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01 Introduction

Our focus throughout this project has been to improve vegans' and vegetarians' dining out experience. Our research findings from our prior exploratory interviews, and journey maps highlighted specific problems that our users faced. We used those findings to come up with low-fidelity wireframes representing potential solutions to their needs. After testing the efficacy of those wireframes with our users, certain features and functionalities emerged as salient, while others faded to the background. Most notably, the functionalities we found most important were using geolocation to identify potential dining options, as well as being able to search for venues in close proximity to the user. From these two core functions, we developed features based on prior user feedback and needs, such as filtering presented options based on user-defined criteria, details about individual restaurants and their menu items, and transitioning to external navigation or online ordering platforms.

All of our prior work has culminated in a prototype that is high fidelity in both look and feel, and that takes a novel approach to presenting recommendations to users. Rather than constantly demanding the user's attention to identify new potential dining venues, our application quietly and unobtrusively aggregates nearby restaurants offering vegan and vegetarian dining options as the user goes about their day-to-day lives, and delivers "bundled notifications" at scheduled, user-defined times so that they can explore new venues without the tedious and repetitive process of searching for a restaurant, reading through the menu, and determining if it's a suitable option. We anticipate that this prototype will streamline our vegan and vegetarian users' process of restaurant discovery by preemptively identifying dining options located in the user's "stomping grounds", so to speak, and presenting them on-demand when requested.

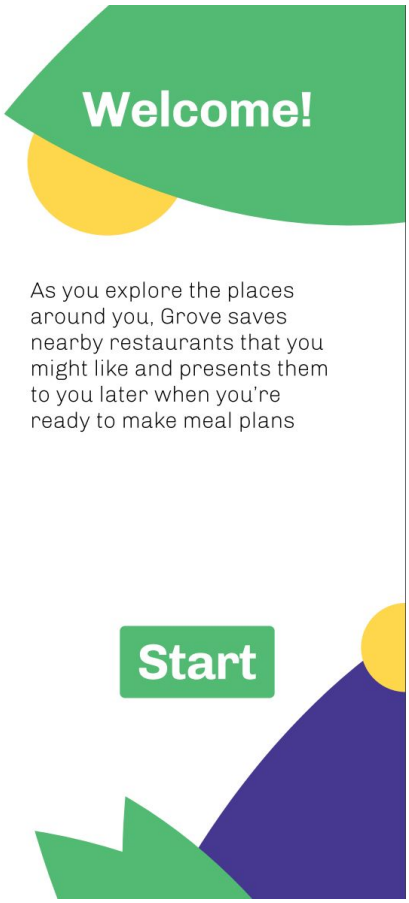
02 Prototype Description

Link to prototype

As we outlined in our previous submission, our prototype combines two core functionalities to facilitate restaurant discovery: a clearly labelled map displaying nearby vegan and vegetarian restaurants and a newsletter-like notification system that keeps track of restaurants that the user has passed by and delivers a periodic update containing all the places the user might want to check out.

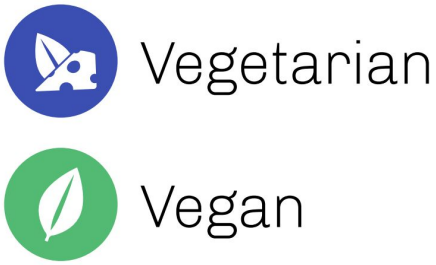
Onboarding

The onboarding page appears when users click to launch the app. This feature only appears when the user uses the app for the first time. This feature is key to introducing the user to a main feature of the app i.e. that it saves nearby restaurants based on the users' geolocation and presents at a later time; this feature is not common and so users might not be familiar with it at first.



Vegan/Vegetarian Icons

Given how often we need to identify interface elements as being either vegan or vegetarian, we were determined in making clear, distinctive, and aesthetically pleasing icons. To that end, we designed a green leaf icon to represent vegan food and a purple leaf with cheese for vegetarian food.



Map

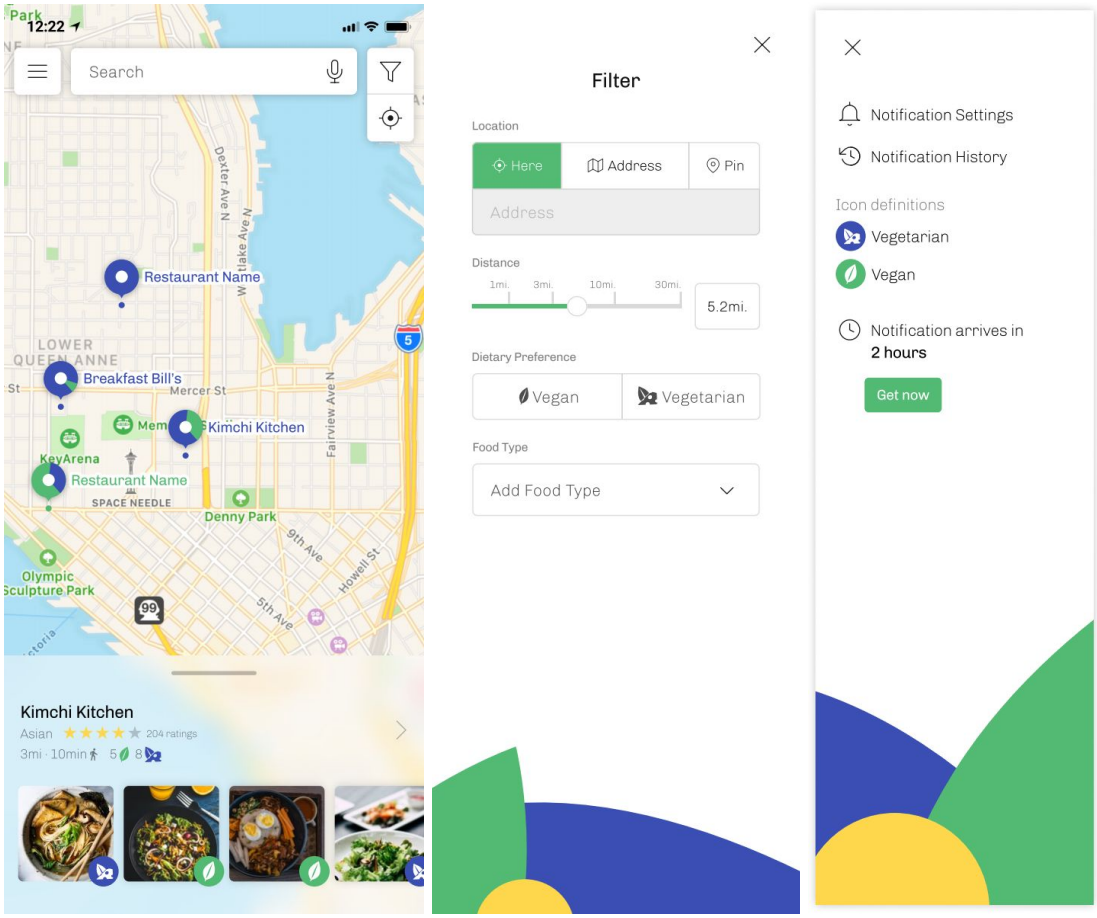
Upon opening the app, users will be met with a map of their surroundings, much like they would with any popular map service like Google Maps. The core difference here is pin design that is more immediately informative to our users.

Initially, we had thought to just use our vegan/vegetarian indicator icons for each restaurant, preferring the icon denoting whichever kind of food the restaurant had more of. However, we decided that this wasn't especially descriptive of the restaurant's menu. A restaurant with 1 vegan option and 100 vegetarian options would display the same as a restaurant with 1 vegan option and 2 vegetarian. And what about 50/50? Our elegant solution was to change the icon pins to little pie charts with their colors corresponding to the colors of the icons.

Otherwise, the map functions largely as a user would any of their own map apps: They can scroll about the map by dragging and recenter around their current position by tapping the recenter button on the top right. Selecting a pin brings up that restaurant's details in the drawer below.

Restaurant Entry

At the bottom of the map, and on several other screens in our prototype, we have our restaurant entry, where users can view its ratings, distance, and cuisine types. Here we also display an overview of the number of vegan and vegetarian options using the same iconography we use elsewhere. Below the restaurant details we included a carousel of vegan and vegetarian dishes so users can browse for food visually as they described in our research. Selecting one of the images will bring up



Right: *Map screen,* ***Middle:*** *Filter menu,* ***Right:*** *Hamburger menu*

Search & Filter

At the top of the map, users have access to our search and filter functionalities. The search works like any other, narrowing results by key words, however, we've included a dictation icon for accessibility purposes.

More important is the filter. Following our results from the wireframe evaluations, we designed a filter with only the essential components our users desired: location, proximity, dietary preference, and food type. The location input allows the user to define where the app will search

in one of three ways: automatically around their current position, manually around a location the user types in, or manually via a pin the user places on the map. The distance input lets the user define the search radius via a slider, which has exponential tick marks to roughly accommodate both wide and narrow searches, or a direct number input. Dietary preference will limit results to either vegan, vegetarian, or both. Finally, food type will limit results to a type of cuisine like Asian or Italian.

Hamburger Menu

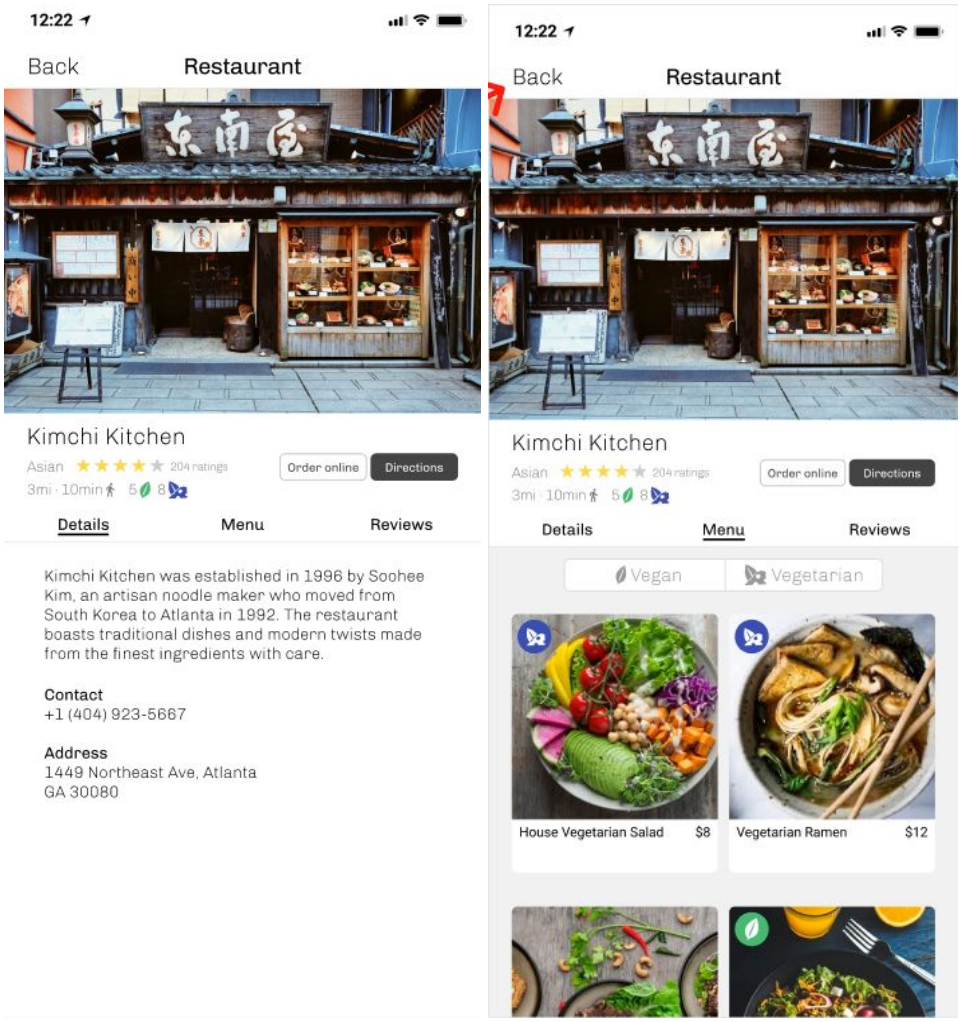
The hamburger menu, accessed via the hamburger bar at the top of the map, serves as both a navigation menu and storage for supplementary information like the icon legend and the notification arrival timer. We had considered using bottom tabs as navigation, but we wanted to reserve as much screen space as possible for the map and restaurant drawer Given that the notification settings and history are more supplementary features, adding one more layer of interaction to reach them was deemed a reasonable compromise for the space.

The icon definitions were added here in response to confusion about the meanings of the icons in our wireframes. We had considered having the legend be on the map, but we didn't want to take up space with information we expected the user to internalize over repeated usage.

The notification timer, though the centerpiece in our wireframe, was deemed to be merely supplementary information, so it resides here now. The "Get Now" button below it will allow users to receive their pass history newsletter right then.

Individual Restaurant View

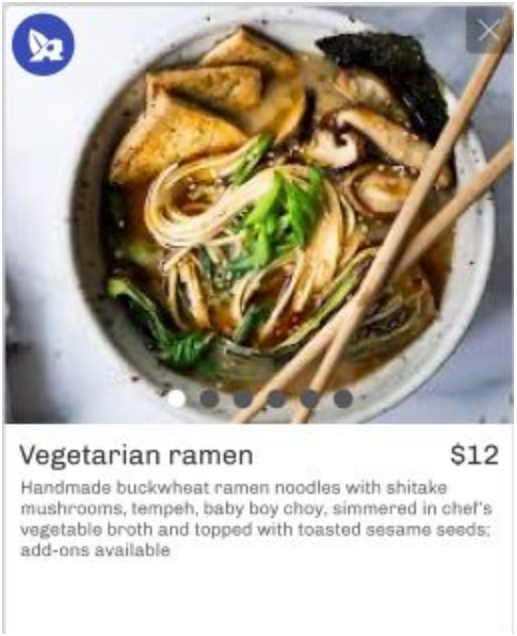
This feature allows users to view more granular details of a particular restaurant compared to information on the map or restaurant list. By clicking onto a restaurant name/title card, users are led to the next page where they will see images of the restaurant, name, cuisine type. Furthermore, there are action buttons to order online, get directions, and tabs to view details, the menu, and reviews.



Menu Item Modal

From the individual restaurant page, users can view the restaurant menu by tapping the middle tab. There, they can view menu item images, names, and prices; they can also filter the menu to only show vegan and / or vegetarian dishes.

Upon clicking a menu item, a modal overlay pops up; users will see the item image, and can swipe for a carousel-type behavior to view more images. If the item is vegan or vegetarian, there is an icon indicator on the main image to inform users. The item name and price is also more prominent here. Below that, the item description is displayed for users' reference.

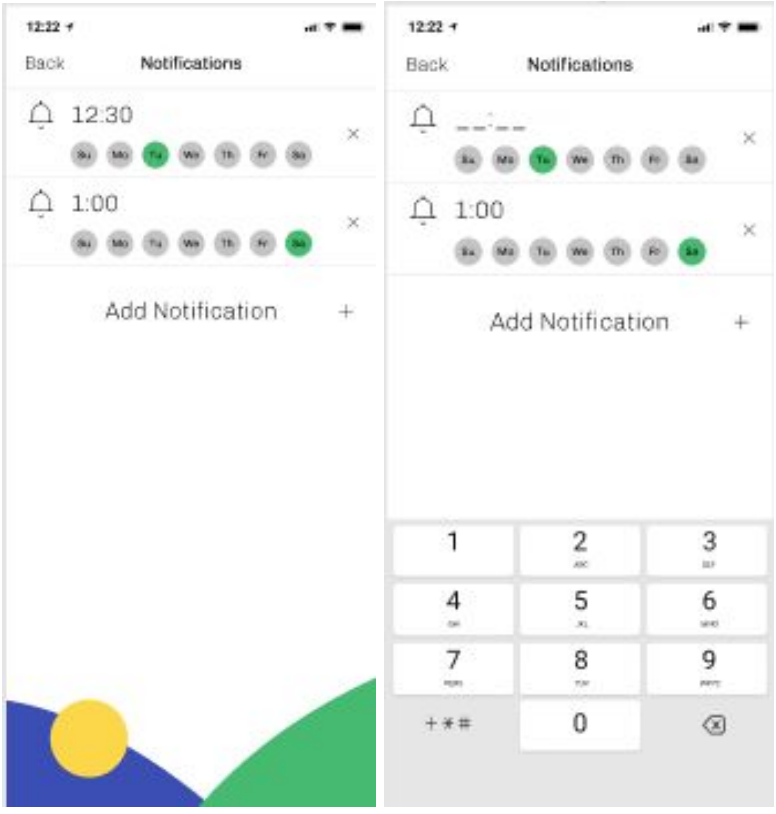


Directions to Restaurant

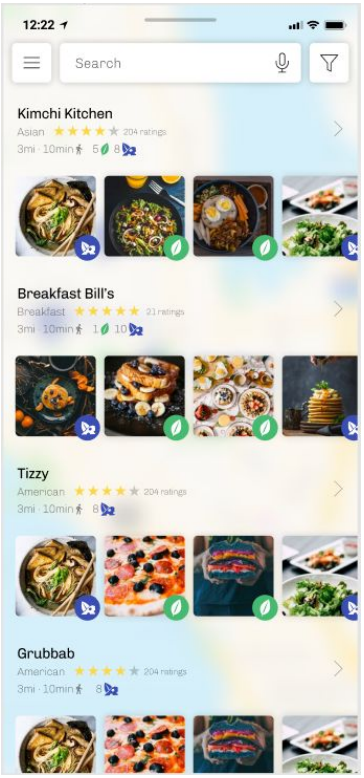
This frame simulates what the users see when they tap on the ‘Directions’ action button from the restaurant page. Here, the map shows basic map functionalities e.g. user location, destination, estimated commute time based on transportation mode, and map / direction visualization. There is a ‘Back’ button to allow users to return to the previous ‘Restaurant’ page.

Notification Settings

This feature mimics a typical smartphone alarm-clock feature for users’ ease of ‘learning’ this app. Users are able to set their preferred day(s) and time(s) when they will receive the curated list of restaurants they have passed. The system delivers the notifications based on these user settings.



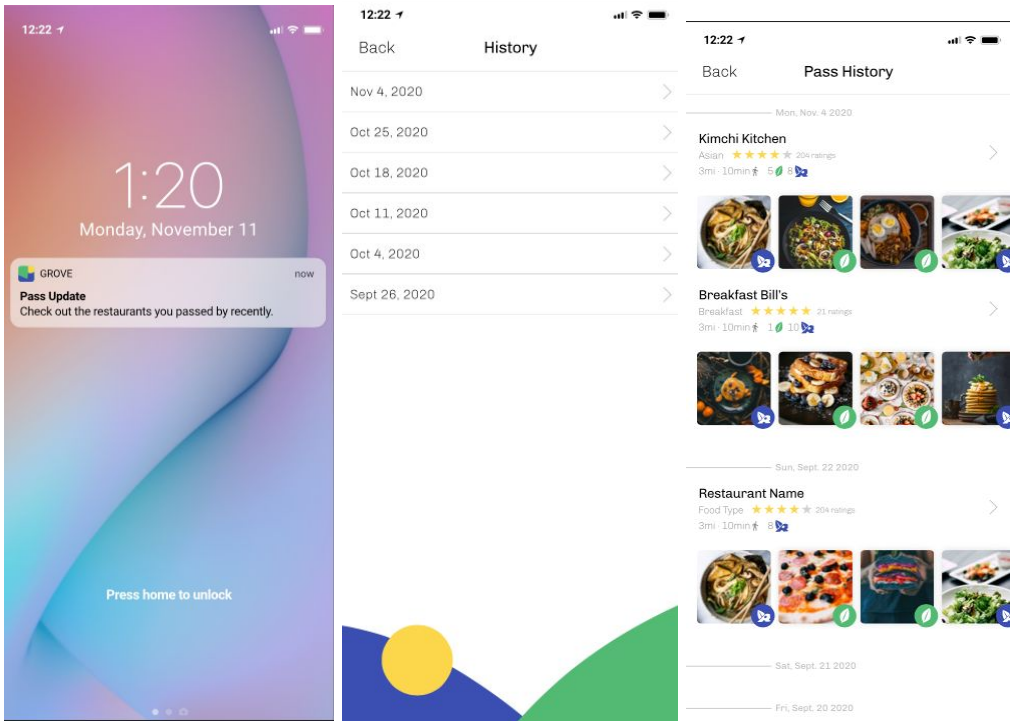
Restaurant Lists



Although the map shows pins to highlight restaurants in an area, users can swipe up to drag a drawer that contains a restaurant list. This feature allows them to view the information in another organized manner; on this list, users can quickly view information on restaurant names, cuisine type, ratings, distance, and vegan/vegetarian availabilities. If users are keen on a place, clicking the particular restaurant card would send them to the individual restaurant page for more information.

"Newsletter" History

Clicking the option in the Hamburger menu bar, or Notification banner (at the locked phone screen) would lead users to see their 'Passed history' (i.e. curated list of restaurants within a proximity of their past geolocation. The information is currently organized by dates when the curated list was sent to the user. Clicking on a specific date would expand to show the list of restaurants along with some details. These details include restaurant name, cuisine, vegan/vegetarian availabilities, and some menu item images.



03 Evaluation Activities

3.1 Heuristic Evaluation

3.1.1 Evaluation Goals

The main objective of the Heuristic Evaluation sessions is to identify usability problems in our working prototype. We hoped to have experts examine our interface against established usability principles (Nielsen's Heuristics), in order to understand how various elements in our design affect the overall user experience. Then, we could incorporate experts' insights and suggestions into our iterative design process. We intended to not only identify the usability issues, but also get experts' opinions on the severity of each issue, which would let us prioritize future design changes. Due to time constraint, we conducted a total of three Heuristic Evaluations simultaneously with the usability tests.

3.1.2 Method Justification

In our previous evaluations, we focused on user feedback to ensure that our initial idea sketches and wireframes addressed key user needs and fitted users' mental model. At this stage, we have collected enough data to inform our design decisions and were able to develop a more concrete representation of the final solution. It is crucial that we validate our design decisions with UX experts, and to uncover problems as early as possible. Also, it is helpful to collect feedback from multiple perspectives as we hope to get a more comprehensive view of the usability issues in our prototype. Moreover, this method requires less time and resources as the expert evaluators do not have to fall into our target user group. Finally, we can focus more attention on the problem areas identified by experts, for the following rounds of usability testing.

One limitation, however, is that our expert evaluators are all HCI students from Georgia Tech, which may or may not impose certain biases. Another limitation is that not every expert evaluator had domain expertise regarding vegan/vegetarian diets, and / or apps related to food and restaurant services.

3.1.3 Method Details

In each evaluation session, we had one facilitator and one note-taker. The facilitator focused on walking evaluators through the instructions and tasks, answering questions, and keeping track of time. The note-taker helped record the usability issues and suggestions on a Mural board (*Appendix A*) as evaluators expressed their feedback aloud. The sessions were conducted over Microsoft Teams, and ranged from 45 to 60 minutes.

Participants

Our expert evaluators were two second-year HCI students and one first-year HCI student. All three evaluators are familiar with Nielsen's Heuristics. While we did not require the evaluators to

be vegans / vegetarians, we made sure that they are familiar with the notion of dietary preferences / restrictions and can empathize with our target users on some level.

Procedures, Metrics and Questions

Each of our Heuristic Evaluation sessions included four main parts. First, we gave each evaluator an introduction of the problem space, our design goals, and the proposed solution. Next, we explained the (two) main user goals, and demonstrated key features that support the respective goals. Then we give the evaluators time to get a sense of the navigation flow, as well as to take a closer look at individual elements in the prototype. Finally, we asked them to judge the prototype's compliance with Nielsen's Heuristics (Figure 3.1.3a). Evaluators walked through every component in our prototype, identified issues regarding the principle(s) they violated, and gave some suggestions for improving our current design. At the end, each evaluator assigned severity scores (Figure 3.1.3b), on a scale of 0-4, to a list of aggregated usability issues.

The justification for using Nielsen's Heuristics is that since we're designing a mobile app, a universal set of usability principles seem to be an excellent standard to follow. Hence, we decided to evaluate how well our prototype complied with established usability principles. The other set of metrics we used are the severity ratings. They help us rank the existing issues and determine what we need to prioritize in our next iteration.

The rationale behind explaining user goals to our evaluators is to let them keep in mind the problems we're trying to solve, and to have them evaluate how well our design solution supports those key goals.

User Goals
1. Users want to look for restaurants that have vegan and vegetarian options.
2. Users want to see what vegan or vegetarian friendly restaurants they've passed during the day (and on previous days).

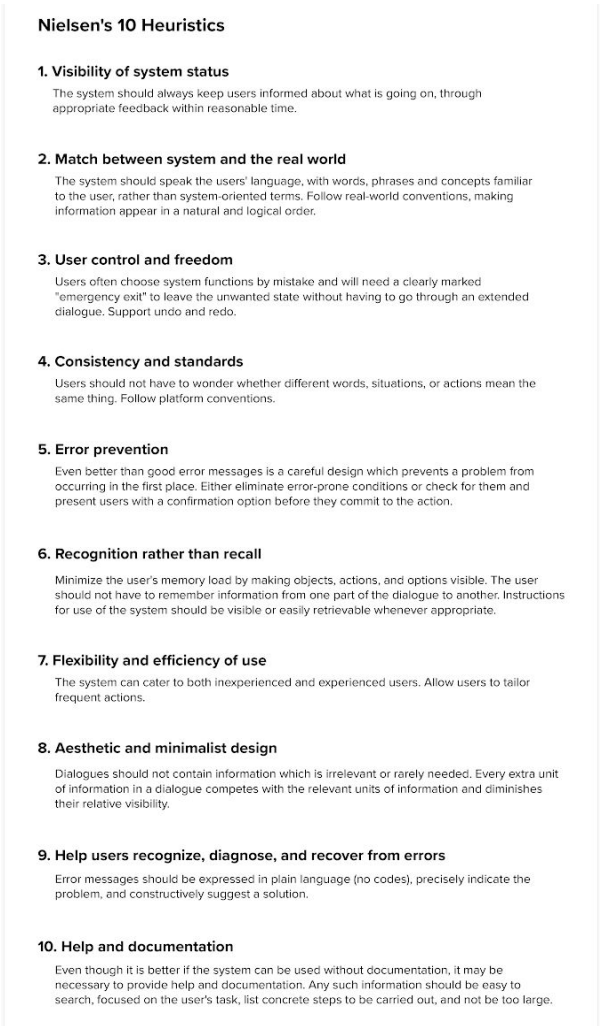


Figure 3.1.3a. Nielsen's Heuristics

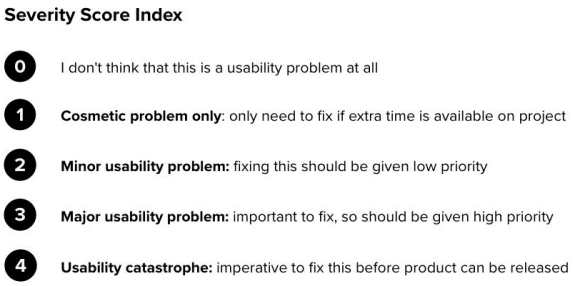


Figure 3.1.3b. Index for Severity Rating Scale

More details about the session design can be found in the script below.

Preparation

1. Send evaluator a copy of Nielsen's Heuristics + Severity Score Index (Mural link)
2. Send Figma prototype link
3. Start recording

Introduction **[3 mins]**

Hi [*participant name*]. Thanks for taking part in this expert evaluation session. I [your name] will be the facilitator while my teammate [notetaker] will be taking down notes. This session will be recorded, are you alright with that?

[Briefly explain context]
We're presenting the interactive prototype we generated to improve the vegan/vegetarian experiences when eating out.

First, I'll walk you through the prototype to demonstrate our design.
Next, you'll be asked to go through the prototype to get more familiar with it.
Finally, you will go through the prototype one more time to identify issues and give evaluations based on the standard Nielsen's Heuristics. You will rate each issue with a severity score of 0-4. As you assign each score, please elaborate on why you did so.

Notes:

a. Please feel free to interject and ask questions at any point.
b. During each walkthrough, please don't hesitate to point out any usability issues you find in the prototype.
c. We're only testing the prototype, not your skill.

Procedure

[7 mins] Prototype Demonstration (Facilitator)

User Goal #1: Users want to look for restaurants that have vegan and vegetarian options.
User Flow 1: Onboarding
Feature: Filter

1. What do you think these do?
2. How would the filters change the map?

User Flow 2: Check out the vegan and/or vegetarian options at a restaurant (Restaurant Details, Vegan/Vegetarian Filters, Individual Item Cards)

User Goal #2: Users want to see what vegan or vegetarian friendly restaurants they've passed during the day (and on previous days).
Hamburger Menu
User Flow 3: (Notification History) Check out restaurants you have passed by.
User Flow 4 : (Notification Settings) Set notification delivery date, time, occurrence.
Feature: Get Notification/Pass History now
Feature: Notification Banner

[7 mins] Prototype Walkthrough (Expert Evaluator)
We want to give you time to get more familiar with the prototype (both in terms of use flow + specific elements). Please feel free to ask questions.
Could you please share your screen so we can observe, and help answer questions?

[30 - 35 mins] Prototype Evaluation
Since we're conducting the evaluations virtually and cannot give you a printed form, we're using Mural to collect your comments. You will share your insights on the issues found, severity score, and recommendations. Please feel free to elaborate on the issues you found, and identify which heuristic each issue violates.

1. Identify issues
2. Rate the severity of each issue

[3 - 5 mins] If have time at the end, Session Design Feedback
1. What did you like/ dislike about how we conducted the session?

2. Did you encounter any accessibility issues?

3.1.4 Analysis

Data Presentation

We gathered two types of data. One is a set of qualitative data, which are notes on usability issues and some design suggestions. The other is quantitative data, which are severity scores to help us prioritize the issues we need to solve. *Figure 3.1.4* is a screenshot of a list of issues, some recommendations, severity score for each issue, and an overall (average) severity score, regarding the heuristic “consistency and standards”, from one expert evaluation session. The full Mural board for this session can be found in *Appendix A*. We used the same template across all three sessions.

(Note: The experts were not required to give a design recommendation for every issue they identified. Hence, some “Recommendation(s)” sections are left empty.)

Figure 3.1.4a. Screenshot of a section of Heuristic Evaluation template

Next, we compiled notes from all three expert evaluations, and mapped each issue to their corresponding element and page.

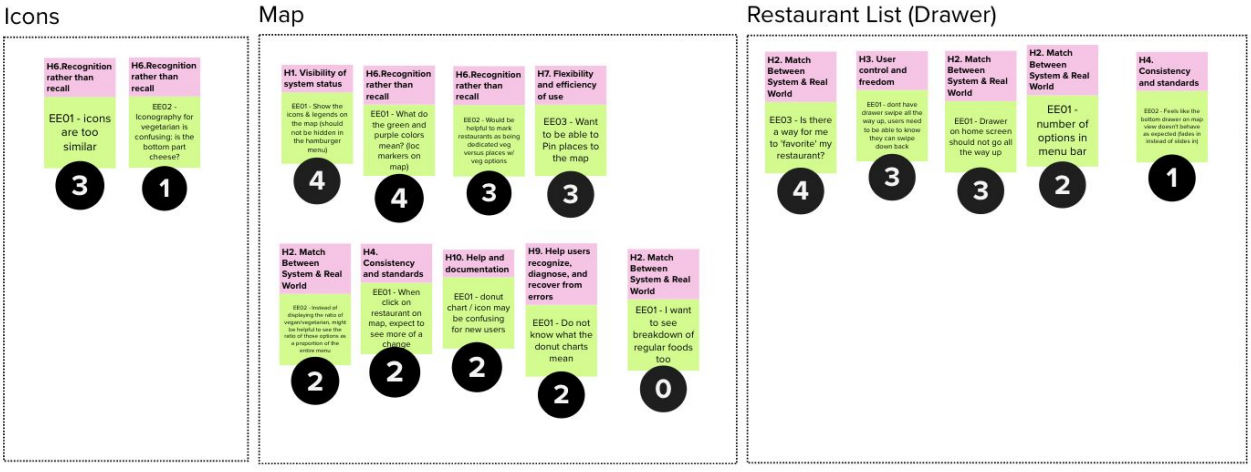


Figure 3.1.4b. Screenshot of a section of the compiled expert evaluation notes. Each note is in the format of “Heuristic (pink sticky) + Issue (green) + Severity Score (black)”

Finally, we sorted the list of issues by their level of severity, in descending order.

Issue	Severity Score	Heuristic
Icons		
EE01 - Icons are too similar	**3**	H6. Recognition rather than recall
EE02 - Iconography for vegetarians is confusing: is the bottom part cheese?	**1**	H6. Recognition rather than recall
Map		
EE01 - Show the icons & legends on the map (should not be hidden in the hamburger menu)	**4**	H1. Visibility of system status
EE01 - What do the green and purple colors mean? (loc markers on map)	**4**	H6. Recognition rather than recall
EE02 - Would be helpful to mark restaurants as being dedicated veg versus places w/ veg options	**3**	H6. Recognition rather than recall
EE03 - Want to be able to Pin places to the map	**3**	H7. Flexibility and efficiency of use
EE02 - Instead of displaying the ratio of vegan/vegetarian, might be helpful to see the ratio of those options as a proportion of the entire menu	**2**	H2. Match Between System & Real World
EE01 - When click on restaurant on map, expect to see more of a change	**2**	H4. Consistency and standards
EE01 - Donut chart / icon may be confusing for new users	**2**	H10. Help and documentation
EE01 - Do not know what the donut charts mean	**2**	H9. Help users recognize, diagnose, and recover from errors
Restaurant List (Drawer)		
EE03 - Is there a way for me to 'favorite' my restaurant?	**4**	H2. Match Between System & Real World
EE01 - Don’t have drawer swipe all the way up, users need to be able to know they can swipe down back	**3**	H3. User control and freedom
EE01 - Drawer on home screen should not go all the way up	**3**	H2. Match Between System & Real World

EE01 - Number of options in menu bar	**2**	H2. Match Between System & Real World
EE02 - Feels like the bottom drawer on map view doesn't behave as expected (fades in instead of slides in)	**1**	H4. Consistency and standards
Filter		
EE03 - Reviews parameters /feature, missing	**4**	H2. Match Between System & Real World
EE03 - “Food type” is misleading - change to “Cuisine”	**3**	H2. Match Between System & Real World
EE01 - "Cuisine" rather than "Food type" for the filter	**3**	H4. Consistency and standards
EE03 - Landing page may be vague - have the filter automatically expanded so users know what to do	**2**	H7. Flexibility and efficiency of use
EE03 - Filter section: contrast /font not contrasted enough	**2**	H7. Flexibility and efficiency of use
EE01 - Vegan and Vegetarian filters (currently function more like checkboxes), but it looks like toggle options	**2**	H4. Consistency and standards
EE01 - 'Address' is not standard (Location input should either hide address input when "here" is selected or just have the current address in there)	**2**	H7. Flexibility and efficiency of use
EE03 - Filter section: Font size seem inconsistent	**1**	H4. Consistency and standards
EE01 - what happens if I don't use vegan / vegetarian filter	**1**	H2. Match Between System & Real World
EE01 - I think about states where filters would cause 0 results - avoid those outcomes	**1**	H5. Error prevention
Hamburger Menu		
EE03 -Expanded section: 'Notification arrives' is confusing	**4**	H4. Consistency and standards
EE01 - “Notification” term is confusing	**4**	H4. Consistency and standards
EE01 - Going back and forth is not that seamless (Settings to Hamburger Menu)	**2**	H3. User control and freedom

EE02 - Icon definitions are interrupting the grouping of "Notification Settings/History" and "Get Now"	**1**	H7. Flexibility and efficiency of use
Onboarding		
EE03 - The 'start' makes me feel like it's a quiz / misleading.	**3**	H1. Visibility of system status
EE01 - Expect system to take information during onboarding (preferences, restrictions etc.)	**2**	H4. Consistency and standards
EE01 - Onboarding to have dietary preferences I can pick at the start	**2**	H1. Visibility of system status
EE03 -Onboarding tutorial for legend etc.	**1**	H1. Visibility of system status
Restaurant Menu		
EE02 - "Order Online" and "Directions" button are small	**3**	H5. Error prevention
EE03 - Color for restaurant description; color selection throws me off bc both are different colors. would prefer one color for selection	**3**	H4. Consistency and standards
EE02 - Margins for text are small (on restaurant view)	**1**	H8. Aesthetic and minimalist design
History List		
EE01 - What is the scope / definition for the "History" list?	**3**	H1. Visibility of system status
EE01 - Need interval as date of notification is unclear	**3**	H4. Consistency and standards
EE01 - Adding notifications can be hard if they have a long list	**2**	H1. Visibility of system status
History (Notification) Page		
EE03 - Not sure if I want ALL the restaurants I've passed - but relevant to my past actions e.g. past purchase, past searches	**4**	H2. Match Between System & Real World
EE01 - "Pass History" information can have time stamps	**3**	H4. Consistency and standards
EE03 - Confusing that restaurant pass view is similar to other pages	**3**	H4. Consistency and standards
EE02 - On the "Notification History" and "Pass History" views, the dates don't refer to	**3**	H4. Consistency and standards

the same thing		
EE03 - Pass history: different ways of organizing e.g. ratings, location, timeline	**3**	H3. User control and freedom
EE02 - Organizing restaurants by day doesn't really conform with what I'd be looking for: It's more about the restaurant than the day	**3**	H7. Flexibility and efficiency of use
EE01 - Pass history: cognitive load to recall my past location	**2**	H2. Match Between System & Real World
EE02 - If you choose to abbreviate months to 3-letters, make sure it's consistent (put "Sept 26, 2020" instead of "Sep 26, 2020")	**1**	H4. Consistency and standards
Notification Settings		
EE03 -'Notifications' confusing for me - not clear whether it is system notification or a unique feature of the app. Should rename it.	**4**	H2. Match Between System & Real World
EE02 - Alarm affordances on "Notification Settings" could be further down, add text explaining functionality	**3**	H10. Help and documentation
Help and Documentation		
EE01 - Add a help section to explain the notification system	**4**	H10. Help and documentation
EE03 - Don't see any point of contact for users to contact if need help	**4**	H10. Help and documentation
EE01 - need onboarding for notification setting - users need more context on what they need to select, what their actions will trigger	**4**	H10. Help and documentation

Severity Score Index

0 - I don't think that this is a usability problem at all
1 - Cosmetic problem only: Only need to fix if extra time is available on the project
2 - Minor usability problem: fixing this should be given low priority
3 - Major usability problem: important to fix, so should be given high priority
4 - Usability catastrophe: imperative to fix this before product can be released

Procedures

In order to draw insights from our qualitative and quantitative data, we organized and analyzed the data in two ways. First, we made a list of key components in our prototype. We organized

the issues identified by evaluators in the format of “Heuristic + Issue + Severity Score.” Then we mapped the issues to their corresponding element / page. In the second part, we utilized the severity scores for each issue to identify which ones to prioritize. As shown in the table above, the issues under each key component are sorted by descending order of severity.

3.2 Usability Testing

Evaluation Goals

Through our usability tests, we intended to identify how clearly we communicated our app’s mental model, as well as our users’ ability to achieve their goals through our high-fidelity prototype. We asked our users to interact with our prototype and leave feedback by attempting to complete pre-defined tasks. We could then compile our users’ feedback and distill actionable themes from them. We also wanted to get their insight as to how usable the system was to them, which we decided to do through the use of the System Usability Scale (SUS).

Method Justification

We settled on task-based usability testing for our user-based testing method because it most closely resembled the environment in which the user would interact with our application. Task-based usability testing would provide us with feedback on how well our application actually supported users in accomplishing their goals. We chose to use SUS scores for three principal reasons: first, SUS scores are easily understandable by yielding only one value. Second, SUS scores are highly reliable [2]. Third, SUS surveys can be completed quickly and can be scored quickly, which makes them ideal for both researchers and for subjects.

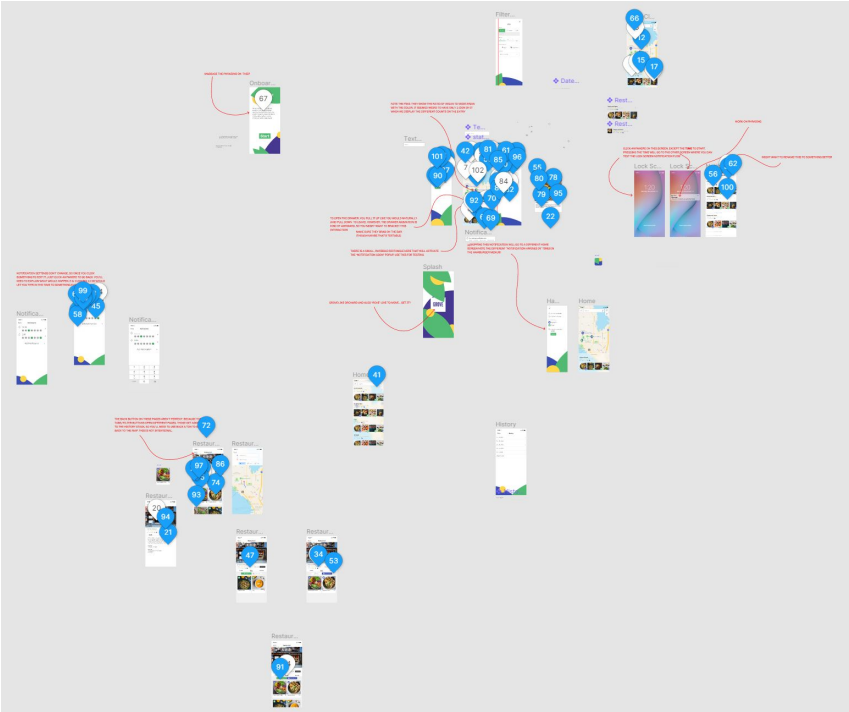
Method Details

Participants

Our 5 usability testing participants were drawn from currently-vegan or vegetarian MS-HCI students. The interviews were scheduled over the course of 4 days.

Procedure

Each usability test was conducted remotely through Microsoft Teams. Users were provided a link to a Figma prototype, and both team members used the “Follow” functionality in the Figma prototype to watch the user interact with the prototype in real time and follow their cursor screen. As our users interacted with the prototype, one of our team members would create comments and leave them on the appropriate part of the Figma prototype, annotated with which user it came from. When the usability test was completed, the comments were automatically attached to the design components, letting team members easily review the comments without having to navigate through the app.



When the user was finished interacting with our prototype, we then asked them to fill out a System Usability Scale (SUS) on Mural, where they could mark their answer to each question and explain their reasoning behind each of their decisions.

Tasks / Task Scenarios

Below are the tasks that we asked our subjects to complete during the usability tests, the underlying goals behind them, and our rationale for why these tasks effectively evaluate how well our prototype supports our users in achieving those goals.

User Goal	Key Task	Rationale
Users want to look for restaurants that have vegan and vegetarian options	“Check out the vegan or vegetarian options at a restaurant. How many items does it have of each category?”	• To observe and determine how well information regarding “the number of vegan/vegetarian items” is presented in our prototype • To gauge whether the current visual + textual representation fits users’ mental model • To identify gap(s) between users’ interpretation and the current representation of vegan / vegetarian items

		• To get user feedback on the restaurant list and the information we included for each restaurant.
Users want to see what vegan and vegetarian items exist at a restaurant	"What items are vegan at Kimchi Kitchen? What items are vegetarian?"	• To observe how users interact with the filters • To gauge whether the filters fits users' mental model • To understand if our current categorization of items under each filter made sense to users. • To get user feedback on the vegan and vegetarian filters
Users want to know details about a candidate restaurant	"What's the phone number for Kimchi Kitchen?"	• To gauge whether the information hierarchy for "Restaurant Details" fits users mental model • To get user feedback on the "Details" section and see if any important pieces of information are missing
Users want to know details about a specific item on a restaurant	"Could you tell me a little more about the vegetarian ramen at Kimchi Kitchen?" **<u>Follow-up</u>**: 1. "What information do you think is missing on this card that you'd prefer to see?"	• To gauge whether if opening individual item cards and browsing through images for each item is intuitive • To get user feedback on the individual item cards, and see if any important information is missing
Users want to streamline their search process	"How would you exclusively limit your search to vegan options?" **<u>Follow-ups</u>**: 1. What do you think the "Food Type" dropdown is for on the Filter pane?	• To understand if the "Filter" icon on the map / home page is visible and accessible to the users • To make sure the labels for each filter option is clear and intuitive

	2. What do you think the 3 Location-based filters are meant to represent?	• To make sure how we set up the filter options are aligned with users' expectations and mental model • To get user feedback on the filter options, and see if any important information is missing
Users want to get directions to a restaurant once they've identified it as a candidate	"Could you get directions to Kimchi Kitchen?"	• To make sure the "Directions" button fits users' mental model. • To make sure the button is visible and easy to access for the users
Users want to see what vegan or vegetarian friendly restaurants they've passed during the day (and on previous days).	"Could you tell me what vegetarian restaurants you passed by on November 4?"	• To gauge whether the new (& key) feature of "collecting restaurants throughout the day" made sense to users • To test whether the current labeling for the feature made sense to users • To see if this functionality is easy to find • To get user feedback on ways to improve the phrasing, structure, ect. of the feature to make it better fit users' mental model
Users want to modify their notification schedule to fit their needs	"Could you modify the dates and times you receive notifications?"	• To gauge whether users understand the concept of setting notification delivery time • To understand if the current design fits users' mental model
Users want to receive notifications	"You've set your notification to arrive in 2 hours, but you realize that you want to eat right this	• To gauge whether users understand the "Get Now" button (which immediately

on-demand if they need them	minute. How could you get that information now?"	shows a list of restaurants one has passed by) • To understand if the functionality is easy to access • To get user feedback on ways to improve the feature

Script

Introduction **[3 mins]**

Hi [*participant name*]. Thanks for taking part in this user testing session. I [your name] will be the moderator while my teammate [notetaker] will be taking down notes. This session will be recorded, are you alright with that?

[Briefly explain context]
You'll be interacting with the prototype we've created to improve the vegan and vegetarian experiences while dining out. I'm going to ask you to complete some tasks using this prototype, and I'd like to get your feedback on how easy or difficult it was to complete each task. I also ask that you talk me through your decision-making process for each step you take.

Procedure

[Part 1. Prototype Walkthrough and Think Aloud]
(START EACH TASK AT THE MAP SCREEN)

User Goal #1: Users want to look for restaurants that have vegan and vegetarian options
User Task: "Check out the vegan or vegetarian options at a restaurant. How many items does it have of each category?"

- Will also test their understanding of what icon signifies vegan/vegetarian

User Goal #2: Users want to see what vegan and vegetarian items exist at a restaurant
User Task: "What items are vegan at Kimchi Kitchen? What items are vegetarian?"

User Goal #3: Users want to know details about a candidate restaurant
User Task: "What's the phone number for Kimchi Kitchen?"

User Goal #4: Users want to know details about a specific item on a restaurant
User Task: "Could you tell me a little more about the vegetarian ramen at Kimchi Kitchen?"

Follow-up: "What information do you think is missing on this card that you'd prefer to see?"

User Goal #5: Users want to streamline their search process
User Task: "How would you exclusively limit your search to vegan options?"

Follow-ups:

1. What do you think the "Food Type" dropdown is for on the Filter pane?
2. What do you think the 3 Location-based filters are meant to represent?

User Goal #6: Users want to get directions to a restaurant once they've identified it as a candidate
User Task: "Could you get directions to Kimchi Kitchen?"

User Goal #7: Users want to see what vegan or vegetarian friendly restaurants they've passed during the day (and on previous days).
User Task: "Could you tell me what vegetarian restaurants you passed by on November 4?"

User Goal #8: Users want to modify their notification schedule to fit their needs
User Task: "Could you modify the dates and times you receive notifications?"

User Goal #9: Users want to receive notifications on-demand if they need them
User Task: "Could you go ahead and get your list of restaurants now, instead of waiting for the notification to arrive?"

[Part 2. SUS Rating]

System Usability Scale

© Digital Equipment Corporation, 1986.

	Strongly disagree				Strongly agree
1. I think that I would like to use this system frequently	1	2	3	4	5
2. I found the system unnecessarily complex	1	2	3	4	5
3. I thought the system was easy to use	1	2	3	4	5
4. I think that I would need the support of a technical person to be able to use this system	1	2	3	4	5
5. I found the various functions in this system were well integrated	1	2	3	4	5
6. I thought there was too much inconsistency in this system	1	2	3	4	5
7. I would imagine that most people would learn to use this system very quickly	1	2	3	4	5
8. I found the system very cumbersome to use	1	2	3	4	5
9. I felt very confident using the system	1	2	3	4	5
10. I needed to learn a lot of things before I could get going with this system	1	2	3	4	5

Presentation

Once all of the usability tests were completed, we transferred the comments on the Figma prototype to a spreadsheet, along with the ID of the user that gave the comment and the specific UI element that the comment was related to. By including the UI element the comment was left on in our analysis, we kept context that otherwise would have made notes difficult to interpret.

A	B	C
User	Prototype Element	Note
U1	Filter	Expect to search first, and then use filters to further narrow down options
U1	Filter	I expect the filter to filter things AFTER I search, not before
U1	Filter Food Type Input	I'm not sure what "Food type" means. Label is not sufficient for me to understand.
U1	Filter Food Type Input	Label unclear
U1	Filter Location Input	I wouldn't use the address function here. I'd expect to use search (to input location) in the home screen.
U1	Filter Location Input	Wouldn't be coming here in the first place to enter search info
U1	Map	Need labels for icons earlier in the flow
U1	Map	Want to see a legend for icons + color codes.
U1	Map Pin	What does the purple icon mean?
U1	Map Pin	Not sure what purple vs green stand for?
U1	Map Search Bar	I would use search to type veg and expect to see more veg options pop up on the screen.
U1	Map Search Bar	Click on search & enter "Vegan"
U1	Menu Item Modal	I dont know all the ingredients and might need to google. Otherwise no problems
U1	Pass History (Notification)	Not clear to me how notification history relate to "Pass History"
U1	Pass History (Notification)	Previous evaluation helped me understand what "pass history" means.
U1	Restaurant Details	If there is a button of "Make a Reservation" at the first screen would be more convenient
U1	Restaurant Details	Add reservation-making functionality?
U1	Restaurant Entry	What are these dishes? They look complicated
U1	Restaurant Entry (map)	Last card = (# more)
U1	Restaurant Entry (map)	Make the last tile say "X more", these currently feel like the only available options
U1	Restaurant Entry (map) Item Icon	Took a while to understand green vs. purple, only understand when seeing the icons.
U1	Restaurant Entry (map) Item Icon	Green == vegan & purple is vegetarian, now I get it
U1	Restaurant Entry (map) Vg/Vt counts	Did not see the item count for the first time. The icons next to each food item image is bigger, easier to recognize/see.
U1	Restaurant Entry (map) Vg/Vt counts	Didn't use these initially
U1	Restaurant Menu	Adding color to filters might help associate faster
U1	Restaurant Menu	Icon matching helps determine what filter corresponds to dishes
U2	Filter	Some sort of onboarding to introduce the filters would help.
U2	Filter	Filter is not very intuitive. Perhaps have a better icon or indicator (Text label under icon). Or not placing it on the map. Not sure what that filter would do (is it for the whole map?)
U2	Filter Food Type Input	I think Food Type means Cuisine
U2	Filter Food Type Input	Different cuisines?
U2	Filter Location Input	I don't know if I might not need all three. Address vs Pin what's the difference? Address is redundant. Would use "Here" most of the time.
U2	Filter Location Input	Here: Current Location, Address: Specific address, Pin: Dropping a pin at a location instead of using address
U2	Hamburger Menu	The "Get Now" function is confusing/not obvious. Took 3 tries. Might be better to have it on the main page (at a more accessible place.)
U2	Hamburger Menu	Notification History might not be the best wording. Maybe call it "Pass History". Currently not consistent.
U2	Hamburger Menu Button	User had a difficult time finding "pass history".
U2	Map Drawer Up	I don't know pulling the drawer up would take me to the list screen. Indicate this action more explicitly.
U2	Notification Settings	I'd prefer one notification at the end of the day/ a consistent time. (Maybe the "Add notification" function/customizability is not clear?)
U2	Notification Settings	Why are there multiple alarms?
U2	Restaurant Menu	These item numbers do not match the # items shown in the menu. A lil confusing
U2	Restaurant Menu	Make numbers match filters
U3	Filter	Should be clearer that "Filter" is only for future searching, not to filter out pass history.
U3	Filter	In order to see restaurants I've passed by, I'd use "Distance" bc i think past "5.2 miles". Time-based thing that would let me see pass history.
U3	Hamburger Menu Get Now Button	This confuses me. I don't know if "get now" makes me think of getting notification now.
		Introduce new ideas. An onboarding process to explain the new functionalities and features.

A screenshot of our user feedback spreadsheet, listing feedback and the subject UI element being discussed.

In total, we recorded 97 comments and got 5 SUS surveys from our 5 usability sessions.

We then constructed an affinity map that was divided into sections corresponding to the UI elements that each comment was left on, and transferred all of the spreadsheet comments onto the affinity map, organizing them by their corresponding UI elements. We also transferred our feedback from the expert evaluations, and put them in their corresponding UI sections. With all of the data in one place, we then set about identifying themes within each section, which we

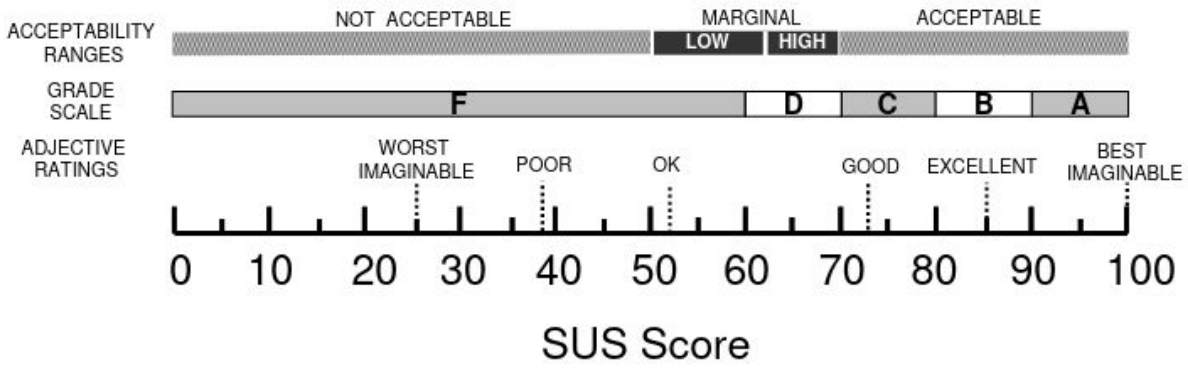
then distilled further into design recommendations discussed later in this paper. See *Appendix B* for an image of the affinity map as well as links to the interactive map itself.

In addition to the themes we identified from user feedback, we also needed to interpret the SUS surveys (*Appendix C*) that we had received from each user. Our procedure for interpreting the surveys was as described in Brooke's original paper for SUS [3]:

1. **For questions 1, 3, 5, 7, and 9, the score contribution is the scale position minus 1**
2. **For questions 2, 4, 6, 8, and 10, the contribution is 5 minus the scale position**
3. **Sum all of the scores together, and multiply by 2.5 to get the SUS score.**

We then interpreted our average SUS score as our usability score across users, using the interpretation method provided by Bangor et al[1].

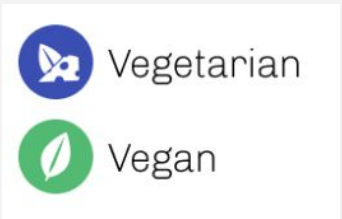
	User Answer (1-5)				
Question	U1	U2	U3	U4	U5
1. I think that I would like to use this system frequently.	4	3	5	5	5
2. I found the system unnecessarily complex.	1	2	1	1	1
3. I thought the system was easy to use.	5	4	2	5	5
4. I think that I would need the support of a technical person to be able to use this system.	1	1	1	1	1
5. I found the various functions in this system were well integrated.	4	4	4	5	4
6. I thought there was too much inconsistency in this system.	2	2	2	1	2
7. I would imagine that most people would learn to use this system very quickly.	4	5	4	4	5
8. I found the system very cumbersome to use.	1	1	1	1	1
9. I felt very confident using the system.	4	3	3	4	5
10. I needed to learn a lot of things before I could get going with this system.	1	2	3	1	1
SUS SCORE:	**87.5**	**77.5**	**75**	**95**	**95**
AVERAGE SUS SCORE:	**86**				



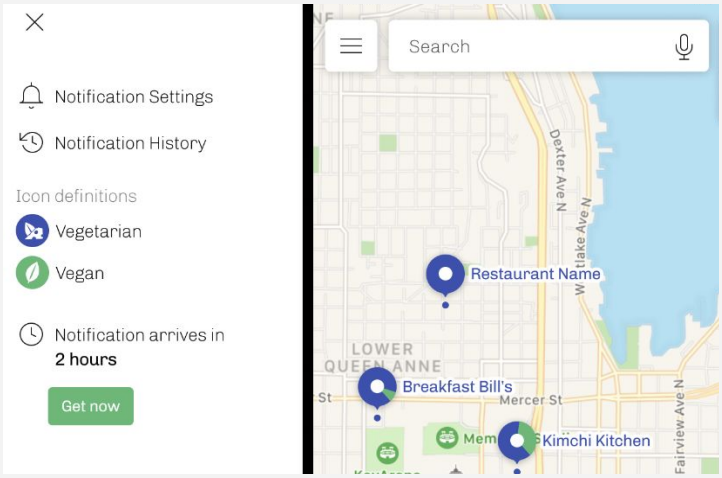
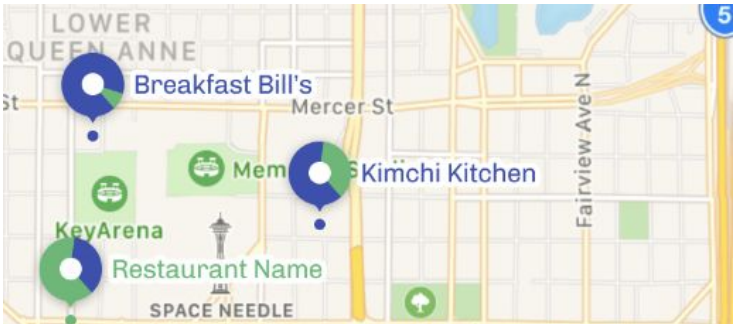
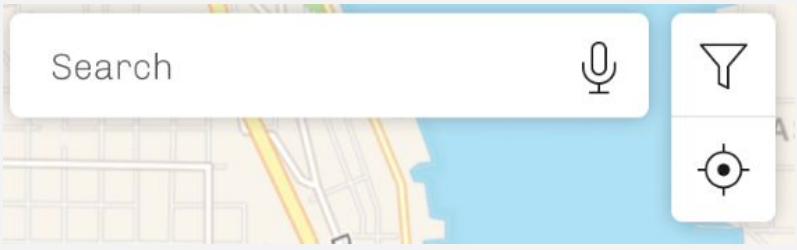
Bangor et al's described means of interpreting SUS scores with grade-based scaling as well as adjective ratings.

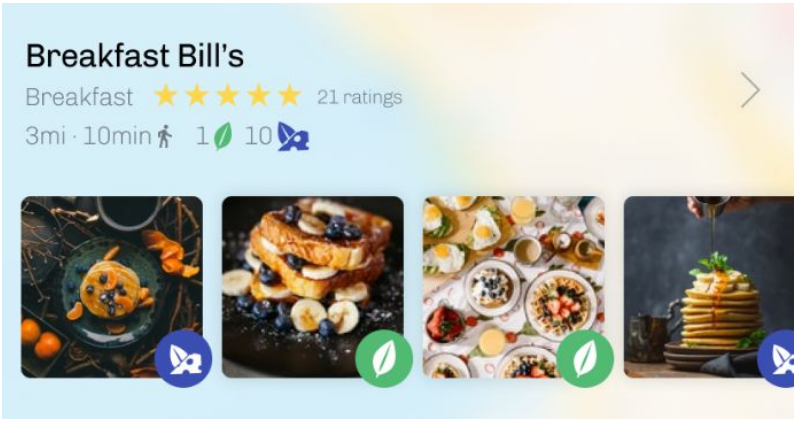
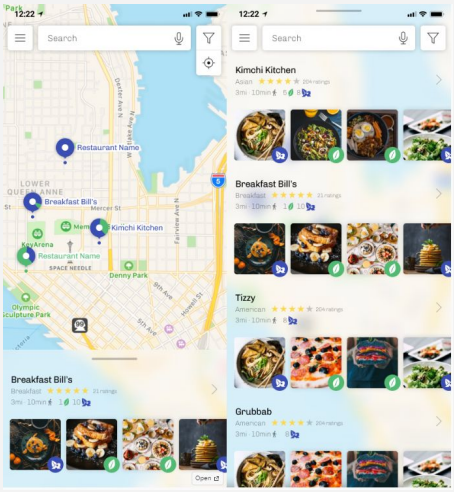
04 Design Recommendations

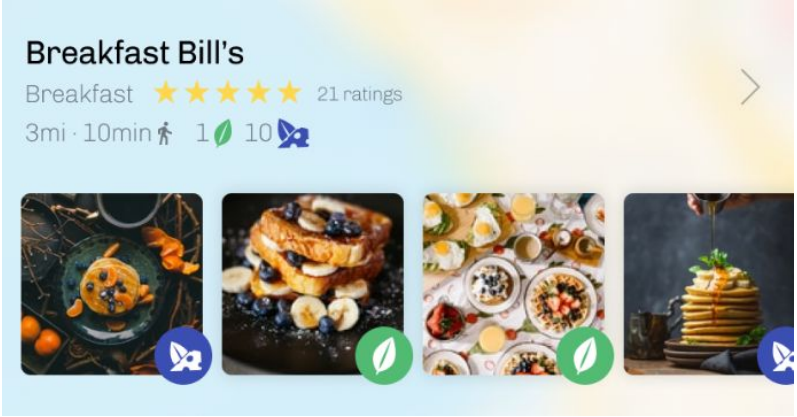
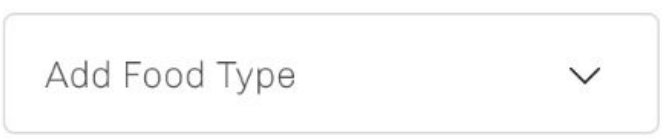
The table below presents a summary of our findings from a combination of expert evaluators (EE) and user feedback (U). The table is organized into specific features or components of the system; the first column refers to the issues and their descriptions, the next column contains quotes and/or screenshots of the particular component issue, and the last column contains design recommendations to overcome these issues. There may be some overlap or repetition within the issues and components as some components are closely related in flow.

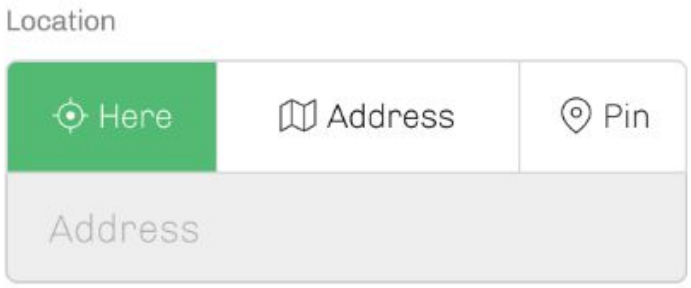
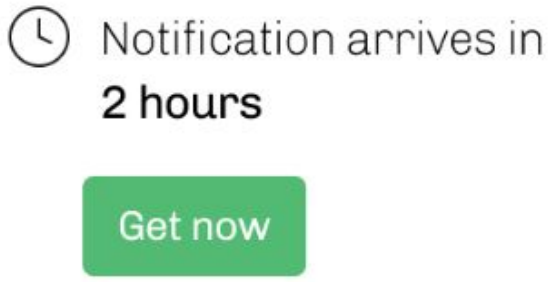
Issue & description	Evidence	Recommendations
Overall		
Vegan/vegetarian icons aren't intuitive	**EE01:** "Icons are too similar" **EE02:** "Iconography for vegetarian is confusing: is the bottom part cheese?" **U01:** "Need labels for icons earlier in the flow"	Vegan/Vegetarian iconography needs to be investigated more. There are currently no industry standards, so discovering effective icons for these concepts would be worth a design exploration by itself. Granted, once users were shown the icon definitions, they were able to interpret the icons effectively; however, the more intuitive we can make them, the better.
		
The notification concept needs better	**EE01:** "Notification term is confusing"	Do not use language like "notification" which already

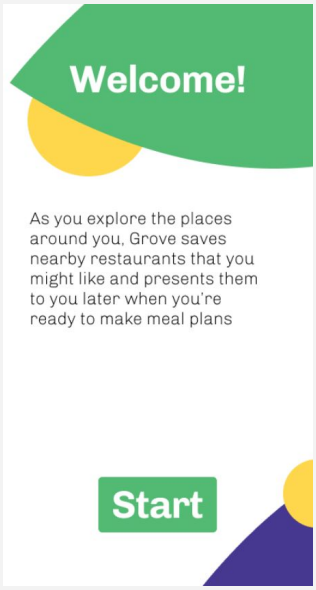
explanation	**EE03:** “Expanded section: 'Notification arrives' is confusing” **U04:** “Include intro screens to better explains "notification" because its different than in most contexts” **U05:** “Maybe think about other ways of naming it to focus on explaining the concept (rather than making it very system-based.)” **U02:** “Notification History might not be the best wording. Maybe call it ‘Pass History.’ Currently not consistent.”	has meaning within the context of phone usage. Focus on “Pass History” for the notification concept and be more consistent with language.
System lacks personalization	**EE03:** “Is there a way for me to 'favorite' my restaurant?”	Feature that allows users to ‘save’ / add restaurants to a ‘Favorites’ list for easy access. Additionally, these favorited places can be used by the system to provide more targeted, personalized recommendations for new restaurants
System lacks help menu	**EE01:** “Need onboarding for notification setting - users need more context on what they need to select, what their actions will trigger” **EE03:** “Don’t see any point of contact for users to contact if need help”	Add a help section accessible via the hamburger menu. This will include details about the functionality of app, definitions for terms, and help contact information
Map Screen		
The pins & map legend placement was confusing	**EE01: “**Show the icons & legends on the map (should not be hidden in the hamburger menu)” **EE01:** “donut chart / icon may be confusing for new users” **U01: “**Not sure what purple vs green stand for?” **U04:** “Legend should ideally be on map”	Map legend (icon/pin definitions) needs to be clearly presented either in an onboarding tutorial or in a persistent location on the map screen, and the concept of the pie chart pin should be explained

<table>
<tr><td colspan="2"> 
</td><td></td></tr>
<tr><td>Pie chart can be better personalized to user expectations</td><td>EE01: “I want to see breakdown of regular foods too”</td><td rowspan="2">Allow users to customize what the pie charts show vegan, vegetarian, or neither options, or just vegan and non-vegan, or vegetarian and non-vegetarian options.</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td>Filter button may not be clear</td><td>U03: “I'm not sure people will recognize the filter icon very quickly. Add a text label along with the icon.”
U04: “When filter is placed with map icon, it doesn't seem like it has to do with the filter”</td><td rowspan="2">Since we don’t have a lot of screen space to work with here, it may be best to merely segregate the map interaction buttons from the search input, so users are less likely to overlook the filter button. If the button is still unclear with users, then we would replace the icon with text.</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td colspan="3">Restaurant Drawer</td></tr>
<tr><td>Carousels on restaurant entries don’t indicate that</td><td>U01: ”Make the last tile say ‘X more,’ these currently feel like the only available options”</td><td>Last card should show “X+” to indicate that there are more options on the full menu,</td></tr>
</table>

there are more options on the menu	**U03:** “I see an arrow and I think I can find more info through that. Maybe the ‘# items’ can go next to the title ‘Kimchi Kitchen.’”	where X is the number of remaining menu items
		
Drawer opening and closing interaction can be confusing	**EE01: “**Don’t have drawer swipe all the way up, users need to be able to know they can swipe down back”	The confusion here could have been a result of limitations within Figma to accurately represent the drawer interaction; however, if it isn’t, then perhaps a drawer is not the right element to use here. We could implement a list view toggle that clearly shows the user that they can switch between the map and list search pages.
		
Legibility of vegan/vegetarian count indicator icons is poor	**U01:** “Did not see the item count for the first time. The icons next to each food item image is bigger, easier to recognize/see.” **U03:** “Didn't use these”	These indicators should be made larger, and possibly be given a label to increase visual weight and clearly define what the icons are indicating
		
Vegan/Vegetarian number icons don’t	**EE01:** “Number of options in menu bar”	We should include a third indicator which counts the

include non-vegan/vegetarian options		number of remaining items on the menu.
		
Restaurant entry could include more functionality	**U03:** “I want the Directions button here. Bc I don't know for sure there's a directions button on the next page. It seems to show more about the menu items at restaurants.”	There is a decent amount of empty space on the restaurant entry, so we can likely include a directions button on the entry itself so users who have already made up their mind don’t have to click through to another interface.
		
Filter		
Filter could include more parameters	**EE03:** “Reviews parameters / feature, missing”	Parameters like rating or price could be added for further filtering
“Food Type” might not be understood by all users	**EE01:** “‘Cuisine’ rather than ‘Food type’ for the filter” **EE03:** “'Food type' is misleading - change to cuisine”	Though many users understood the meaning of “Food Type” they understood it to mean “cuisine,” so it seems that we can respect our expert feedback while not confusing users who understood the current phrasing by changing the “Food Type” to “Cuisine”
		
Filter flow doesn’t conform to user expectations	**U01:** “Click on search & enter ‘Vegan’”	Some users have gotten used to typing “vegan” into Google to refine their search

		Explain filter during onboarding so that the flow makes more sense
Location input interaction unintuitive	**EE01: “**'Address' is not standard (Default current location or home address?)” **U01:** “I wouldn't use the address function here. I'd expect to use search (to input location) in the home screen.” **U02:** “I don't know if I might not need all three. Address vs Pin what's the difference? Address is redundant. Would use "Here" most of the time.”	Address input should be a single text input, but default to the current location, so we can avoid having the confusing buttons
		
Hamburger Menu		
“Get Now” button is confusing and difficult to see	**U02:** “The "Get Now" function is confusing/not obvious. Took 3 tries. Might be better to have it on the main page (at a more accessible place.)”	Following from the previous problem: better explaining the concept of the notification may make the “Get Now” button more intuitive. The button & notification timer should also be more heavily emphasized so users are drawn to it more easily.
		
Onboarding		
Onboarding tutorial is	**EE03**: “Onboarding tutorial for	Include more ‘step-by-step’

insufficient	legend etc.”	onboarding tips to highlight main features and functionalities; add ‘Tips’ function within map or hamburger menu
Tone of the onboarding is sterile and doesn’t fit our context	**EE03:** “The 'start' makes me feel like it’s a quiz / misleading.”	Restructure the writing here: include short blurb of app concept and change button to ‘Explore places’ or ‘Discover now’
		
Notification Settings		
Notification settings functionality unclear	**U02:** “I'd prefer one notification at the end of the day/ a consistent time. Maybe the "Add notification" function/customizability is not clear?” **U04**: “Not immediately sure what you have to do; action ambiguous **U05**: I think "Notification Settings" is going to be an "On/Off" button.” **EE03**: “'Notifications' [is] confusing for me - rename it.”	Re-word ‘Notification’ to ‘Pass history list’ or ‘Pass newsletter’; ensure that wording is consistent with the rest of the system and test effectiveness with users.

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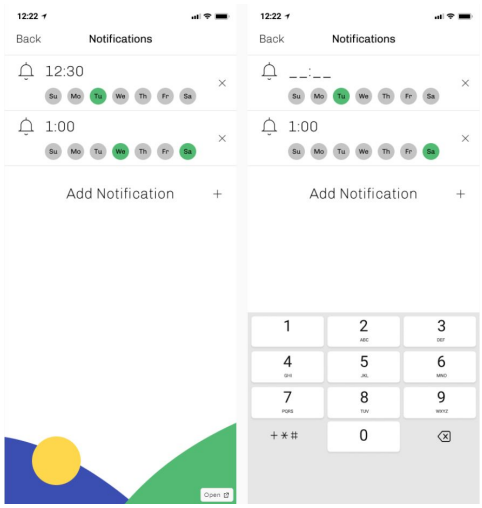
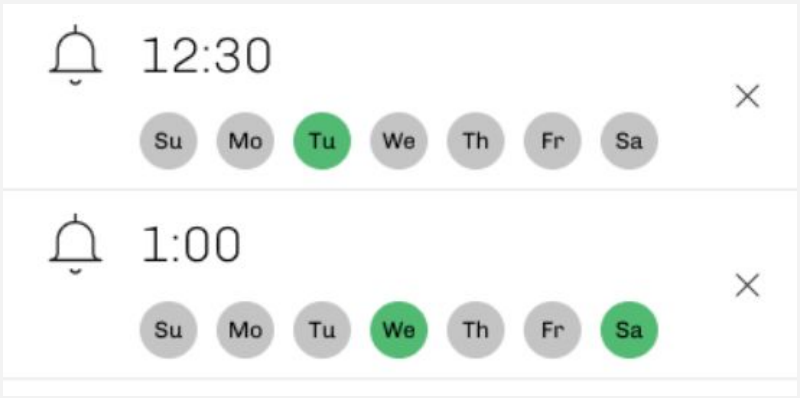
<tr><td colspan="2"> 
</td><td></td></tr>
<tr><td>AM/PM indicator missing</td><td>U03: “Add PM or AM”</td><td rowspan="2">Add AM and PM indicators next to the time</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td>Ambiguous editing feature</td><td>U03: “I expect something more explicit for ‘Editing’.”
U03: “Not sure how to edit an existing alarm/notification time.”</td><td>Add a ‘Edit’ action link to highlight users’ attention on this feature</td></tr>
<tr><td colspan="3">History (Notifications) Page</td></tr>
<tr><td>Ambiguity of language</td><td>U03: Notification History feels like notifications I got rather than just pass history. Device-based rather than feature-specific. Maybe call it "History" or sth else.
U01: Not clear to me how notification history relate to "Pass History"</td><td>As mentioned in another section, to adhere to consistency in language and use the term ‘Pass history’; to include this explanation in onboarding tips</td></tr>
</table>

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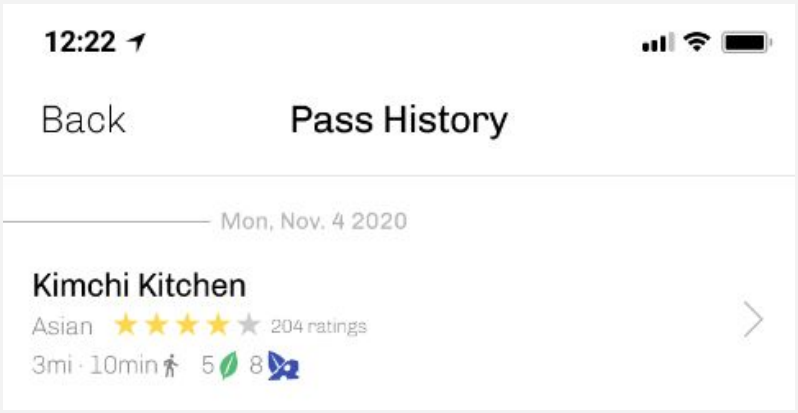
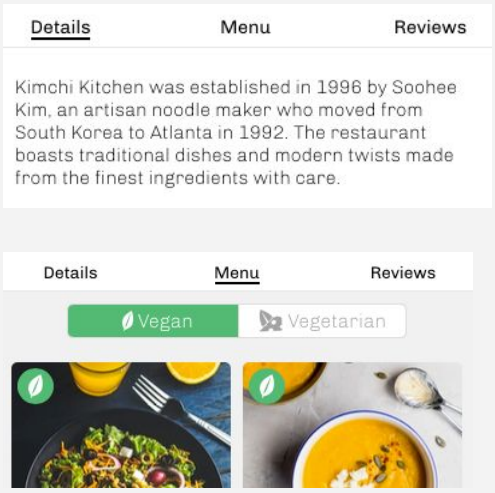
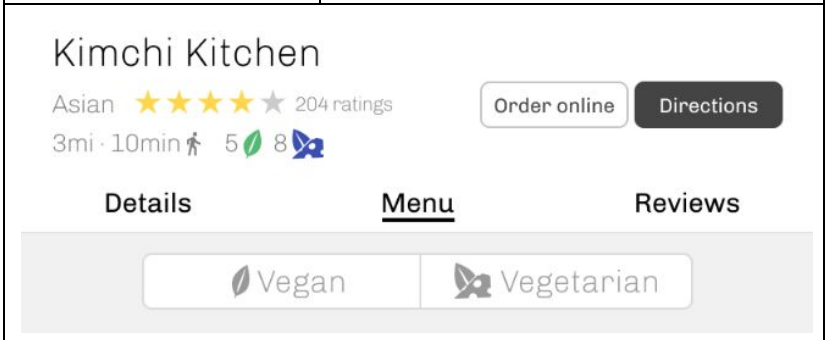
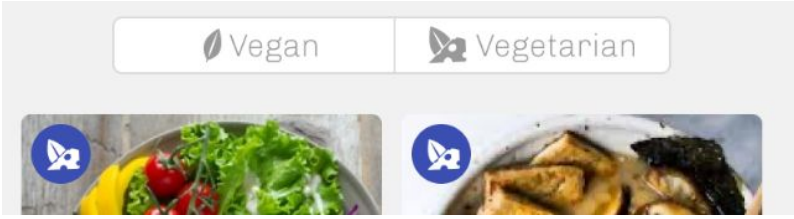
<tr><td colspan="2"> 
</td><td></td></tr>
<tr><td>Flexibility in retrieving information</td><td>U03: Might be good to add a filter button here.
EE03: [Add] different ways of organizing e.g. ratings, location, timeline.
EE02: Organizing restaurants by day doesn't really conform with what I'd be looking for: It's more about the restaurant than the day.
EE01: [Feels like] cognitive load to recall my past location.</td><td rowspan="2">Add filter functions e.g. location, cuisine, ratings, to allows users to filter through the information quickly and get results relevant to their immediate needs</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td colspan="3">History List</td></tr>
<tr><td>Flexibility in retrieving information</td><td>EE01: What is the scope / definition for the history list?</td><td>Define organization of past notification list e.g. group by month in current year or date range selection</td></tr>
</table>

<table>
<tr><td colspan="2"> 
</td><td></td></tr>
<tr><td>Clarification on notification intervals</td><td>EE01: Need interval as date of notification is unclear</td><td rowspan="2">Clarify dates on the list shown (date of passing the place) to distinguish from date of notification being sent to user</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td colspan="3">Menu Item Modal</td></tr>
<tr><td>Users want to see more information e.g. ingredients and nutritional value</td><td>U01: I don't know all the ingredients and might need to google.”
U05: I'd also want to see nutritional value in terms of calories (estimates)</td><td rowspan="2">Include ingredient list and nutritional value on the modal (assumption that data is gathered from restaurant database / source)</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td>Icons on menu item modal could be less visible depending on the background</td><td>U03: The icon here is not very visible for dark backgrounds. Might be helpful to put it on the white area.</td><td rowspan="2">Place icon in another location and/or change icon (color/design)</td></tr>
<tr><td colspan="2">  </td></tr>
</table>

<table>
<tr><th colspan="3">Restaurant Menu</th></tr>
<tr><td>Ambiguity in UX writing for ‘Restaurant details’ and ‘Menu'</td><td>U04: “ ‘Details’ not the most intuitive word.”
U04: “Maybe we shouldn't assume people know that vegan is by definition vegetarian”</td><td rowspan="2">Change ‘details’ to ‘About’; include system definitions of ‘vegan’ and ‘vegetarian’ during onboarding process and/or within legend in system</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td>Users had difficulty counting the number of vegan/vegetarian options</td><td>U05: “[I] counted the number of vegan options rather than looking at the item number indicators at the top. I didn't know what the icons mean yet. The filters, on the other hand, had text labels & seem to be a call for action.”</td><td rowspan="2">Either make the vegan/vegetarian count indicators larger or put the number of options in parentheses next to the filter buttons</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td>Lack of clarity for filtering feature</td><td>U01: “Adding color to filters might help [me] associate [the items] faster”</td><td>Add color to filter buttons that map to the darker / more saturated shade when they are selected; this would inform users that the buttons are clickable and correspond to the vegan or vegetarian color</td></tr>
</table>

	code (consistent throughout the system)

05 Lessons Learned

The following discusses highlights that we learned during this phase in the project. We found that teamwork, session organization, filtering through user feedback, and making the best out of the time and resources we had, were key to successfully delivering at this stage.

Working together to fill gaps

In order to effectively conduct expert evaluations and user testings in a short time, we found it effective to have a session facilitator, scribe, as well as video record the sessions (as there was screen sharing). We took turns to accommodate our varying schedules and support each other for the research sessions. This allowed us to capture rich insights from the sessions which we could then use to conduct effective analysis. Thus, it was important to have certain roles separate and covered so that these research activities can be done effectively. The recordings were useful for us to go back and rewatch certain snippets for insights that needed clarification.

Session organization matters

We received positive feedback from users in terms of the way the evaluation sessions were conducted. Users were happy and impressed by the organization of having ready templates on Mural. Here, they were able to clearly see the heuristics principles, instructions for the activity, user goals and scenarios, and sticky notes for insights. Having the structure set forth made it easy for them to know what was required of them and allowed them to focus on analyzing the system instead of struggling to understand the session. Additionally, this structure and clarity allowed the sessions to flow smoothly; thus, we spent more time gathering evaluator insights and less time explaining things to participants.

Balancing user comment vs urgency / relevance for change

Although we strived to be user-centered throughout the entirety of our project, we found some isolated comments during this phase of the project. Thus, we learned that it was a fine balance of internal discussions versus implementing design changes for isolated comments; some factors we accounted for were ease of implementing the change, impact of the change, and consistency with the purpose of our system.

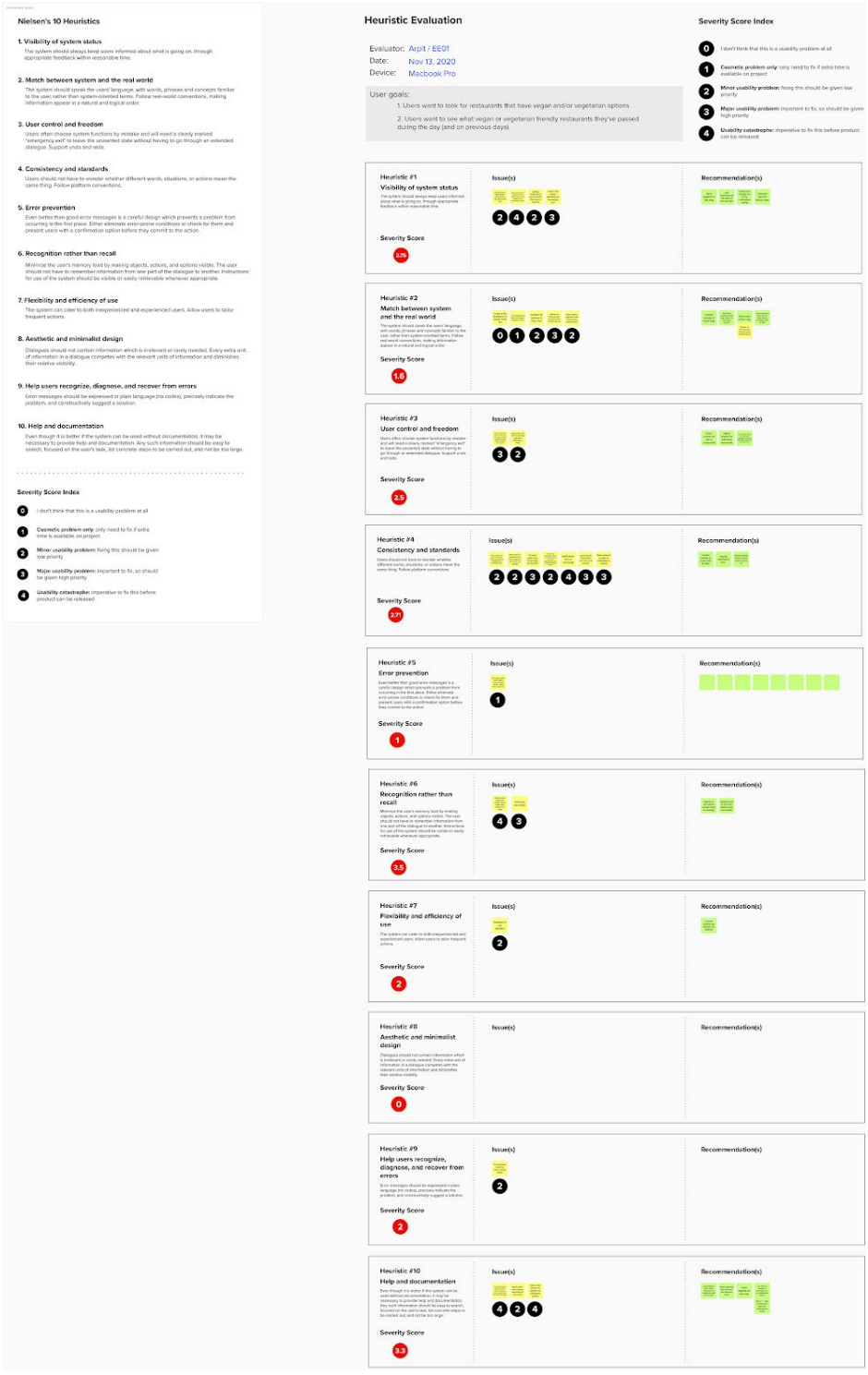
The sequence of evaluation activities could be improved

Ideally, we would conduct expert evaluations before iterating on design fixes, and then conduct usability testing with the iterated prototype. However, given the time constraint, we could not perform the evaluations in the desired sequence. While we recognize this limitation, we're reminded to be flexible with the available resources and adapt. As a result, we conducted both expert evaluations and usability testing within the same research cycle and using the same

prototype. We found great insights despite the less than ideal scenario. We learned it was important to adapt and make the best of the time and resources we had.

06 Appendix

A. Heuristic evaluation note-taking template (from session EE01)



Nielsen's 10 Heuristics

1. Visibility of system status
The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

2. Match between system and the real world
The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

3. User control and freedom
Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

4. Consistency and standards
Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

5. Error prevention
Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

6. Recognition rather than recall
Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

7. Flexibility and efficiency of use
The system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

8. Aesthetic and minimalist design
Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

9. Help users recognize, diagnose, and recover from errors
Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

10. Help and documentation
Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

Severity Score Index

0 I don't think that this is a usability problem at all

1 Cosmetic problem only: only need to fix if extra time is available on project

2 Minor usability problem: fixing this should be given low priority

3 Major usability problem: important to fix, so should be given high priority

4 Usability catastrophe: imperative to fix this before product can be released

Heuristic Evaluation

Evaluator: Arpit / EE01
Date: Nov 13, 2020
Device: Macbook Pro

User goals:
1. Users want to look for restaurants that have vegan and/or vegetarian options
2. Users want to see what vegan or vegetarian friendly restaurants they've passed during the day (and on previous days).

Severity Score Index

0 I don't think that this is a usability problem at all

1 Cosmetic problem only: only need to fix if extra time is available on project

2 Minor usability problem: fixing this should be given low priority

3 Major usability problem: important to fix, so should be given high priority

4 Usability catastrophe: imperative to fix this before product can be released

Heuristic #1
Visibility of system status
Severity Score 2.75
Issue(s) 2 4 2 3
Recommendation(s)

Heuristic #2
Match between system and the real world
Severity Score 1.6
Issue(s) 0 1 2 3 2
Recommendation(s)

Heuristic #3
User control and freedom
Severity Score 2.5
Issue(s) 3 2
Recommendation(s)

Heuristic #4
Consistency and standards
Severity Score 2.71
Issue(s) 2 2 3 2 4 3 3
Recommendation(s)

Heuristic #5
Error prevention
Severity Score 1
Issue(s) 1
Recommendation(s)

Heuristic #6
Recognition rather than recall
Severity Score 3.5
Issue(s) 4 3
Recommendation(s)

Heuristic #7
Flexibility and efficiency of use
Severity Score 2
Issue(s) 2
Recommendation(s)

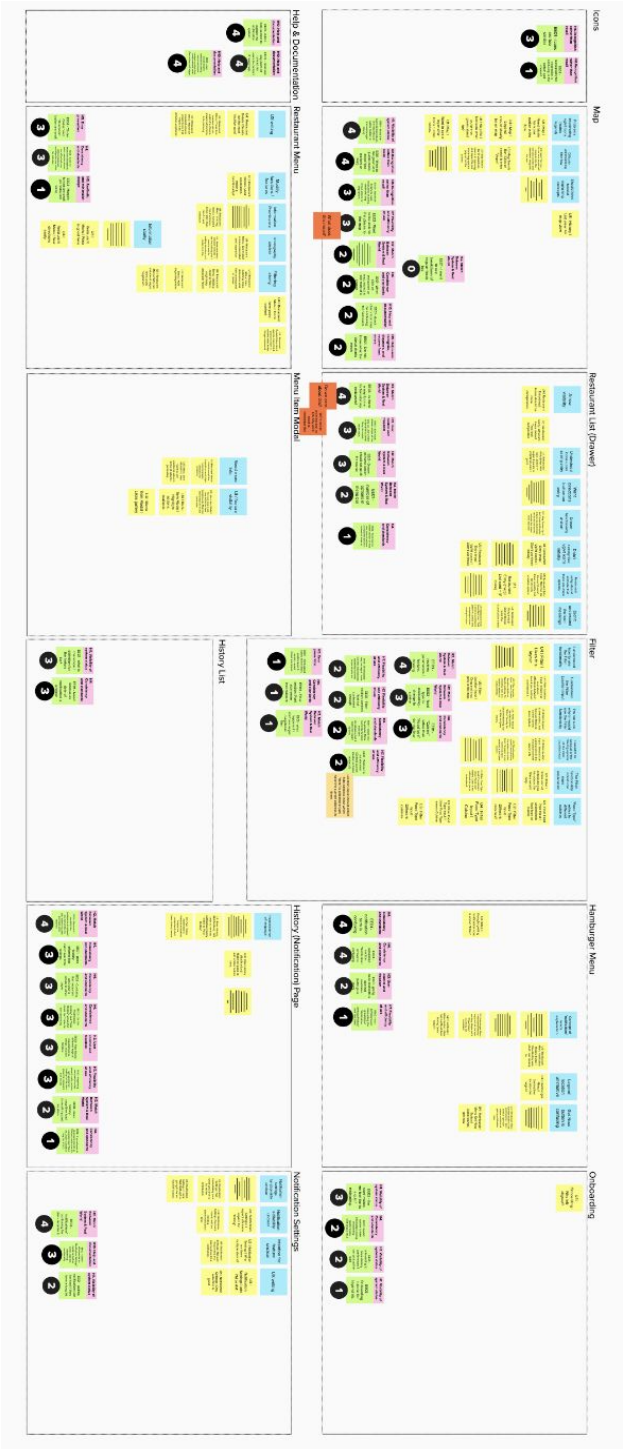
Heuristic #8
Aesthetic and minimalist design
Severity Score 0
Issue(s)
Recommendation(s)

Heuristic #9
Help users recognize, diagnose, and recover from errors
Severity Score 2
Issue(s) 2
Recommendation(s)

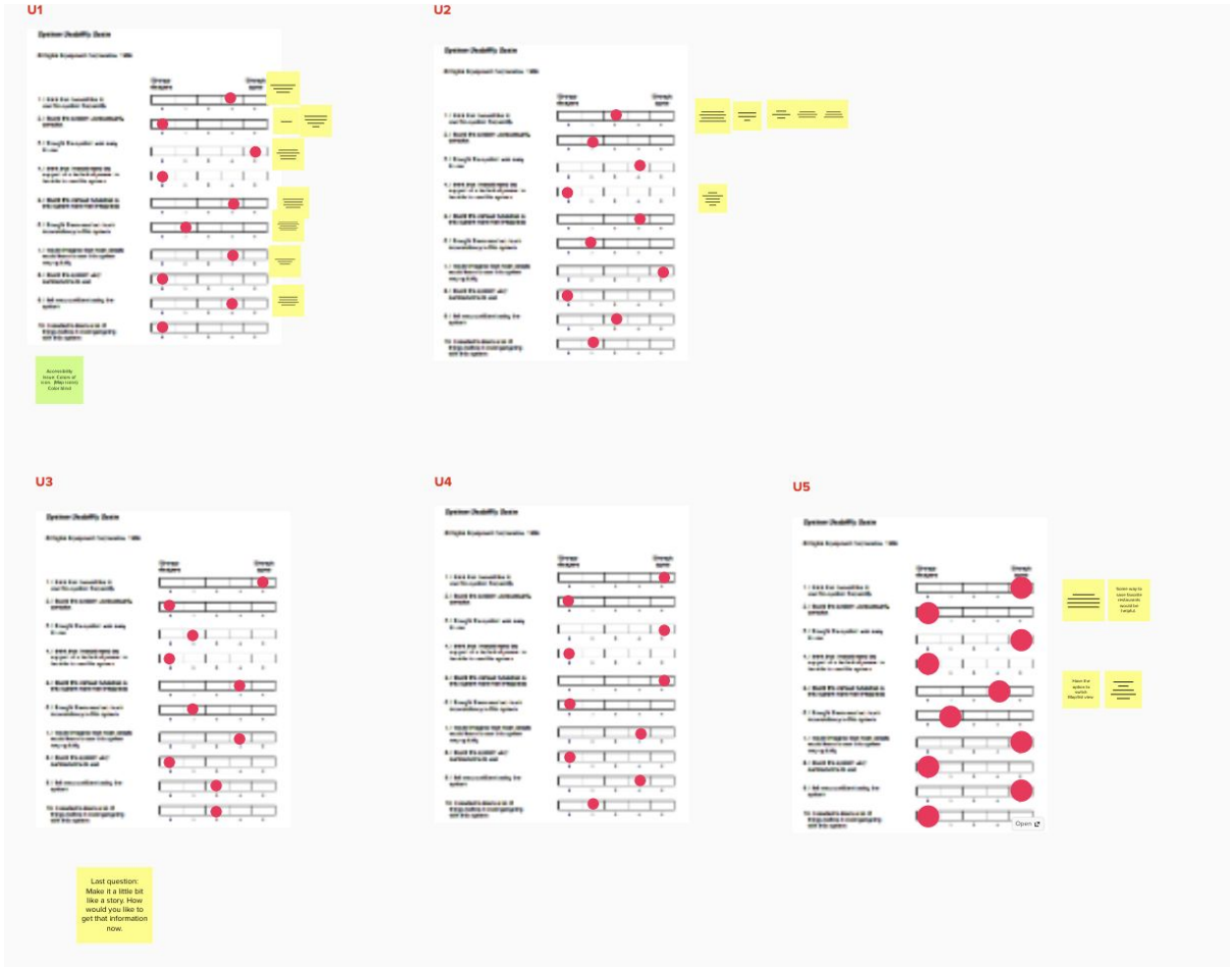
Heuristic #10
Help and documentation
Severity Score 3.3
Issue(s) 4 2 4
Recommendation(s)

B. Aggregated notes from Heuristic Evaluation and Usability Testing sessions

The notes are mapped to their corresponding element / page, and then categorized by themes. The yellow notes are user feedback, blue notes are recurring themes. For expert evaluation sessions, we have “Heuristic (pink note) + Issue (green) + Severity Score (black)”.



C. Compiled SUS surveys from 5 usability testing sessions



07 References

[1] Aaron Bangor, Philip Kortum, and James Miller. 2009. Determining what individual SUS scores mean: adding an adjective rating scale. *J. Usability Stud.* 4, 3 (May 2009), 114–123.

[2] Aaron Bangor, Philip T. Kortum, and James T. Miller. 2008. An Empirical Evaluation of the System Usability Scale. *Int. J. Human–Computer Interact.* 24, 6 (July 2008), 574–594. DOI:https://doi.org/10.1080/10447310802205776

[3] J. Brooke. 1996. SUS: A “Quick and Dirty” Usability Scale. DOI:https://doi.org/10.1201/9781498710411-35