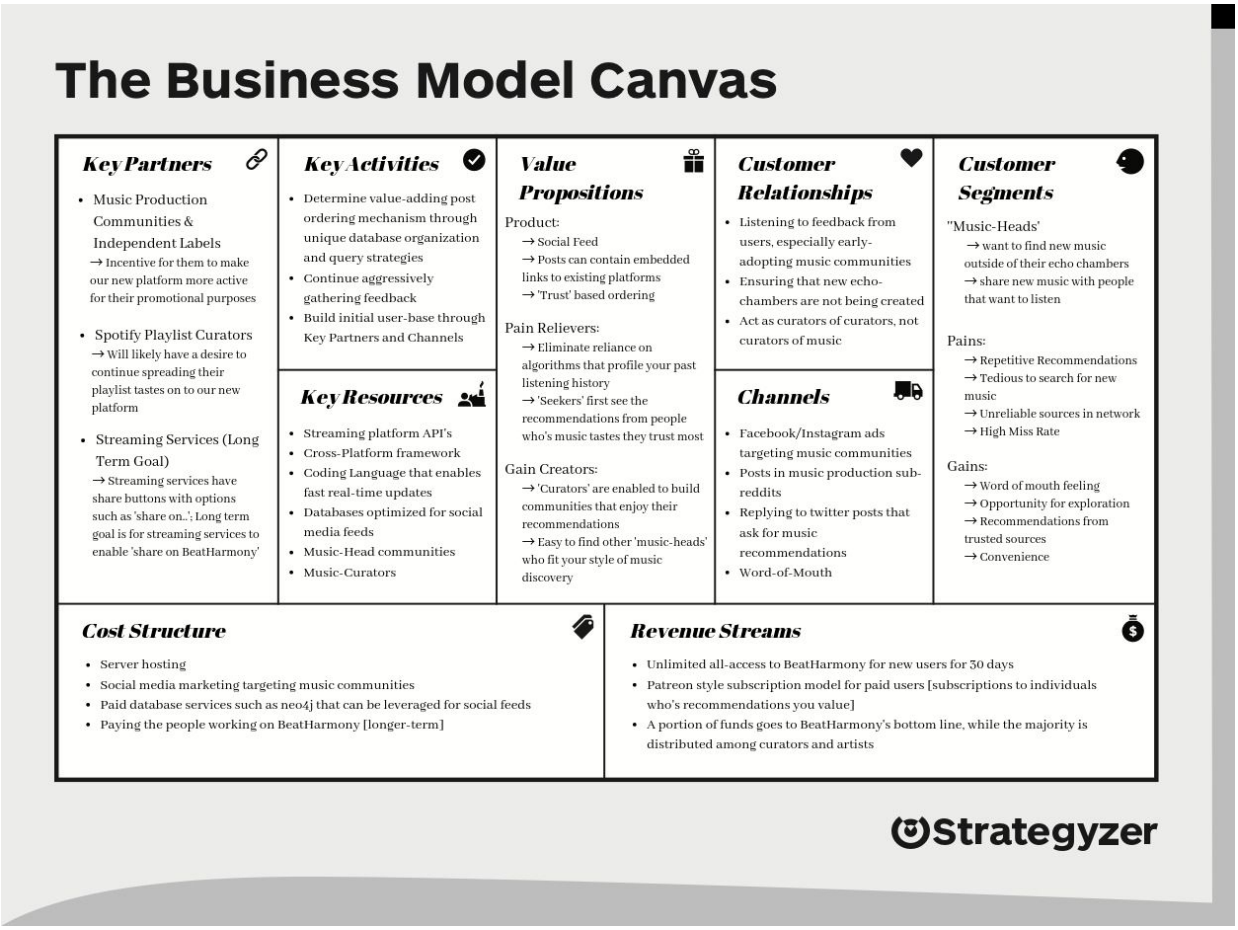
- Facebook login authentication flow through expo-facebook (https://docs.expo.io/versions/latest/sdk/facebook/). This change was made because we learned new information about Expo and how it supports Facebook authentication more conveniently than AWS Cognito, especially for prototyping purposes. Being able to quickly test out how the facebook login flow affects users is more valuable to us at this stage of the project.
- Continuing navigation to the main app after authentication was a challenge. After the user signed in, the app would get stuck and not continue to the main feed portion of our application. To overcome this hump, further research & learning needed to be done regarding react-native's many techniques for navigation. This problem was solved by utilizing '`export default createBottomTabNavigator'` and by rendering the exported module as a 'navigator' rather than as a component.
- Ironed out the code to ensure it works on android in addition to ios. I was stuck on why icon's were not showing up on android, but a majority of the issues related to icons were fixed by

making use of a separate npm module from expo rather than from react native. this worked since the expo npm module is geared towards apps running on expo.

- Ensured that all of the data in the feed was being pulled from our backend database through react native ‘fetch’ function. ‘fetch’ was used to perform GET operations to our backend service to get user profile and activity feed data and populate our front end application with it.



Business Model Canvas



3. Learning from previous prototype

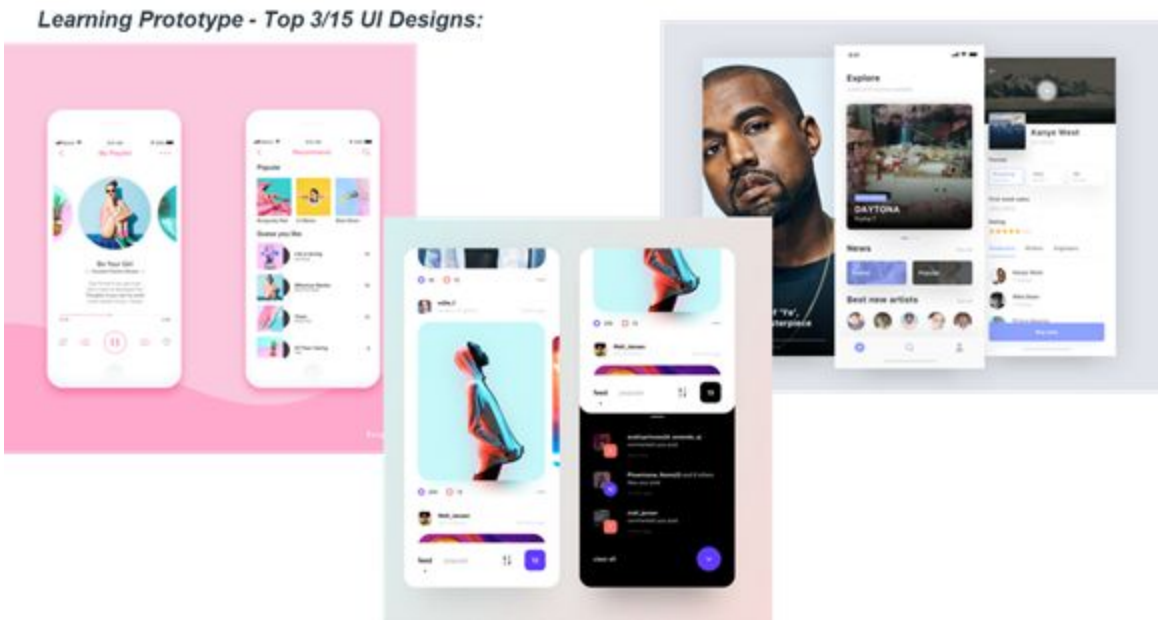
Learning Prototype – Sprint 2

Goals of learning prototype in Sprint2 was

- Collect customer data referencing our overall product design.
- Collect customer data for a future interactive learning prototype.
- Narrow in on a UI design.
- Narrow in on a color palette or aesthetic style.

About 28 people were interviewed to collect their preference on 15 UI designs and 15 Color palettes. Based on above survey we narrowed down to the top 3 UI design and color palette.

Top 3 UI designs and color palette selected from above survey is listed below



Learning Prototype – Sprint 3

Sprint3 activities were based on following main activities

- Creating Basic Design document along with use case updates
- Creating server architecture
- Decide on technologies for each of the resources in the system

In addition, we created a clickable prototype of mockup screens / UI and planning to get user feedback.

Insights gained

1. All of the participants thought that the “like” button was the Apple Music logo and that it would export the playlist to Apple Music. This is because it is situated next to the export to Spotify icon, and because the number of saves a playlist has is shown on the opposite side of the post.

Design ideas to address this concern:

   a. Find a different icon for liking a post, because the music note is actually Apple Music’s logo.
   b. Put the number of saves close to the “like” button
   c. Change the wording of “saves” to “likes” so that language is consistent throughout the app.

2. All four participants thought that the live chat section was actually a comments section before they click on it. Three out of four participants also stated that they would prefer comments over

a live chat; two preferred comments because it is easier to follow. With a live chat they felt like they would not be able to see or take part in discussions that happened some time ago, whereas with comment threads, discussions are preserved and easier to find and sort through.

Design ideas to address this concern:

a. Switch the live chat section to an asynchronous comments section.
b. If we continue using the live chat, the chat can split up into subchats/groups based on topic.

3. A few participants said that they would prefer being able to message any user directly from their profile because this would allow them to start conversations with interesting users immediately. At the moment, users can only message people that they have matched with the matching feature.

   Design ideas to address this concern: Implement messaging functionality for every user regardless of whether they have matched or not. My main concern here is where users will be able to access these messages because the menu bar already has a number of icons, and the top right corner of the app holds the icon for creating playlists.

4. Two users said that they would like to see peoples' top artists on their match profiles.
5. Two users said that it was hard to differentiate between the unread and read states for messages and notifications.

4. New learning prototype description

Rishma: UX/UI Design Overview

During Sprint 4, the following design efforts were made:

- Design the onboarding flow
- Redesign and test UX/UI components based on user feedback
- Design and test collaborative playlist functionality

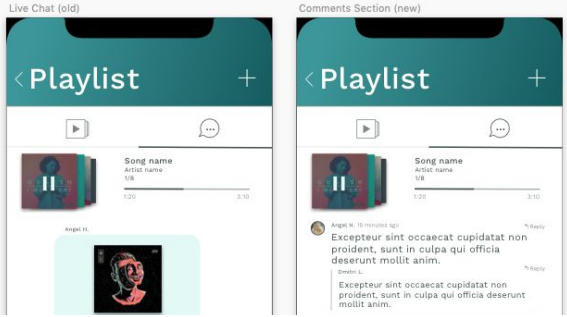
Updated Flows

View the updated prototype here starting from the onboarding. The onboarding flow will be tested early in Sprint 5: https://invis.io/C2UGJH2AN7H#/385550543_Sign_Up

View the updated prototype here starting from the feed:
https://projects.invisionapp.com/share/C2UGJH2AN7H#/screens/387311462_Homepage

We made the following changes to the design based on user feedback and our collaborative design document:

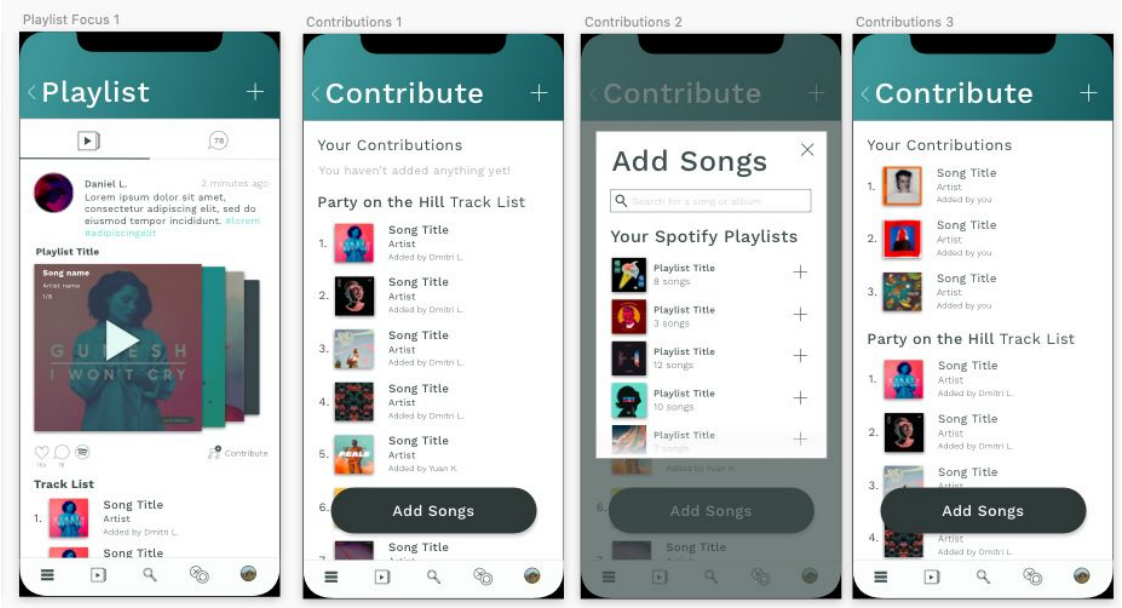
All participants thought that the live chat section was actually a comments section before they click on it. Four out of five participants also stated that they would prefer comments over a live chat; two preferred comments because it is easier to follow. With a live chat they felt like they would not be able to see or



take part in discussions that happened some time ago, whereas with comment threads, discussions are preserved and easier to find and sort through.

- Resulting design change:
    - The live chat section was changed to a comments section. The team considered modelling the comments off of YouTube comments and Reddit threads. We ended up using Reddit as a guide because it is designed to simulate discussion. The team also agreed that building a comment section was more realistic programmatically than a live chat section given the timeline of the course.

We also created the flow for the collaborative playlist section based on the team's collaborative design document.



User

Feedback on New Designs

To collect user feedback on the new design changes, we conducted remote usability testing. A Qualtrics survey was created which instructed participants to walk through certain tasks. The participants were then asked to answer questions about the tasks including difficulty level and general thoughts about functionality. The full survey protocol can be found in Appendix A.

Based on the user feedback, I have changed the "like" icon, and I will also be updating the menu structure so that messaging is easier to find. Some icons, such as the icon to create a new song and to get to the matching page, will also need refinement to better represent their function.

5. Summary of the team's key activities

- Created website and video for the application
- Created a new learning prototype to get feedback on collaborative design
- Created survey to gather user feedback
- Restructured the code base for Front end to make it more simpler and maintainable
- Modeled following screens as per specifications

    - My feed screen
    - Liked playlist screen
    - Search page screen
    - Profile page screen
- A basic sign-in with Facebook flow has now been assimilated
- Replaced some sample data on Front end with backend data, and ironed out the code so that it works with Android as well

Part II (done individually)

6. Details of your Sprint4 contribution

Following are my contributions to Sprint4

Front End UI design

In previous Sprints, myself and Justin were mainly working on back end. My initial plan was to continue on back end

- Authentication
- Web services

In order to accomplish above I had spent a significant time learning about REST API, Spring Framework and also made a function in User controller to retrieve user by username in Sprint3. My initial plan was to team up with Justin and continue on backend.

However, towards the end of Sprint3, team understood that we need more hands on Frontend as compared to backend. Therefore I switched to Front end design. I have done following activities for Sprint4

- Did a quick learning on React Native going thru Tutorial and several sample examples
- Absorbed what Ankit had done initially for Frontend design (looking at his github repository)
- Restructuring the codebase into something simpler and more maintainable
- Created Invision account to look at the exact specifications of prototype screens created by Rishma
- Created an account on Expo and used Expo Snack as a development platform
- For testing I used Expo client app on my Android phone. The app updates on the phone as you type your code in Expo Snack.
- Modeled following screens as per specifications
    - My feed screen
    - Liked playlist screen
    - Search page screen
    - Profile page screen (in progress)
- Explored Tab navigator from React navigation and incorporated it to navigate between screens
- For icons I used Icon component from React native elements. There are many available sets of icons in different fonts such as Ionicon, FontAwesome, etc.
- Integrated custom icons created by Rishma

Right now the only functionality is navigating between screens using the bottom tab. The four icons represent Home (My feed), Liked playlists, Search and Profile screens respectively, you navigate by pressing the respective icon. Each of these screens is populated with UI elements. In the future these UI elements will be made into functional buttons for liking posts, linking to other profiles, playlists, Spotify etc. Some more screens will also be added such as a Messaging screen and a Playlist description screen.

Here are some screenshots of the screens developed. For now the focus is on completing the basic layout of the screens and colors will be added in later.

8:51

My Feed

Dmitri L. 2 minutes ago
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt. #lorem #adipiscingelit

40 78 Contribute

Jenny S. 8 minutes ago
Lorem ipsum dolor sit amet consectetur #lorem #adipiscingelit

8:51

Liked Playlists

Search in your Liked Playlists

Playlist Title
8 songs 12

Another Playlist Title
12 songs 94

A Third Playlist
10 songs 101

Fourth Playlist Here
15 songs 39

Summer Playlist
9 songs 55

Halloween Playlist
11 songs 78

Songs that remind me of Animal Crossing
15 songs 3

8:51

Search

Search for songs, playlists or users

Recent Searches

Playlist Title
8 songs

Another Playlist Title
12 songs

A Third Playlist
10 songs

Trending Playlists

Playlist Title
8 songs

Another Playlist Title
12 songs

A Third Playlist
10 songs

8:51

Profile

Katherine L.

Trusted curators	**58**
Followers	**18**
Playlist Likes	**225**

Sprint 4 Report creation

As compared to previous Sprints, the format of the report has changed. There are two parts to the report. Part I common to all members of the team and Part II is individual contribution. I did following as part of report

- Created a template for the report with required section headings so that individuals can fill in as per their main area of focus. I shared this with the team
- Filled in following sections of the report
    - Problem statement
    - Pitch
    - Current design pivot
    - Selected approach details explaining the main features, value proposition and a conceptual diagram
    - Business model canvas
- Added Front end details section to include the work I did as part of Sprint 4
- Added summary of activities section
- Added Learning from previous prototype section

Sprint3 feedback consolidation and review:

Summarized the key Sprint3 presentation feedback and shared it with team members.

Question / Comments	Positive comments
There was some lag while switching the apps. It deters the user experience.	The idea of integrating your platform into any music platform that already exists is a pretty good idea.
How differentiating the app is from the SoundCloud, spotify etc is something I did not get the answer. SoundCloud has options to search other people,Äôs playlist and follow that person to get the music trends that that person is following	Good job on addressing user feedback of wanting to integrate with existing music services. I think this is the right way to go.
Currently there was a lag in switching between the applications. It would be great if that lag is reduced. Also, switching algorithm based to user based is a good decision.	Very nice UI, clean. Comment section over likes section is essential for this! Front end colors are a little bright
They explained the application architecture well, but need to explain how they plan to integrate more music services. Will the implementation be same as it is for Spotify? Have they considered integrating a spotify player to their app rather than redirecting it to the spotify playlist page?	For BACKEND: They have shown lots of things such as Scan QR code!
I am just wondering how to generate a group of trusted users when a new user just register.¬†The source is from his/her friends or other ways?	Not sure how intuitive the UX is, but UI is very great
I also liked your redefinition of playlists as living documents. However, there is a lot grey area here. For example, who can actually edit a playlist? Who can delete, add, etc.? Is it anyone following the playlist or only a select a few? What stops people with malicious intent from sabotaging playlists, or more likely, adding songs that really doesn't fit with the playlist? These are all questions that you can think about.	First group to actually show their backend working through Postman
Just a small suggestion, the contrast of white text on teal background is not easy for people to see.	I really like the collaborative playlist idea, and as an avid music consumer
The social feature is good, but I am inclined to follow playlists and friends on Spotify's integrated social environment over a third party application that links to Spotify. * How would playlists integrate with Spotify? I shouldn't have to return to your app between songs.	
Also, Spotify is about to roll out collaborative playlists, will this affect your product	
UI mockup could've been better if comments were possible youtube videos can lead to many tech difficulties when presenting. preload them if possible	

Lag while switching applications – we plan to address this when integration is complete. We can see what elements can be optimized.

Differentiator from Spotify, Soundcloud - We are bringing in organic music tested by music curators and also okayed by social liking (word to mouth experience) rather than thru algorithm. It depends on market acceptance if people find value to add a new app instead of using Spotify. We are confident that there is a potential in market for our idea.

UI comments – mostly we have received positive comments on UI. We will look into specific suggestions on improvement

Malicious intent of sabotaging playlist - Interesting comment. We have to think on those lines. Not sure if it can be addressed within the scope of the project

7. Reflections on Sprint4

As part of previous sprints, I had learnt Spring Framework, REST API and gained an understanding of how to set up architecture for mobile application on backend / front end, tools involved and testing methods.

As I switched to Front end in Sprint4, I got more hands on experience with React Native tool, Expo snack development and Expo client testing platform. Working in group, I also learnt about prototyping methods using Invision and user feedback strategies.

As mentioned in the course website, this course requires a lot of interaction with group. Due to conflicting deadlines from other courses for other group members, it is hard to keep track of progress and also to maintain strict deadlines for the work assigned. Many times we end up doing things at the last minute, sometimes without much discussion. Even with this limitation, I think our group is turning out excellent presentations.

8. Your biggest concerns

After completion of the basic UI layout, my next task for the frontend will be adding touch functionality to the UI elements, adding state to UI elements and integrating with the backend. I am concerned about whether I may have to rewrite large portions of code from scratch while incorporating more functionality.

Teams previous concern for database was: We will continue with MongoDB, but stay aware of possible issues and don't get complacent. We are thinking we continue with MongoDB for now, unless we decide to go graph-based. Spring Data has neo4j functionality available if we want to use it. Graph stores are used to store information about networks of data, such as social connections. Graph stores include Neo4J and Giraph. ---> I am concerned what changes will this bring to the Frontend integration and if it can be contained within Sprint5 deadline.

Appendix A

Survey Protocol

Note: * before a question means that it was required

Hi! We are team BeatHarmony and we are creating an application to improve the music discovery process. Thank you for taking part in this usability study. Our app has 5 main sections: a scrollable feed, liked playlists, search, user profile, and a matching functionality where users are matched with people who have similar music taste. BeatHarmony will also provide functionality to export any playlist to Spotify.

If you have any questions or concerns, please email us at rmendhekar3@gatech.edu

For this usability study, you will be asked to complete **4 tasks** using our online prototype and answer some questions about each task. You can take as much time as you want to complete the task and questions. At the end of the study, you will be asked some general questions about the prototype. Please open the prototype here: https://projects.invisionapp.com/share/C2UGJH2AN7H#/screens/387311462_Homepage

Although we would prefer if you complete this study using a computer, you will also be able to complete it on mobile. Don't worry about interacting with the prototype until you see the first task. This study should take about 20 minutes. When you're ready to begin, go ahead and hit the Next button on this page.

Task 1

Go ahead and scroll through the main feed. Once you are satisfied, **like** the first playlist post in the feed.

When you are finished, click the Next button on this page to answer some questions about the task you just completed.

1. *How easy or difficult did you find it to like the first post?
    - 1 - Very difficult
    - 2 - Difficult
    - 3 - Neutral
    - 4 - Easy
    - 5 - Very easy
2. Please explain your response to the question above.
3. *What do you think the three icons on the bottom left side of each post do?

4. Do you have any comments or questions about this section of the app?

Task 2

Next, please **add a comment** to the first playlist post in the feed.

When you are finished, click the Next button on this page to answer some questions about the task you just completed.

5. *How easy or difficult was finding the comments section of the first playlist post?
    - 1 - Very difficult
    - 2 - Difficult
    - 3 - Neutral
    - 4 - Easy
    - 5 - Very easy
6. Please explain your response to the question above.
7. Do you have any comments or questions about this section of the app?

Task 3

Next, please **contribute a song** to the first playlist post in the feed.

When you are finished, click the Next button on this page to answer some questions about the task you just completed.

8. *How easy or difficult was it to contribute a song?
    - 1 - Very difficult
    - 2 - Difficult
    - 3 - Neutral
    - 4 - Easy
    - 5 - Very easy
9. Please explain your response to the question above.
10. *What are your thoughts on this feature?
11. Do you have any questions or comments about this section of the app?

Task 4

Next, please navigate to your messages.

When you are finished, click the Next button on this page to answer some questions about the task you just completed.

12. *How easy or difficult was it to find your messages?
    - 1 - Very difficult

- 2 - Difficult
- 3 - Neutral
- 4 - Easy
- 5 - Very easy

13. Please explain your response to the question above.
14. *How many unread messages do you see on this page?
15. Do you have any questions or comments about this section of the app?

General Questions

16. *What are your overall impressions of the application?
17. *If this application existed in real life, at which frequency would you use it?
    a. I would not use this application.
    b. I would use this application once every few months.
    c. I would use the application once or twice a month.
    d. I would use the application once or twice a week.
    e. I would use the app almost every day.
18. *How appealing or unappealing do you find the aesthetics of the application?
    a. 1 - Very unappealing
    b. 2 - Unappealing
    c. 3 - Neutral
    d. 4 - Appealing
    e. 5 - Very appealing
19. Please explain your response to the question above.
20. Do you have any thoughts or comments that were not addressed by this study?