

# CS6750 Project: Google Maps, remember the eggs!

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## 1 INTRODUCTION

The primary objective of this project will be to redesign Google Maps. This navigation app is a lot more than just something that provides directions – it is part of an ecosystem that allows the user to integrate their schedules, their email, files and much more in a holistic ecosystem. Additionally, in this climate of Covid-19, this application goes beyond these initial capabilities and allows the user means to explore areas of interests, virtually sightsee, and ‘travel’ the world. Any user, for example, can navigate to [maps.google.com](https://maps.google.com) and search for the Klaus Advanced Computing Building and drop down to the street view to walk Georgia Tech’s campus. We can view the Computer science classrooms from the pictures submitted by the users who have physically been there to allow remote students to experience being there.

Given the ubiquitous nature of this application, there are still some areas that could be improved on to allow the user further convenience and offload cognitive load into the application.

## 2 INITIAL NEEDFINDING

### 2.1 Problem Space

Google Maps has many areas we can explore to improve from enhancing the user experience and increasing their productivity. In an effort to outline the problem space, I will go through a few use cases to showcase areas to improve upon.

Over the course of a regular week, my wife and I create various post-it notes of items we need for grocery. The initial problem was we kept losing the notes. From there we pivoted to using Google Keep to keep track of our grocery list. The big challenge that came up was the location dependency. We, as a family, have certain stores we prefer for certain items – for example, large quantity items from Costco, organic items from Whole Foods, spices from the Bulk Barn, etc.

Managing the notes was becoming cumbersome. Having the capability to capture specific items against locations in Google Maps would solve this problem.

Additionally, another scenario that has typically occurred with Google Maps is when finding a route for a vacation. Specifically, when I get a route from Toronto to Georgia Tech, I would like to see sight recommendations based on areas and sights I have shown an interest in.

## **2.2 User Types**

Google Maps is one of the dominant navigation apps in the that space. This app is used by many different user types around the world with various backgrounds and skillsets. Hence, it's interface must be designed so that it is usable by an eclectic audience. I will limit this project to the user types of adults who will be using it simultaneously while performing various other tasks throughout the day.

## **2.3 Survey**

### ***2.3.1 Survey Plan***

For the first needfinding exercise, I published a survey to gather the diverse informational data points about the users and what areas they would like to see improve in Google Maps' interface. Appendix 9.1 contains the questions asked in the survey and their link to the data inventory. Appendix 9.2 contains the responses.

I will avoid observer bias by avoiding leading questions. Additionally, I will ask the questions from multiple angles to mitigate any confirmation biases that might creep in.

### 2.3.2 Results

Overall 26 participants responded to the survey from a wide demographic of users. Most of the respondents were below the age of 40 (~88%). Additionally, half of the respondents are working in the IT field, indicating that they are somewhat tech-savvy.

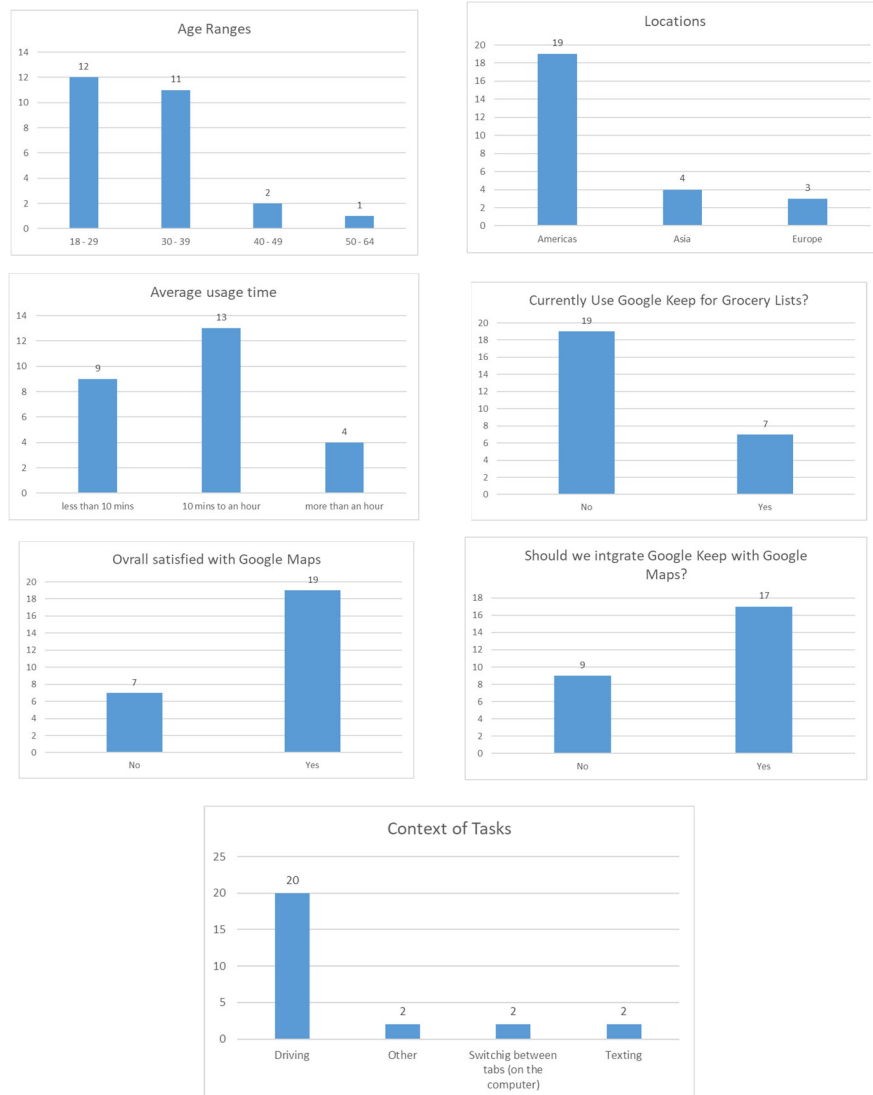


Figure 1 - Results from the Survey

Majority of the respondents were based in the Americas, indicating English/Spanish/French speaking users. Majority of the users were driving while interacting with Google Maps, showing a verbal or location based interface

would be safer. The majority of the respondents want to achieve the goal of navigation with added features such as points of interests, speed limit indicators, weather, changing street view to satellite easier, predictive offline map downloads.

Most of the respondents were satisfied with the functionality of Google Maps, however they were more likely to indicate that there should be some integration between Google Keeps and Maps.

## **2.4 Analysis of Product Reviews**

### **2.4.1 *Plan***

For the second needfinding, I will scrape the data from the Google Maps community forum to determine how to populate the data inventory with user needs. This community has all the data in plain text format. I will copy the last 1,000 feedbacks for the mobile devices only and use that to manually collate the data into high level categories.

Additionally, I will look at reviews from sites that recommend alternative to Google Maps and the pros and cons provided for the application. This data is in plain text and videos as well. I will take the most helpful comments and collate them in categories.

Support forums might be a bit biased to voluntary bias as users who are not happy or frustrated are the ones who typically go out of the way to input feedback which might skew the results. To mitigate this, I will use multiple sources of user feedback, the official Google Maps forum and a forum that has real users (linked to their LinkedIn profiles) providing data. This will ensure my redesign accurately captures any current gaps in the interface. I will also need to be cognizant of confirmation bias: seeing issues I might have faced being reflected in the feedbacks. By using a large volume of data (1,000 feedbacks from the official forum) I will ensure to mitigate this bias.

### 2.4.2 Results

From the forums, I was able to determine the UI seems to be the primary cause of issue for users. The majority of concerns and issues that were being reported

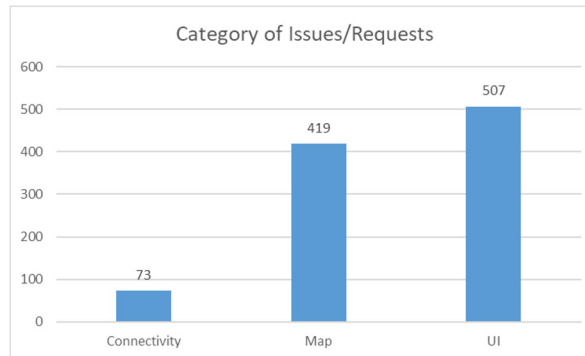


Figure 2 - Categories from Google Maps Forums

were how to use the interface to:

- Remove extraneous data from the screen
- Transition from one view to another
- Get a custom number of steps ahead in the navigation
- Customize route (for vehicle sizes, traffic type such as buggy or carts, scenery)
- Offline maps – getting these automatically for ‘dead-zones’

Besides the UI issues, the other major category was of the map itself, some locations were not showing correctly or the data was not accurate.

From getapp.com, I was able to extract more meaningful data as it was often reviewed by users who were not anonymous. This also allowed me to look at feedbacks from users from various organizational sizes and review ratings. Looking at highly rated reviews, from large organizations and only by verified users, I was able to determine the following feedback from users:

Pros	Cons
Offline mode	Connectivity
Ease of use	Bike routes

Pros	Cons
Impartial – does not argue or chastise	Requires tactile input even when driving at high speeds
Provides accurate estimates	UI – Font sizes
Provides consistently	Should provide truck directions
Updates regularly	Google Assistant is always on
	Slow interface
	GPS drifting

## 2.5 Data Inventory

Inventory Item	Responses
Who are the users?	Most users are below the age of 40, with a technical background. Medium to Expert users.
Where are the users?	Most of the users are based in the Americas.
What is the context of the task?	Most user are on their mobile devices, driving or listening to music.
What are their goals?	To get the route to a destination.
What do they need?	Start and end locations.
What are their tasks and subtasks?	They enter in the destination, pick the optimal route, select mode of transportation and start navigation.

## 2.6 Interface Requirements

### 2.6.1 *Functionality*

- The interface will allow the user to search for a destination
- The interface will allow the user to select mode of transportation
- The interface will allow the user to select a route

### 2.6.2 *Usability*

- The interface will allow the consistency across the application (and the Google ecosystem)

### 2.6.3 *Learnability*

- The interface will allow the user to learn new features through prompts

### 2.6.4 *Accessibility*

- The interface will be prominent and legible through meaningful icons
- The interface will be operable in dark and light modes
- Auditory interface will be accessible to the user

### 2.6.5 *Compatibility*

- The interface will be compatible across web browsers and mobile devices

## 3 HEURISTIC EVALUATION

### 3.1 What is designed well

This maps application has been around since early 2000's. It has been able to outlast its competitors (mapquest, yahoo maps, etc) by significantly reducing the **cognitive load** of its users by the simplifying the interface and allowing the users to enter in their start and end destination and using a clean map UI start their journey. Google Maps was able to do so by allowing the users to operate in the world and with minimal interaction with the interface, go about accomplishing their tasks. It allowed the user to look at the interface and minimize the Gulf of execution by simple touch based controls on mobile devices or a clean interface with minimal controls in a desktop version of it. Having a simple navigation button and then hiding all controls when in navigation mode allowed the user

to not even notice let alone have a **gulf of execution**. When using either the desktop or the mobile version, the UI invites the user to directly manipulate the controls, be it to touch the map and move it around or to enter in textual data. It allows the users to not rely on their Memory, especially for users with a bad sense of direction, this application separates out the reliance upon landmark based navigation and provides clear visual and verbal instructions. These feedbacks allow the user **perceptibility** of the state of the application and what is going on in the system.

Google Maps allows itself to be highly **equitable** by making the interface accessible to all levels of users. The **ease and comfort** to interact with it make it a market leader. This is achieved by allowing the user to for example view the same map and directions in either landscape mode or portrait mode. The icons provide intuitive pictorial representations of the various tasks and the underlying meaning of the subtasks.

Using multiple fonts paradoxically maintains a sense of **consistency** as the user is able to visually segregate titles and smaller pieces of information. Additionally, its icons provide a consistent look and feel throughout the application.

### 3.2 What isn't designed well

The Google Maps lacks one key element and that is **simplicity**. In the beginning it did follow this principle and did not have a wide suite of extra information but

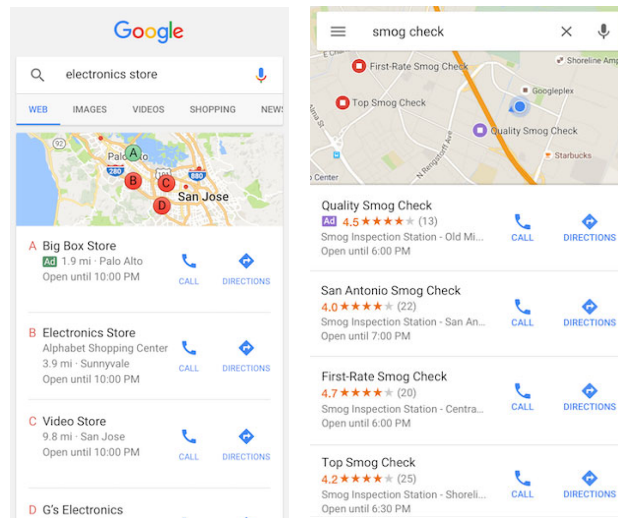


Figure 3 - Ads in Maps (source: <https://support.google.com/google-ads/answer/3246303?hl=en>)

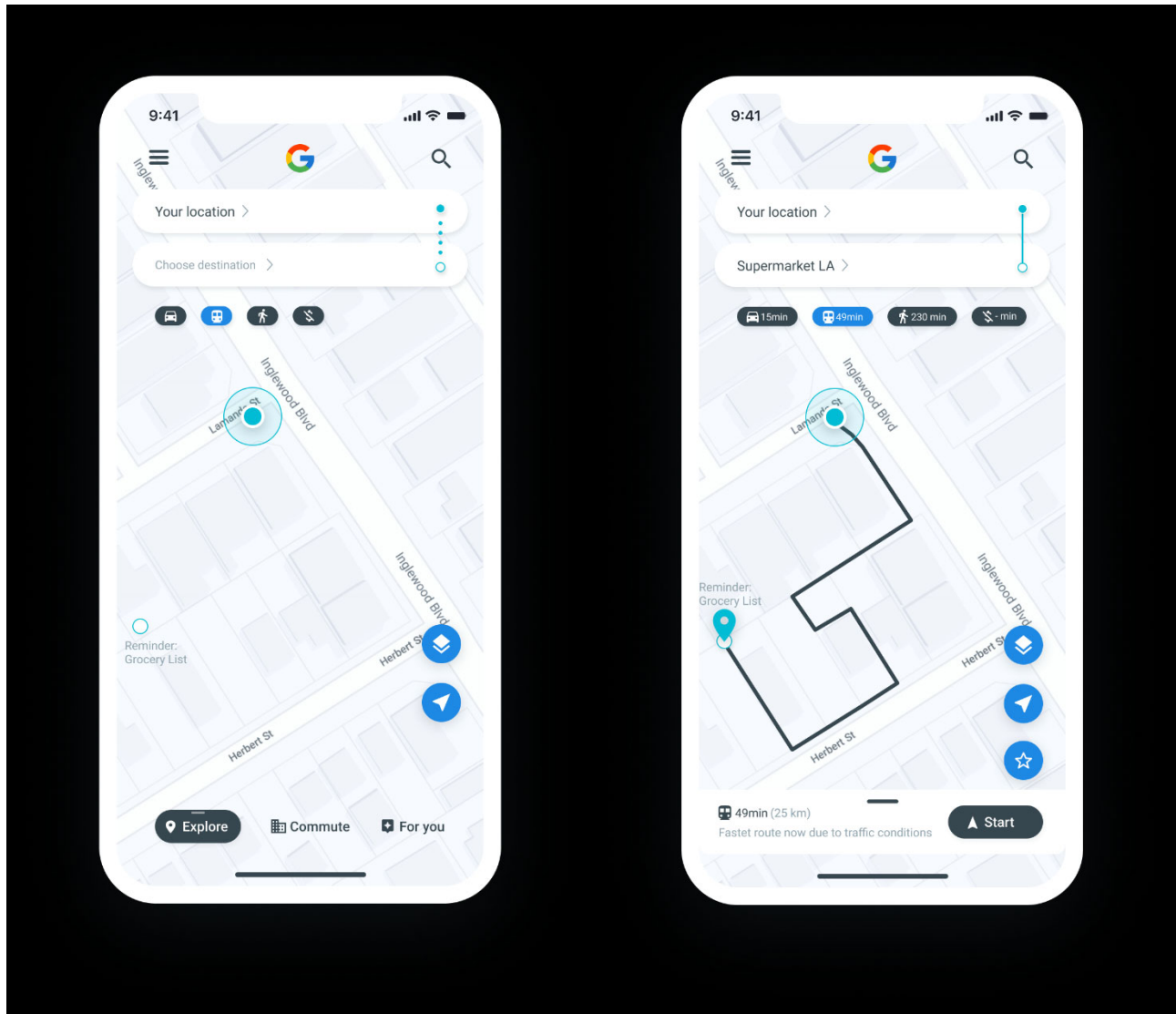


now it has incorporated paid advertisements into its maps directly. They show up as regular results and prominent icons on the map.

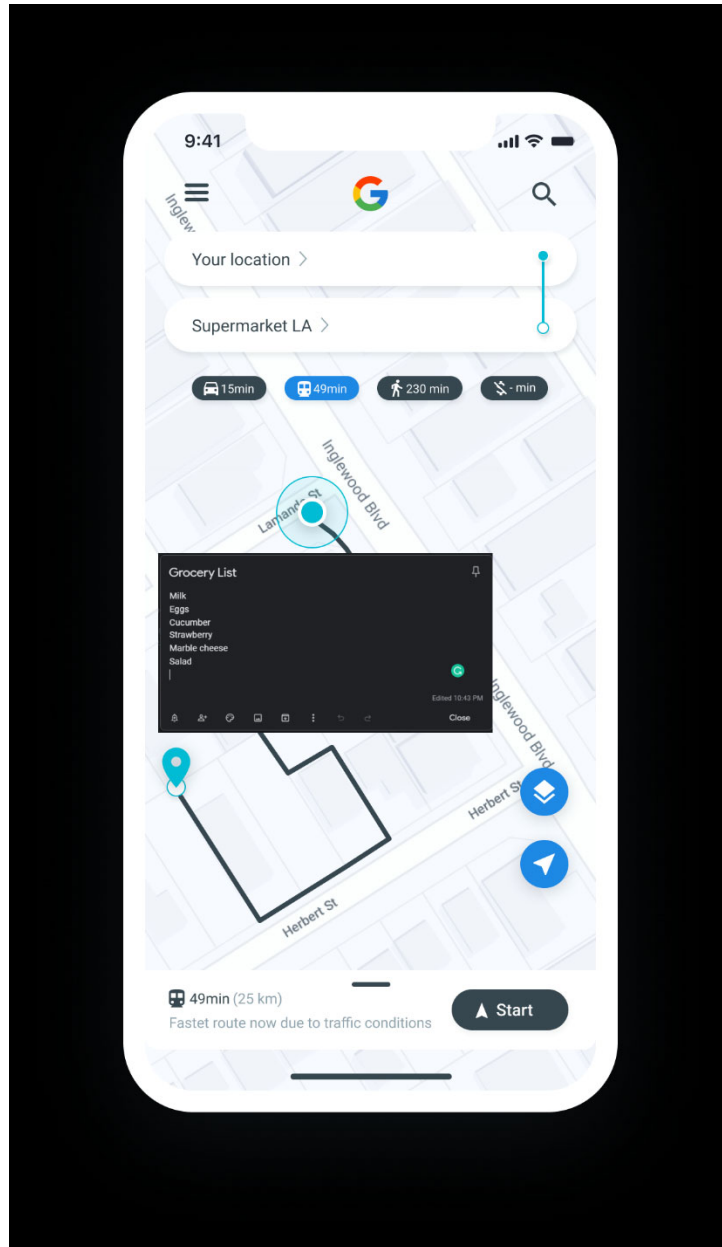
The other main area that it seems to be lacking is in **structure**. A mental model that users would have is that they might wish to save a route, perhaps when traveling to a foreign land where they might have limited network connectivity, which the user can open that saved route and start the navigation using the GPS. Another structural component that is missing is that of shared routing. A user cannot share their route with a friend (at this time, only the current location can be shared in Google Maps). This could come in handy when traveling with a group of friends and trying to synchronize their routes and sightseeing opportunities.

## 4 INTERFACE REDESIGN

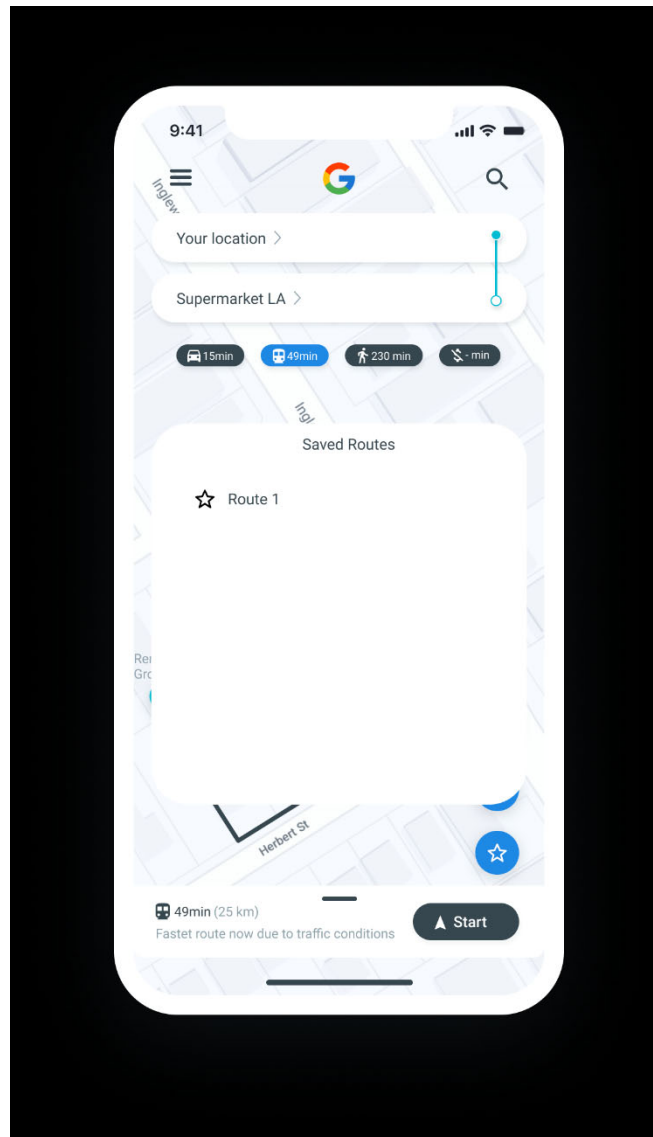
User can select a destination and get a soft reminder of a Google Keeps list that is associated with that location:



Upon clicking that location, the Google Keep embeds the note in Maps



When the user selects the star icon, it allows the user to save this route:



## 5 INTERFACE JUSTIFICATION

The redesign allows the user to search and provide prompts linking Google Keeps with the geographical locations in the search area on the device through non-intrusive prompts. This allows the interface to be **equitable** across a wider demographic of users. The redesign also reduces the **bridge of execution** even

more so than the original design by reducing the number of clicks the user will have to go through in order to bring this searched route back up. The save functionality can allow the user to keep a list of frequent routes or routes to upcoming trips that they can pull up faster.

This redesign also allows more **flexibility** by letting users of a diverse background interact with it. The current interface requires a bit of a learning curve, with the redesign, that learning curve is reduced. This is accomplished by the tighter integration of the ecosystem that Google offers and synergizing the data from one tool to another.

The prototype showcases **consistency** with the interfaces that Google has across its ecosystem of simplicity while not allowing the mass bombardment of functionalities. One such instance is the Gmail app and how Google has allowed it to become overly saturated.

My design also allows for **affordances** through its UI by using iconography and subtle overlays to remind the user of notes tied to a location. This also achieved through mapping the relationship between the mental model of the user with the actual execution of the functionality.

The elements that are preserved are related to the equity of the interface. The same user experience is available to all types of users; it does not segregate based on experience or user types.

## 6 EVALUATION PLAN

### 6.1 Selection

I will use the wireframe to conduct a think aloud evaluation protocol.

### 6.2 Evaluation Plan

For the qualitative evaluation, the approach that will be taken will be to recruit candidates for a verbal exchange, and from that exchange, the key evaluations that will be gathered are learnability, memorability and satisfaction. This will be done via a live exchange, synchronously, for one single interface, with each of the participants.

### **6.2.1 Participants**

The participants that will be used are family member (my wife, sister, brothers, and brother-in-laws). The reason for selecting family members is twofold – Ease of recruitment and experience. They are close by for me to meet up with them and ask for a 5-minute favor. Also, they have experiences across various disciplines and are tech savvy enough to provide sound reasoning for their actions while going through the verbal prototype.

### **6.2.2 Recruitment**

The recruitment process will be to informally ask them via a messaging app (WhatsApp) or via email to meet with me in the upcoming week. The reason provided will be to complete an assignment.

### **6.2.3 Locality**

Where to meet for this evaluation with them will depend on the participant's convenience. Most likely it will be at their individual home, in a semi-private room. The room might change, but the process to gather the evaluation will be consistent across the participants.

### **6.2.4 Record keeping**

Note taking will be the primary method of record keeping. The reason for notetaking is it will be cost effective and easier to analyze post evaluation.

## **6.3 Content of the Evaluation Plan**

The introduction that will be provided to each participant is the problem space of this project, i.e. to improve the search and navigation capabilities of Google Maps by incorporating Google Keeps and allowing the user to save the routes searched. I will provide them with the verbal intro and go into the prepared script. As I am walking them through the interface, the key questions that I will keep coming back to are “what do you like about this step?”, “what do you dislike about this step?” and “what was your thought process for each action”.

## **6.4 Interview Script**

The following is the script I will follow while interviewing the participants:

SHAHZAD

*Today we will start to use the prototype for the search functionality within Google Maps*

PARTICIPANT

*Glad to assist!*

SHAHZAD

*First we will land on the search page. You will see the following fields: Your Location, Destination*

PARTICIPANT

*Ok, sounds good*

SHAHZAD

*Now lets say you enter in your destination of Supermarket LA, a route is provided with a Reminder text next to the supermarket*

PARTICIPANT

*I would select reminder to see what the details of that reminder are*

SHAHZAD

*As soon as you click on that reminder, a Google Keep Note pops up in the map showing the grocery list*

PARTICIPANT

*What about if I want to exit the note?*

SHAHZAD

*Upon seeing this interface, what do you propose the next step should be to close out the note?*

PARTICIPANT

*Ok. I'll touch the map somewhere besides the note*

SHAHZAD

*Good. Now you will come back to the route display.*

Alternate Path:

PARTICIPANT

*You had mentioned the Save button earlier. I will press that now*

SHAHZAD

*Good, that will open a dialog box showing saved routes. The cursor will be on the name Route 1*

PARTICIPANT

*I wish to save this search for next time. I'll type in the name of this search at the top*

*My Route to Supermarket*

SHAHZAD

*Great! Now the saved route name will be updated.*

## **7 EVALUATION EXECUTION**

### **7.1 Overall Evaluation report**

For the qualitative evaluation, I was able to recruit 3 participants. The sessions went very well, taking on average about 10 mins to complete each. These were conducted over a period of 1 week, in separate locations and at various times.

The process for conducting these sessions remained directionally the same - the nuances in them changed participant to participant. The overall divergence that occurred for all the sessions was the participants had a hard time mentally visualizing the flow of the changes to Google Maps. The fidelity of the mockup helped the participants visualize the key components however they wanted to see other interfaces for how the additional functionalities would behave. To compensate, a rough sketch and verbal prototyping was needed to convey the details to the participants.

The raw results are in the appendix.

### **7.2 Analysis of the feedback**

The primary response that was received was the existing interface to search is simple. It required minimal explaining for each participant to get a handle on how to search for a destination, specially the nuisances of searching using partial addresses, and other means to search besides addresses. The expected feedback that was received was the new interface design is a slight improvement, comparatively. The unexpected but predictable result was the wireframe prototype was medium fidelity to appropriately convey the design changes and the participants required additional mockups or a working prototype to be able to accurately gauge the benefits of the new design. As for the design itself, the general feedback was the coloring made it easier to understand, the options to search were more prominent and the saving feature of the route was very well liked.

### **7.3 Change Description**

Some changes that would result specifically from this evaluation are:

- Use more 'earthy' tones of colors



- Use the color wheel to pick colors that contrast each other
- Reduce the number of selection criteria, or make them more compact to expand as needed.
- Add in more intuitive icon for saving (the current icon indicates something not as 'solid', more along the lines of 'liking a route')

## 8 REFERENCES

1. Google Maps Community Forum: <https://support.google.com/maps/community?hl=en>
2. <https://www.getapp.com/marketing-software/a/google-maps/reviews/>
3. <http://www.uplabs.com/posts/concept-for-google-maps>
4. Shahzad Rizvi – M assignments

## 9 APPENDICES

### 9.1 Needfinding Survey Questions

Survey Inquiry	Data Inventory
Age Range	<i>Who are the users?</i>
Profession	<i>Who are the users?</i>
Location (Americas, Europe, Asia, Africa)	<i>Who are the users?</i>
Time spent on average in a week on Google Maps	<i>Context of the task</i>
Do you use Google Keeps for grocery lists?	User tasks
Do you usually drive while interacting with the Google Maps UI?	Context of the task
Do you agree with statement “Having a grocery list functionality in Google Maps, that would remind me of items to purchase based on my location, would be helpful”?	User Needs
Are you satisfied with the options in Google Maps to help you achieve your tasks?	User Needs
What improvements would you recommend making in Google Maps?	User Needs

## Survey Inquiry

## Data Inventory

Would it be helpful to be able to integrate Google  
Keeps with Google Maps to get location specific  
lists?

User Needs

How do you typically interact with Google Maps?

User Tasks/Subtasks

## 9.2 Survey Responses

### Select your age:

1. 30 - 39
2. 18 - 29
3. 50 - 64
4. 30 - 39
5. 18 - 29
6. 18 - 29
7. 30 - 39
8. 18 - 29
9. 40 - 49
10. 30 - 39
11. 18 - 29
12. 18 - 29
13. 40 - 49
14. 18 - 29
15. 30 - 39
16. 30 - 39
17. 30 - 39
18. 30 - 39
19. 18 - 29
20. 18 - 29
21. 30 - 39
22. 30 - 39
23. 18 - 29
24. 18 - 29
25. 18 - 29
26. 30 - 39

### What is your Profession?

1. Software Consultant
2. unemployed

- 
3. IT Programmer
  4. C# programmer
  5. Frontend Engineer
  6. Banking
  7. Software Engineer
  8. Software Engineer
  9. Sales
  10. financial investor
  11. Computing Engineer
  12. Student
  13. Teaching
  14. .
  15. student, stay at home parent
  16. Engineer
  17. Finance
  18. Software Dev
  19. Engineer
  20. SDE
  21. creator
  22. student
  23. Software engineer
  24. software developer
  25. Teacher
  26. business development

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**Where are you located?**

1. Americas
2. Americas
3. Americas
4. Americas
5. Europe
6. Americas
7. Americas
8. Americas
9. Americas
10. Asia
11. Americas
12. Europe
13. Americas
14. Americas
15. Americas
16. Americas
17. Americas
18. Americas
19. Americas
20. Americas
21. Europe

- 
22. Asia
  23. Asia
  24. Americas
  25. Asia
  26. Americas

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**Average time spent on Google Maps?**

1. 10 mins to an hour
2. 10 mins to an hour
3. less than 10 mins
4. 10 mins to an hour
5. less than 10 mins
6. less than 10 mins
7. 10 mins to an hour
8. 10 mins to an hour
9. more than an hour
10. less than 10 mins
11. 10 mins to an hour
12. 10 mins to an hour
13. less than 10 mins
14. 10 mins to an hour
15. more than an hour
16. less than 10 mins
17. less than 10 mins
18. more than an hour
19. 10 mins to an hour
20. 10 mins to an hour
21. less than 10 mins
22. more than an hour
23. less than 10 mins
24. 10 mins to an hour
25. 10 mins to an hour
26. 10 mins to an hour

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**Have you used Google Keep for tracking your grocery lists?**

1. Yes
2. No
3. No
4. No
5. No
6. No
7. No
8. Yes
9. No
10. No
11. No
12. No

- 
13. No
  14. Yes
  15. No
  16. No
  17. Yes
  18. No
  19. Yes
  20. No
  21. No
  22. No
  23. No
  24. No
  25. Yes
  26. Yes

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**What other activity are you doing while interacting with Google Maps?**

1. Driving;Texting;Switchig between tabs (on the computer)
2. Driving;Texting
3. Driving;Switchig between tabs (on the computer)
4. Driving
5. Other
6. Driving
7. Driving;Other
8. Driving;Texting;Other
9. Driving
10. Driving
11. Texting;Switchig between tabs (on the computer);Other
12. Driving;Texting
13. Driving
14. Driving
15. Driving
16. Driving;Texting;Switchig between tabs (on the computer)
17. Switchig between tabs (on the computer)
18. Switchig between tabs (on the computer)
19. Driving
20. Driving
21. Driving;Switchig between tabs (on the computer)
22. Other
23. Texting;Switchig between tabs (on the computer)
24. Driving
25. Driving
26. Driving

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**If you selected Other, please explain:**

- 1.
- 2.
- 3.

- 
- 4.
  - 5.
  - 6.
  7. searching food
  8. on a phone call
  - 9.
  - 10.
  11. listening to music, listening to podcasts, playing pokemon go
  - 12.
  - 13.
  - 14.
  - 15.
  - 16.
  - 17.
  - 18.
  - 19.
  - 20.
  - 21.
  22. n/a
  - 23.
  - 24.
  - 25.
  - 26.

**Do you agree with statement "Having a grocery list functionality in Google Maps, that would remind me of items to purchase based on my location, would be helpful"?**

1. Yes
2. Yes
3. No
4. Yes
5. No
6. Yes
7. No
8. Yes
9. Yes
10. No
11. Yes
12. Yes
13. Yes
14. Yes
15. No
16. Yes
17. No
18. No
19. Yes
20. No
21. No

- 
- 22. No
  - 23. Yes
  - 24. Yes
  - 25. Yes
  - 26. Yes

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**Are you satisfied with the options in Google Maps to help you achieve your tasks?**

- 1. Yes
- 2. Yes
- 3. Yes
- 4. Yes
- 5. Yes
- 6. Yes
- 7. Yes
- 8. Yes
- 9. No
- 10. Yes
- 11. Yes
- 12. Yes
- 13. Yes
- 14. Yes
- 15. Yes
- 16. Yes
- 17. No
- 18. Yes
- 19. Yes
- 20. No
- 21. No
- 22. No
- 23. No
- 24. Yes
- 25. No
- 26. Yes

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**What improvements would you recommend making in Google Maps?**

- 1. Add location based reminders
- 2. No
- 3. None
- 4. sometimes can not see speed limit. I need to see every time .
- 5. N/A
- 6. NA
- 7. adding weather along the route.
- 8. I can't think of anything, but the integration with Google Keep to show grocery lists would be helpful
- 9. Custom routes based on shopping lists
- 10. navigation more accuratly



- 
11. Suggesting interesting places to visit in my current location based on places I've visited before.
  12. The grocery thing sounds interesting. Maybe a way to see restaurants and things on the way between two destinations.
  13. NA
  14. .
  15. easiest/safest navigation route (even if it takes longer or has more traffic)
  16. Maps does everything I need it to. Make it easier to transition between street view and map view though
  17. show me frequently visited places or chains when looking at an area
  18. I think Keep should notify me when I'm at the grocery store, not Google Maps.
  19. predicted offline downloads when going to area without cell reception
  20. NA
  21. ;
  22. n/a
  23. Allow us to tag documents or other data to map points for us to keep track of
  24. Better integration with music/entertainment apps.
  25. I didn't know there is a task function in Google Maps... I just use it for directions
  26. na

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**Would it be helpful to be able to integrate Google Keeps with Google Maps to get location specific lists?**

1. Yes
2. Yes
3. No
4. Yes
5. No
6. No
7. No
8. Yes
9. Yes
10. Yes
11. Yes
12. Yes
13. Yes
14. Yes
15. No
16. Yes
17. Yes
18. No
19. Yes
20. No
21. No
22. No
23. Yes
24. Yes
25. Yes

---

26. Yes

**How do you typically interact with Google Maps?**

1. To navigate to a destination
2. N/A
3. Get Directions, Explore Places
4. just typing.
5. indications from one place to another
6. navigating
7. phone app
8. On my phone
9. phone
10. gas station, coffee shop recommendation
11. I use it to verify how far are some places I'd like to visit and how long would take me to get there.
12. On my phone to use while I am going somewhere. Generally through sound.
13. On the phone.
14. text and voice commands
15. driving/navigation; typing
16. on my phone or pc
17. Directions or reviewing an area for interesting places or stores
18. Just for driving directions to new places. I wouldn't use it to go to my local grocery store that I already know how to get to.
19. driving
20. NA
21. routing, searching
22. n/a
23. On my phone while walking, searching for a way to get to my destination using public transport
24. Usually set the destination before I drive, and won't really touch it while driving.
25. When I get into my car, I use it on CarPlay to select my destination
26. phone, type

### 9.3 Evaluation Execution Raw Results

Participant 1 - Saad:

Showed him the wireframe mockup of entering in the destination and a route and suggestion/reminder appearing.

Read through the verbal script.

Liked the prototype, wanted to see buttons to navigate away from the note and the saved routes.

Recommendations:

- Remove the modes of transportation after the route is selected

Participant 2 - Muhammed Ali:

Showed him the wireframe mockup of entering in the destination and a route and suggestion/reminder appearing. Also showed him the saving capability.

Read through the verbal script. He deviated from the script and wanted to explore how the user can add multiple destinations.

Liked the prototype, wanted to see buttons to navigate away from the note and the saved routes.

Recommendations:

- Add in an option to include multiple destinations.

Participant 3 - Zahra:

Showed her the wireframe mockup of entering in the destination, the route and reminder appearing, and the route saving capability.

Read through the verbal script. She deviated from the script and wanted to explore how the user save alternate routes.

Recommendations:

- Add in interface to show alternate routes.