

## Group 2, Exercise 3: Profiles and Personas

### User Profiles: Google Maps

To create user profiles, we need to first analyze Google Maps users in general. Google Maps user analysis allows us to understand the big picture of user information. Table 1 shows the Google Maps User Analysis.

Table 1: Google Maps User Analysis

Characteristic	Applied to Google Maps User
Age	Range from 12-80+
Gender	M/F
Culture	All, with Internet connection
Physical abilities	Fully capable to partially capable
Education	Literacy to highly educated
Computer Experience	May have little experience to highly experienced
Motivation	Motivated by effective result, convenience, cost, time, and safety
Types of uses	Depend on user's goal
Attitude	Varies, at least moderately comfortable with technology

The result of Google Maps user analysis shows that this application is widely used for a various range of people. Therefore, the general characteristics such as age and gender cannot be used to categorize demographic groups.

Our group had a brainstorm to figure out the appropriate characteristics based on information we have gathered from observations and interviews. Our conclusion drawn from our discussion is to use user's roles in using Google Maps as the major criteria. Three demographic groups are split into:

1. Students: users who mostly use Google Maps as an assistive tool for checking public transportation services for going to school, college, or university.
2. Work Commuters: users who generally use Google Maps as the source of information such as traffic conditions and estimated time for planning the best route to their workplaces.
3. Trip Planners: general users who would like to plan their trips to places farther away. They are mostly interested in route planning, finding good hotels and restaurants, and finding other attractive places.

These demographic groups are formed as user profiles and are described in detail with different user's characteristics as shown in Table 2.

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Table 2: User Profile (Google Maps User Groups)

User Characteristics	Google Maps characteristics, by group		
	Students	Work Commuters	Trip Planners
Age	18-65+	20-65+	15-80+
Sex	M/F	M/F	M/F
Physical limitations	Likely fully able-bodied, but may have physical limitations in hearing, vision, and/or mobility. Likely able to drive and/or walk, but could rely on public transportation	Likely fully able-bodied, but may have physical limitations in hearing, vision, and/or mobility. Likely able to drive and/or walk, but could rely on public transportation	Likely fully able-bodied, but may have some perception disabilities with respect to their age. Likely able to drive and/or walk, could rely on public transportation.
Educational Background	Well Educated	Moderately to highly educated	May have only minimal educational level
Computer/IT user	May have pretty good knowledge and experience with smartphones and using computers	Moderately to highly experienced with smartphones and computers	May have little or no prior experience of computer or IT use.
Motivation	Motivated to get to places in and around the college campus and also to places in and around the city he/she lives in.	Motivated to get to and from work efficiently, reliably, and on time. Motivated to do errands efficiently, if necessary, during the commute.	Motivated to use Google Maps, but would probably prefer the tasks dealing with route planning, finding attractive places.
Platform	Use smartphones usually.	Smartphone users- iPhone, Samsung, or other	PC and Smartphone, preferably use a smartphone during his trips.
Attitude	Comfortable with Technology	Comfortable with technology. Often tired and/or distracted.	May vary depending on the results of tasks they perform in Google Maps
Type of Neighborhood	Could be suburban/urban or rural.	Mostly urban or suburban. Can be rural	Both urban and rural

## Group 2, Exercise 3: Profiles and Personas

### Future Work

To gather more personal data for more research, we would continue doing contextual inquiry and interviewing additional people of varying demographics, including different occupations, income levels, various neighborhoods (city use vs. suburbs vs. rural). We would observe people who are older, possibly less tech-savvy, who are retired and have more free time to go on road trips. We would also observe more females to see if there are any differences in use by gender. It would also be helpful to study those who use Google Maps while on the job, versus using it for their personal life or recreational activities. We would also observe more people who use it for walking around campuses, buildings, downtown cities, as well as those who use it for public transportation in areas where that is heavily used. We would also observe people who use it overseas- for either online or offline use.

We would also perform a competitive analysis on other apps, such as Waze, Apple Maps, and Rome 2 Rio, to see what features and options those apps have. Doing observations of people using those apps would indicate what usability issues, problems, and feelings users have with those apps, compared to Google Maps, and could inspire us with solutions for fixing the Google Maps issues.

We would also conduct user testing to see how much time it takes for users to perform the tasks we had issues with (such as adding a waypoint and switching views) on both the phone app and the computer website) and if there is indeed widespread frustration with performing those tasks.

## JL-Group 2 Exercise 2: Data Collection Assignment

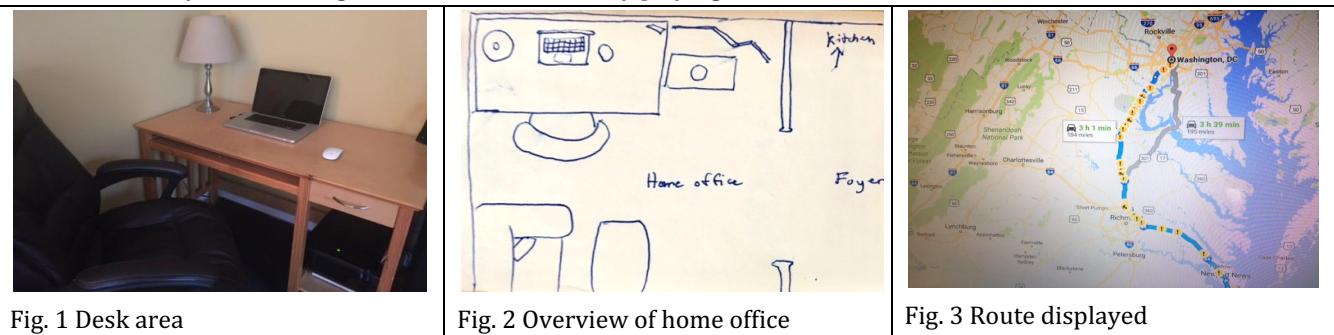
**Google Maps - Individual Observations, Field Notes by Jennifer Lycke**

**Date and Time:** Monday 03/28/17 at 5:30pm – 5:55pm (25 minutes)

**Location:** Participant's Home Office, Carrollton, VA, middle-class suburban neighborhood

**Participant:** Caucasian male, mid-40s, tech savvy, uses multiple devices (smartphone, tablets, laptops, desktops, smart home entertainment systems) frequently. He is wearing comfortable clothing, as this is an informal setting. He has recently returned home from work from his job as a nuclear engineer.

**Environment:** Home office with desk, high-speed Internet, comfortable desk chair, dimly lit, no background noise. No other devices were nearby, although he commented that he often would have his iPhone handy while on his laptop. A printer sits underneath the desk, on a lower level, and is on and connected to the laptop by wifi. No books, papers, or other notable artifacts were nearby, except a music remote control for his entertainment system, although music was not currently playing.



**Introduction:** I initiated a brief introduction to the study and asked permission to take pictures and record our conversation with my phone audio recorder. He agreed and I asked him to describe his general usage with Google Maps. He stated that he uses it sometimes, primarily to plan travel routes for upcoming trips. For example, he recently planned a bus wine tour route from home to 3 different wineries in the mountains, then back home. He likes the options Google Maps provides for route planning. I tasked him with finding a travel route he is interested in taking, using the options he normally uses.

**Finding a route:** He wanted to look at possible routes from Carrollton, VA to Washington DC. To access Google Maps on his laptop, he went to [www.google.com](http://www.google.com) (Google Search) and typed “**directions to Washington DC**” in the search box, then clicked “**Maps**” tab near the top of the screen. He likes using this method because “in only 2 clicks”, he’s able to get directions from his home displayed. He said that Google automatically puts in his current home address by default in the original location because that is a setting that he previously set in Google, which he likes.

A route immediately displays on the right, as expected, indicating a time estimate (using current traffic data) and mileage, with the possible route options on the left. He selects the car icon near the top left, because he would be driving. Possible driving routes are displayed. He clicks the **OPTIONS** link in the directions panel and shows me the possible options- a feature he says he uses often. The route options listed are checkboxes to avoid highways, tolls, and/or ferries, and Distance units are kept on default to **Automatic** (he has no need to change them to miles or km). He uses the **Avoid Tolls** option often, so he checked that box. He clicks the **CLOSE** box to close the options. He then selects the top route (of 2) listed, which is indicated as the fastest, by clicking the **DETAILS** link. He says he mostly selects the preferred top route by Google, as this is always the fastest. The major steps of the directions, along with time estimates, display on the left. He commented about the **Exclamation point** icons, indicating possible delays, that display all along the route path. When his mouse hovers over an icon, a box overlay that says “**Incident**” displays. There are many such incidents that

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display on the route, but that is what he expects when going to Washington DC. He also drags the route to the left and right with his mouse, showing that Google Maps will then highlight a different route when he does this. He also clicks the **zoom in +** icon, as well as the **zoom out -** icon. He clicks the **target icon** to indicate where his current location is.

An option that he likes, which is one of the reason he uses Google Maps, is that he can add waypoints to his route. If he wanted to stop in 2 specific places along the route from Carrollton to Washington DC, he can add these waypoints. He forgot how to add a waypoint, as he thought they changed the interface for this since when he previously used this functionality (*possible issue*). He said "It used to be easier...maybe they changed it." He clicked the **OPTIONS** link, but a waypoint option did not display. He closed that box. He clicked the icons and dots to the left of the 2 location fields, but that did not give a way to add waypoints either. He started clicking around the directions panel, but did not find this option, and started getting mildly frustrated.

He opened a new Safari browser window, a Google window displayed by default, and he Googled "**how to add waypoint in Google Maps**". Online instructions came up. The instructions told him to hit the **+ Plus** sign. He went back to the Google Maps window, and found the **+ Plus** sign, said "Ah! It's right there!", and clicked it. Another destination line was added to the route. He typed in "**Arlington National Cemetery**" into the new line as a waypoint. When I asked if Google knew the order he wants to go to each destination, he said he needed to drag with his mouse the waypoint up to in between the departure location and the destination. He experimented with dragging and changing the order of the waypoint.

**What he does with route results:** He is satisfied with the route results and he clicks the mobile phone icon immediately above the instructions. A popup displays that says "**To send this place to your device SIGN IN**". He clicks **SIGN IN** and he signs into his Google account. His login information was not prefilled into the sign-in fields, so he typed his information in. It has been a couple weeks since he used a Google login, so he had to pause and think for a minute of his login information (*possible issue*). Once signed in, he sent the directions to his phone by clicking the **Text** option and sending. He walks over to his phone and double-checks that the directions were texted to his phone, then returns to his home office. This is a feature that he uses often- so that he can take his planning steps and actually execute the steps, by using them for driving directions. He returns to his laptop and closes the **Send to Phone** popup.

He then clicks the **Share** icon (next to the Phone icon) and a popup displays with the long URL and the Short URL to the instructions. He selects **the Short URL** option, hits **Cmd +C** to copy and **Cmd + V** to paste it into a new email in his Apple Mail program. He sends the email to himself, so he has a record of the route for future reference and for backup purposes- when he's planning on actually taking the trip, in case his phone goes dead while travelling.

Back in Google Maps, he closes the **Share** window by clicking the **X** and then clicks the **Print** icon (next to the Share icon). The 2 options display "**Print including maps**" and "**Print text only**". He selects **Print including maps** and the printer dialogue box opens. He prints and the map and directions print clearly from the printer under his desk. He says he often uses the sharing features of Google Maps -i.e. sending to phone, emailing a link, and printing a hardcopy- the results are provided for him to use for route planning, driving, and collaborating.

**What he does not use Google Maps for:** When asked about other features he uses, he said he doesn't use many other features, other than the route planning discussed above. He doesn't use it for day-to-day travel, such as commuting to work- only for special trips that need to be planned. Also, while he might incidentally

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see a business icon display near a route, he does not use Google Maps to discover businesses or read or write reviews. He would use other apps (such as Yelp or TripAdvisor) for that.

**Notes on possible research directions, arising from individual observations:**

- Laptop vs phone use of Google maps
- Google Maps vs. other map apps – lots of competition – Waze, Yelp, TripAdvisor, Apple Maps, Maps
- Google requiring login for sharing directions- should it be necessary?
- Making “add waypoint icon” more distinctive (move it to in between departure and arrival locations?? Fit mental model/natural mapping better??) and add waypoint text to tooltip to find more easily
- Social aspects? Does it increase use or add value?
- Which forms of sharing directions are most popular?
- How can Google Maps be incorporated into new applications, uses, etc? How can it be integrated with other services?
- What other little-known features are there? How often are they used? Should they become more apparent in the design so more people use them? If so, how? How do people currently discover these features? Would discovery of these features lead to more people using Google Maps vs competition?

## GROUP RESEARCH FOCUS

### Summary of individual observations

From the result of each member in the group, we came up with some shared and interesting viewpoints about users' experiences on Google Maps. All participants shared common experiences in using Google Maps. We found some common mistakes the users made, e.g. the difficulties with using some features. We had a brainstorm on which research questions we would be investigating based on what we had observed. We decided to mainly focus on further investigating Google Maps regarding usability based on what we have learned from the class, such as Norman's principles of design. Thus, our list of research questions, interview questions, and task walkthrough will be based on usability and Norman's principles of design.

### List of research questions

1. Are there problems users are having with the current Google Maps interface?
2. Are there issues with the learnability, efficiency, memorability, or error feedback of the current interface? If so, specify.
3. If so, how can we improve the interface of Google Maps so people can use it more efficiently and with greater satisfaction?
4. Specifically, how can we improve the switching between views (e.g. Street View, Satellite View, and so on)? How can we improve adding a waypoint? Can we improve the icon graphics and/or their placement to minimize confusion?
5. How can we improve Google Maps, so users will choose it over the competition (Apple Maps, Waze)?
6. Can we make the ‘hidden’ features more discoverable to users so that Google Maps can become more useful to them?
7. How can the different types of devices affect the capability of using Google Maps?

### List of interview questions

1. Do you use Google Maps on a computer, a smartphone, or both?
2. How often do you use Google Maps? (daily, weekly, monthly, or less than once a month).

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3. Do you use Google Maps primarily for driving, public transportation, or walking?
4. On a scale of 1-5, with 5 being the most difficult, how difficult was it for you to **learn** how to use Google Maps?
5. On a scale of 1-5, with 5 being the most difficult, how difficult was it for you to **remember** the steps to perform your task?
6. On a scale of 1-5, with 5 being the most difficult, how difficult do you think it is to **use** Google Maps?
7. What are the primary tasks you perform using Google Maps?
8. What are the main features of Google Maps that you use? (e.g. options)
9. Do you encounter any issues when using Google Maps (errors, frustration, confusion, and so on)? If so, what issues?
10. If you are planning or taking a route, do you know how to add stops (waypoints) along the way? Do you have any problems when doing so?
11. Do you know how to switch views in Google Maps (for example, go from Street View to Satellite View)? Do you have any problems doing so?
12. Are you able to find all of the options and features that you want to use?
13. Are you aware of other features of Google Maps that you'd like to try, but haven't yet? If so, which ones? And if so, why haven't you tried them yet?
14. How would you improve Google Maps to make it easier to use?
15. How would you improve Google Maps to make it more useful to you?

**Task walkthrough steps**

1. Open up Google Maps on your preferred device.
2. Create a route from your current location to Syracuse, NY.
3. Add a stop along the way at a restaurant in a town along the route.
4. Select your preferred method of transportation (car, public, walking).
5. Switch the map view from the default view to Satellite View. Switch to Street View.
6. View various options that you may use to customize your route. Select the option(s) that you would like to use.
7. Save, share, or begin following your route as you normally would.
8. Repeat steps 1-7 with a different type of device (e.g. if the user's preferred device is PC, let the user use mobile) (We need task number 8 to answer research question number 7)

**Note:** While a user is performing a task walkthrough, the observer can observe user behavior in terms of how he feels, how fluently a user can perform. Then the observer writes down the note of this observation to answer research questions.

**INDIVIDUAL INTERVIEW AND TASK WALKTHROUGH SUMMARY AND NOTES**

**Date/Time-** Saturday, April 8 11:00am-11:45am

**Participant-** Male, Caucasian, early 30s, father of two, engineer

**Environment-** at his home in Carrollton, VA, middle-class suburban neighborhood, with 2 toddlers. Living room for smartphone segment, upstairs in home office for desktop segment of walkthrough. Toddlers were needing attention throughout the interview, one of them sitting on his lap for parts of the task walkthrough and interview, so participant occasionally lost his train of thought, and then needed to refocus.

**Task Walkthrough Summary:**

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After a brief introduction about the project, I initiated the task walkthrough on his preferred device (**iPhone 7**). He tapped the **Google Maps icon** on his homescreen, entered '**Syracuse**' into the search field and searched for a route. He tapped the **Route** option, bringing up the directions screen with starting and destination fields. He tapped starting location field and selected **Your Location** which displayed as the prominent option. Driving was the default method, and the method he would use from Virginia. The fastest route displayed, indicated the mileage and time estimate and a path from **Carrollton, VA** to **Syracuse, NY**.

When asked to create a stop along the way (waypoint) at a restaurant, he searched for an option, deep-pressed spots along the route, but was unable to find out how to do so. He said that he hadn't done this before on the phone. He tried pressing, tapping, and looking at different icons to be able to do so. After almost giving up, he started the route, tapped the magnifying glass icon, and found the option to select Restaurants. A number of restaurant popups with ratings displayed. He tapped one and then the option to **Add Stop** displayed at the bottom of the screen. It took about 5 minutes to get to this point, so he said "Aha, there it is!" He added it as a stop. Then he tried to add another stop, but was only given the option to remove the stop he already had. He deduced that he can only have one stop added to a route at a time.

Once a restaurant stop was finally added to the route, he was asked to change the method of transportation. He was not able to find a way to change it at this point. By default, the route was set to driving, which was what he wanted anyway. He deduced that he would have to start over with the route to select a different option, such as public transportation.

When asked to switch views from the default to **Satellite View**, he quickly and easily tapped the picture thumbnail on the home screen to bring up **Street View**. However, he had to hunt around to find a **Satellite View**, which was found by going to the route time estimate drop "up" menu (instead of a drop-down, the arrow displays a menu above, instead of below), **Settings**, and **Show Satellite Map** switch option.

When asked to save, share or follow route as he normally would, he just continued to follow the route. He does not normally save or share a route, but would just re-create the route again if he had to.

Participant was asked to perform the task walkthrough again on a second device. We went upstairs to his home office to a **desktop PC with Windows 10**. He opened up **Firefox** and typed "**maps.google.com**" to bring up **Google Maps**. He typed in '**Syracuse, NY**' and noticed immediately that there were more options prominently displayed, such as various forms of transportation. His home address displayed by default from prior use. Multiple routes displayed and he selected the top (fastest) route. He said he'd normally pick the fastest route unless driving through Washington, DC. where alternate routes might be considered to avoid the city traffic.

When asked to add a waypoint at a restaurant, he could not find the option immediately. He zoomed in on the map, right-clicked, but did not find the option for another minute. He then found the **+Plus sign**, and typed in a restaurant (**Red Robin**). Multiple Red Robins near the route displayed. He selected one in a town he was familiar with and dragged the Red Robin stop in between the start and the end of the route. He was able to reorder the destinations very quickly by dragging.

He kept with the default method of transportation, driving, but readily saw the options for other methods of transport if we wanted to change that at any point.

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When asked to switch to **Satellite View**, he easily did so by clicking the thumbnail labelled **Satellite** in the corner. When asked to switch to **Street View**, he **zoomed in** on the map to a location on the route. He **zoomed in** until another **thumbnail** displayed in the lower part of the screen. He knew this would bring him to **Street View** for that location. He said he often does this when using the laptop and planning a route so he could visualize what an intersection or a business destination looks like. This way he'd know what to look for and know ahead of time if he needs to cross over a few lanes of traffic to enter a parking lot or to be in a certain lane ahead of time. He then easily switched back to **Street View** as requested.

**Interview Summary:**

The interview answers, as well as the task walkthrough, indicated that he uses Google Maps on **both** his smartphone and his desktop computer. He uses it at least **once a week**, and only for **driving** purposes. He said Google Maps has been easy to learn (**rated 2**, on a scale of 1-5 for difficulty), easy to remember the steps (**rated 2**, on a scale of 1-5 for difficulty), and relatively easy to use overall (**rated 3**, on a scale of 1-5 for difficulty). He uses it **primarily for route planning and tracking traffic** for local driving (commute, errands, etc) and occasional long-distance driving.

The problems that came to his mind involve when driving in congested areas with many overpasses (such as in Washington DC) where the roads are "stacked", that the route calculations would get confused about where he was. It would sometimes recalculate at the last moment and cause last-minute confusion while driving.

He did not originally know how to add waypoints using the phone app. He says that he would just break the trip into segments (Route A from start to a waypoint, Route B from a waypoint to the destination, etc). However, he thinks that being able to long-press a spot on the map, then adding a waypoint marker would be useful and make the process more effortless. He was very familiar with switching views and did not have much effort with that, although switching to **Satellite View** on the phone was more involved. He remembered how to do it quickly, though. He was not aware of any other features he'd like added to Google Maps and he's generally able to find the options and features that he needs.

**How these observations, interview, and task walkthrough indicate the Google Maps interface relates to the following principles of usability and design:**

**Learnability-** The Google Maps interface seems to have good learnability overall. Performing basic tasks was easy to pick up, with the exception of adding waypoints on both the computer and phone versions. Switching to Satellite View on the phone did not have the same method as switching to Street View, so this could reduce learnability for this task.

**Memorability-** It seems to be pretty easy to remember how to perform tasks once one has already performed a task, with the exception of adding waypoints on the phone app. There were several steps involved to do this, which taxes the memory. One user thought the method to do this might have changed in recent times, had trouble remembering how to do it. The other user hadn't performed this task previously, but the method to do it was not intuitive.

**Discoverability-** The waypoint option on the phone app was very low in discoverability. It was also fairly low in discoverability on the computer version- as the icon was overlooked. Perhaps the placement of the icon could be improved, as participants did not look in the spot it was located in, or the icon could be made to stand out more with a different color, or with a label. Maybe if the button had better natural mapping, by

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being located in between the start and the final destination (as it is in real life in such a route), the button would be easier to find. This would have to be tested.

**Natural Mapping-** The location of the **add stop** icon does not appear to be intuitive, as far as natural mapping, because the **add stop** icon displays below (after) the destination. It would need to be researched whether moving this icon to in between the start and the destination, as it would take place chronologically in real life, would improve the mapping and make the icon easier to find. This also relates to users' **conceptual model** that the waypoint is "in between" the start and end of the trip.

**Conceptual Model-** As mentioned above, in real life, the waypoint, or stop, is in between the start and destination. Users likely have a conceptual model that in the system, including the interface, the waypoint should be "in between" the start and finish points as well.

**Feedback-** Overall, the route and various options display as expected very quickly, providing users the necessary feedback. Features such as displaying exclamation points for traffic incidents along the route are timely and expected by users. There was an issue about whether previously added waypoints were still there included in the route, or whether they were replaced by newer waypoints, meant that the older waypoint markers disappeared when new ones were added. The feedback was thus confusing- is there more than 1 waypoint still in the route? Displaying multiple markers for each waypoint along the way would provide better feedback. Also, the issue about routing issues in areas with overpasses is more of a functionality issue, rather than an interface issue, and is not the primary focus of this research. However, perhaps feedback could be displayed in areas with these issues, indicating that there are many intersecting roads/overpasses in this area, and users should take heed that there could be recalculation issues in these areas. This is a potential safety hazard if drivers need to cross over several lanes of traffic at the last moment, due to Google Maps routing issues. Feedback warning drivers and passengers to be extra cautious about sudden recalculations could mitigate problems with this. This would have to be studied. Also, providing traffic feedback by default might make things more efficient for users.

**Visibility of System State-** User was not sure if the multiple waypoints he was trying to add were actually added, or if each older stop was replaced by the newer stop. This is because the "system state" of having multiple waypoints was not visible- there were no markers displaying (except for the most recent waypoint). Therefore, there was confusion and an assumption that he was not able to add multiple waypoints. Also, as related to the overpass recalculation issue, if the user is in a location with overpasses and ramps that cause GPS confusion, there is no visibility (such as a warning symbol or color change) that the user is currently in this type of area.

**Constraints-** As related to the Visibility of System State issue mentioned above, there was confusion whether one could actually add multiple waypoints to the route on the phone app, indicating a case of a constraint that was not actually true, but the user perceived it to be.

**Signifiers-** There may be an issue with the signifiers for the list of problems below, as far as the icons used to add a stop and switching views. Perhaps the signifiers are currently missing or misleading and could be made to become more helpful to users.

Overall Google Maps has good usability, according to my observation and interviewee satisfaction ratings. However, there are some problems observed, as listed below.

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**LIST OF PROBLEMS:**

- It is hard to add a stop (waypoint) to their route, particularly by phone. This step was not intuitive at all. Several steps are involved on the phone, and users would need to have remembered it from recent usage to be able to find the steps easily. Both users had issues with this task as described above. One had to do a browser search to find the instructions, and the other user took a while to figure it out by trial and error. Both users expressed frustration when asked to perform this task.
- User thought the traffic layer option should default to being on. Instead, one has to go to Settings to select that. Traffic is one of the main reasons he uses it, so he did not like that he has to take extra steps to turn it on. This is a possible safety issue, if used by driver while driving.
- On the Phone app, it is harder to switch to various methods of transportation while route planning or after a route has been established. User did not know how to switch once the route was established and thought he would need to start over to be able to switch this. On the other hand, the transportation options displayed more prominently on the computer version.
- Switching on the phone app to Satellite View takes several steps. If this was done while the driver was driving, it would potentially be unsafe. Perhaps cycling through all views using the same method would make this easier? This would have to be researched.
- Although there were not as many steps involved to add a waypoint to a route on the computer version, there was still some searching involved. The location of the **+Plus** sign icon seemed to be overlooked in my observations. I think the location might be better served where its natural mapping (in between the starting point and the destination point) is more obvious. Instead it is current located below the destination point. Since the waypoint (stop) is in between the start and the finish, it might make more sense to be located there rather than after the destination.
- Seemingly, the user was only able to add one stop (such as a restaurant) per route by phone app. He was unable to determine if the original stop was still there, or if the new stop replaced the original stop, even when selecting different types of stops (e.g. 1 restaurant and 1 gas station). One red marker was added along the route, so did the other disappear or is it just not marked anymore? It turns out that multiple stops can be added, but the interface did not indicate this at the time. One has to back out of the driving route to the starting point/destination screen. Then it displays that there are multiple stops. However, when driving, this would not be clear, particularly to the driver. For long routes where multiple stops may be needed, this is limiting and confusing. Participant said that if he needed to make multiple stops, he would just start from scratch, breaking each segment of the trip into separate trips. He thought it would be more efficient, though, to be able to add multiple stops along one route- at least more clearly and quickly.
- Noted from experience that when driving in areas with lots of overpasses using Google Maps phone app, such as in Washington DC, the "stacking" of the roads on top of each other sometimes causes confusion for Google Maps and it loses track of where you are, and often recalculates at the last minute. This can cause confusion and perhaps even safety issues for drivers, if they need to cross a few lanes of traffic at the last moment. This may be more of a GPS functionality issue rather than an interface usability issue, however perhaps Google Maps could add extra feedback or warnings in

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areas when this risk is probable.

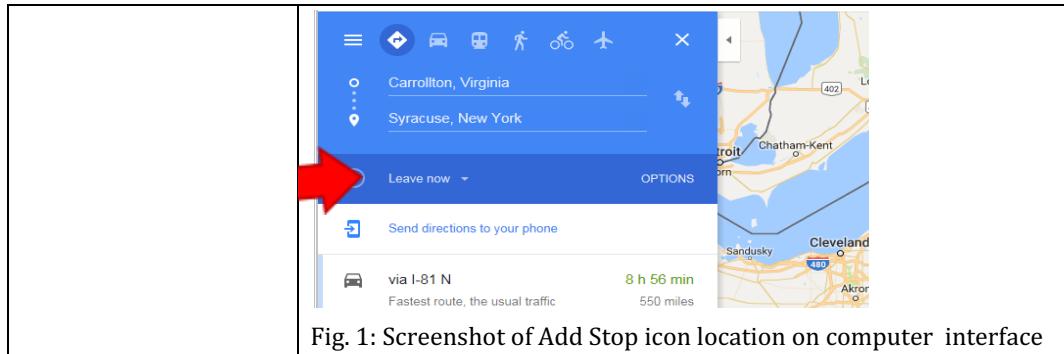


Fig. 1: Screenshot of Add Stop icon location on computer interface

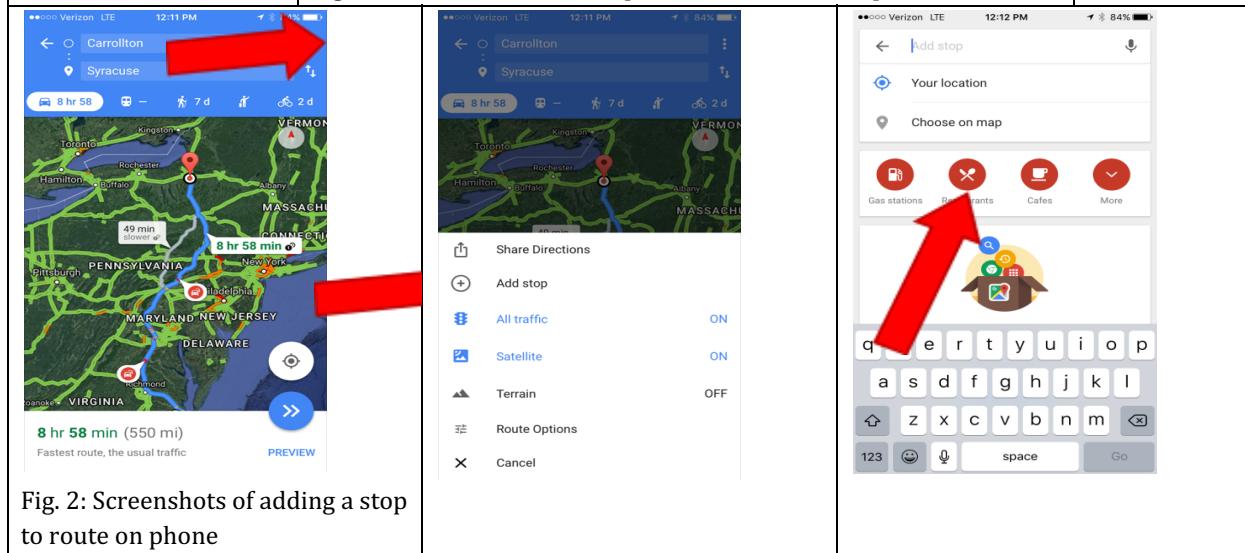


Fig. 2: Screenshots of adding a stop to route on phone

# Patrick

"I like to get to work on time and get home to my family on time."

**34 years old, Caucasian,  
Speaks English**

**Occupation:** Engineer

**Family:**

Married, with 2 toddlers

Owes single-family home

**Location:** Carrollton, VA

**Education & Work:**

Highly educated  
Works full time, 35 min  
away

**Environment:**  
In car by himself, driving  
suburban routes

**Likes**

Family

Tech

## Goals

- Making it to work on time
- Getting home from work at a decent hour to see family
- If needing to run an errand, finding his way to the stops efficiently

## Frustrations

- Limited in free time, due to being a homeowner, working full-time, and having a wife and kids
- Sometimes not being able to make it to work on time, due to bad traffic
- Sometimes not being able to get home in time to spend enough time with his kids before their bedtime
- Gets frustrated if he cannot find an option or perform a task efficiently on Google Maps

## Devices

- iPhone 7, carries with him all the time
- PC with Windows at home

## Tech Background

- Extended experience with Google Maps
- Also uses other map/GPS apps, such as Waze or Apple Maps

## Usage

- Not daily, but frequent use, particularly if he needs to reroute due to a traffic issue or a need to stop somewhere.
- Often checks traffic for 35-minute commute each way
- Searches for local businesses if he runs an errand for his family. Adds stop to his route before heading home.
- Occasionally plans and customizes driving travel routes for road trips with the family

## Roles

- Primary provider for the family
- Occasional family trip planner

## Attitudes

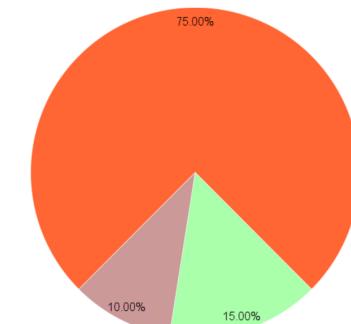
- Not strictly loyal or exclusive to Google Maps
- Overall, finds Google Maps easy to use
- Willing to try different Google Maps options- only if they can be found easily

## Expectations

- To easily see traffic status updates
- That GPS directions are accurate
- To add stops and customize routes

## Google Maps Task Frequency (% of use)

- Check traffic for work commute
- Find business during commute to run errand
- Plan road trip route



# Tim



**23 years old, Indian,  
Speaks English**

**Occupation:** Student(RIT)

**Family:**

Single

**Location:** Rochester, NY

**Education & Work:**

Studying his masters at RIT

**Environment:**

He drives a car in and around Rochester.

**Likes Efficiency**

**Family**

**Tech Savvy**

"I use the maps usually to go places around Rochester and I am more or less satisfied with these maps"

## Goals

- Going to class on time
- Getting to places in Rochester, e.g. Walmart
- If needing to run an errand, finding his way to the stops efficiently.
- Going to places around Rochester

## Frustrations

- Re-Routing is not too good.
- Cannot find options easily on google maps easily which leads to frustrations
- Avoiding tolls is a problem while navigating.

## Devices

- One plus one android phone and PC with Windows

## Tech Background

- Uses google maps from a long time
- Uses it mainly on the phone and doesn't use any other maps.

## Usage

- Uses it sometimes in college to get to places he has not gone before.
- Uses it to go to places in Rochester. e.g. Walmart
- Uses it to go to places near Rochester. e.g. Letchworth state park

## Roles

- Student

## Attitudes

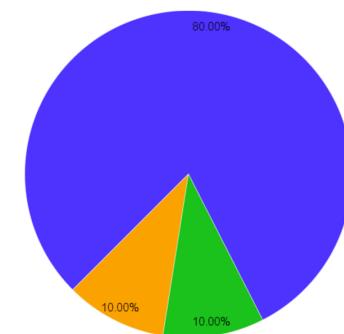
- Strictly uses Google Maps
- Finds Google Maps easy to use
- Finds it not so easy to find the other features, but is willing to use them.

## Expectations

- To share and download routes in an easier way (to make the option visible)
- To make re-routing more accurate

## Google Maps Task Frequency (% of use)

- Check for restaurants and places nearby Rochester
- Checks for buildings on campus
- Checks for places in Rochester



# Peter

"After I retired, I have been spending most of my life traveling around the world.  
I like the tool that I can easily use to help me plan my trip"

**62 years old, Caucasian,  
Speaks English**

**Occupation:**  
Policeman(Retired)

**Family:**  
Married, with 2 sons  
Owns a small apartment

**Location:** Arlington, TX

**Education & Work:**  
Moderately educated  
Retired, a lot of free time

**Environment:**  
In car by himself, driving  
both urban and routes

**Likes Usability**

Like to learn a new thing

Know how to use

## Goals

- Finding tools that are easy to use for trip planning.
- Creating flexible routes and attractive places be visited during my trip.

## Frustrations

- Limited in perceptions due to the age, cannot memorize complicated steps to use Google Maps.
- Sometimes not being able to use required function effectively such as adding a waypoint.
- Gets frustrated if he cannot find an option or perform a task efficiently on Google Maps

## Devices

- Samsung Galaxy S6, carries with him all the time
- PC with Windows at home

## Tech Background

- Occasionally use to use Google Maps for planning his trips.
- Familiar with GPS tools as he used to be a policeman.

## Usage

- 4 times/year, only for his trip for planning and during his travel.
- Preferably use a PC for planning a trip at his home, and use a smartphone during traveling.
- Frequently check the route, places as he planned during his travel.
- Always searches for attractive places other than what he planned before. Like to add a stop to his route during his trip.

## Roles

- Primary trip planner

## Attitudes

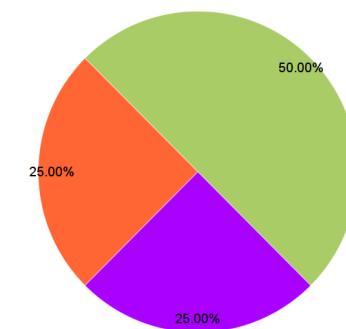
- Not strictly loyal or exclusive to Google Maps
- Overall, knows Google Maps widely used and popular for people.
- Like to learn a new Google Maps features - only if they can be found easily to learn and to use.

## Expectations

- To easily plan routes for his trip.
- To easily add a waypoint for attractive locations.
- To easily learn and use the new features, if he wants.

## Google Maps Task Frequency (% of use)

- Check his location, traveling status during his trip.
- Plan routes and places for his trip.
- Add new attractive places during his trip



## Group 2, Exercise 4: Storyboarding with Scenarios

**Actor(who):** Peter

**Setting (Where):** Apartment, Arlington Texas

**Motivation:** He wants to plan the trip to Austin, use Google Maps to create route, and add some attractive places (restaurant, gas stations)

### Text-based Problem Scenario

1. Peter is driving from Arlington, TX to Austin, TX for a road trip by himself next week. He wants to plan his trip to figure out the fastest way to go and to find a decent restaurant and convenient gas station along his route.
2. He sits at his home Windows PC, opens up Google Maps, clicks the **Directions** icon, types **Austin** in the destination field, and makes sure his current location comes up as the starting point. Google Maps then displays possible routes. He chooses the top route listed, which says it is the fastest. After the list of directions and the route map display, he takes a look and decides that would be his best route. He sees that Waco is about halfway through his trip, so decides he should stop there.
3. He now wants to add a stop for a restaurant in the Waco area, but cannot figure out how or where he is supposed to add this waypoint to his route. He looks all over the interface, goes to the **Options** menu, but does not see anything related to adding a stop. He sits there for a minute trying to figure out what to do...

### Text-based Design scenario

1. Peter is driving from Arlington, TX to Austin, TX for a road trip by himself next week. He wants to plan his trip to figure out the fastest way to go and to find a decent restaurant and convenient gas station along his route.
2. He sits at his home Windows PC, opens up Google Maps, clicks the **Directions** icon, types **Austin** in the destination field, and makes sure his current location comes up as the starting point. Google Maps then displays possible routes. He chooses the top route listed, which says it is the fastest. After the list of directions and the route map display, he takes a look and decides that would be his best route. He sees that Waco is about halfway through his trip, so decides he should stop there.
3. He now wants to add a stop for a restaurant in the Waco area, so he clicks the **+ icon** which is intuitively located on the side, in between the starting point and the destination fields.
4. Clicking the **+ icon** to add a stop adds another field that is labeled "**Add stop**" in

## Group 2, Exercise 4: Storyboarding with Scenarios

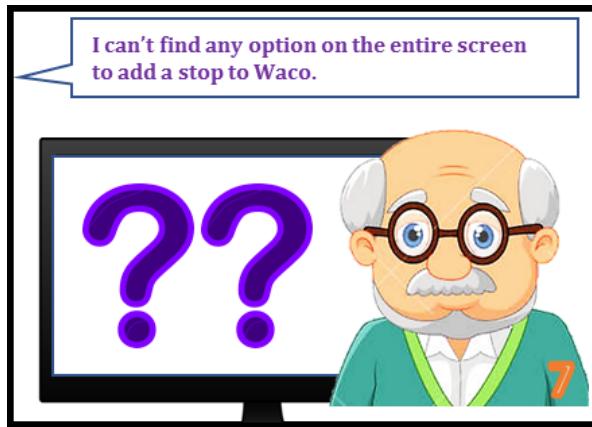
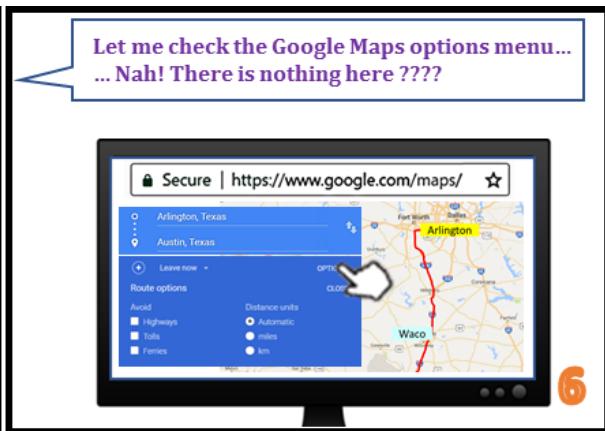
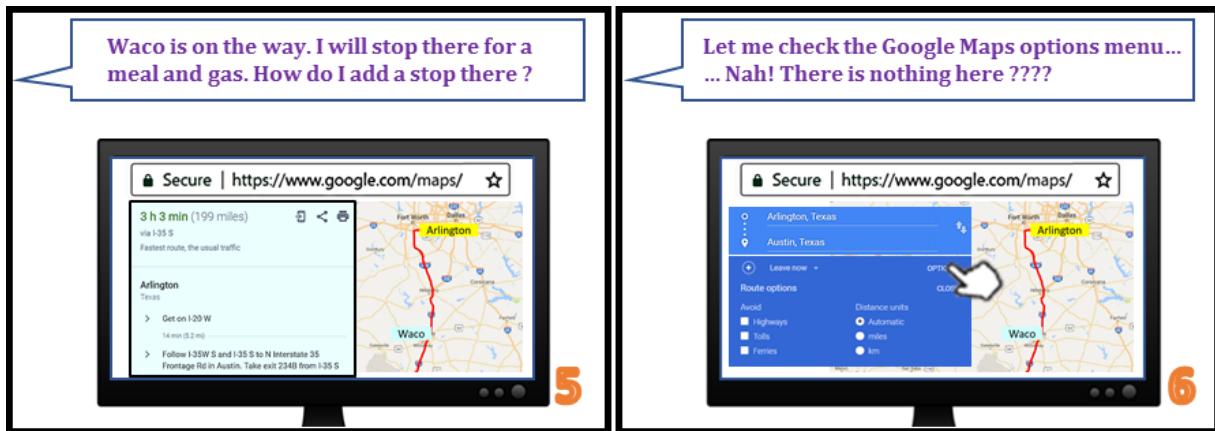
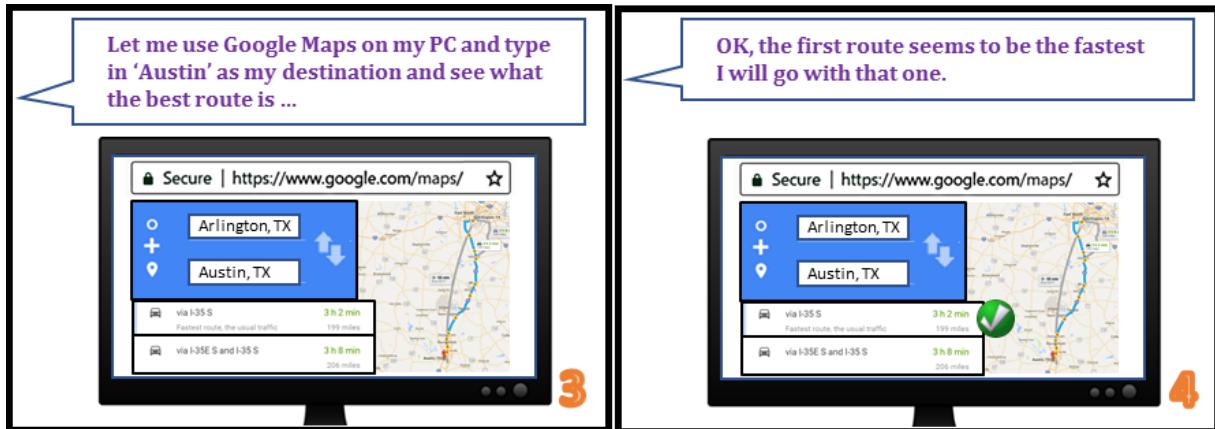
between the two existing fields.

5. He clicks in this new field and a screen slides in with a search box, menu items for **Your Location, Choose on Map**, and options for **Gas Stations, Food**, and **More**. (similar to the Google Maps app).
6. Peter selects **Food** and the map updates with red markers of restaurants located close to the route, along with a list of restaurants with details. He zooms in on Waco and looks at the area's restaurant names. He sees a Texas Roadhouse and decides to eat there. He clicks the Texas Roadhouse marker, the restaurant details display, and he clicks where it says **Add Stop**. Texas Roadhouse in Waco is now added as a waypoint to his route.
7. He repeats steps 3-6, but selects **Gas stations** this time, finding one that is very close to the restaurant he selected.

### Problem Storyboard

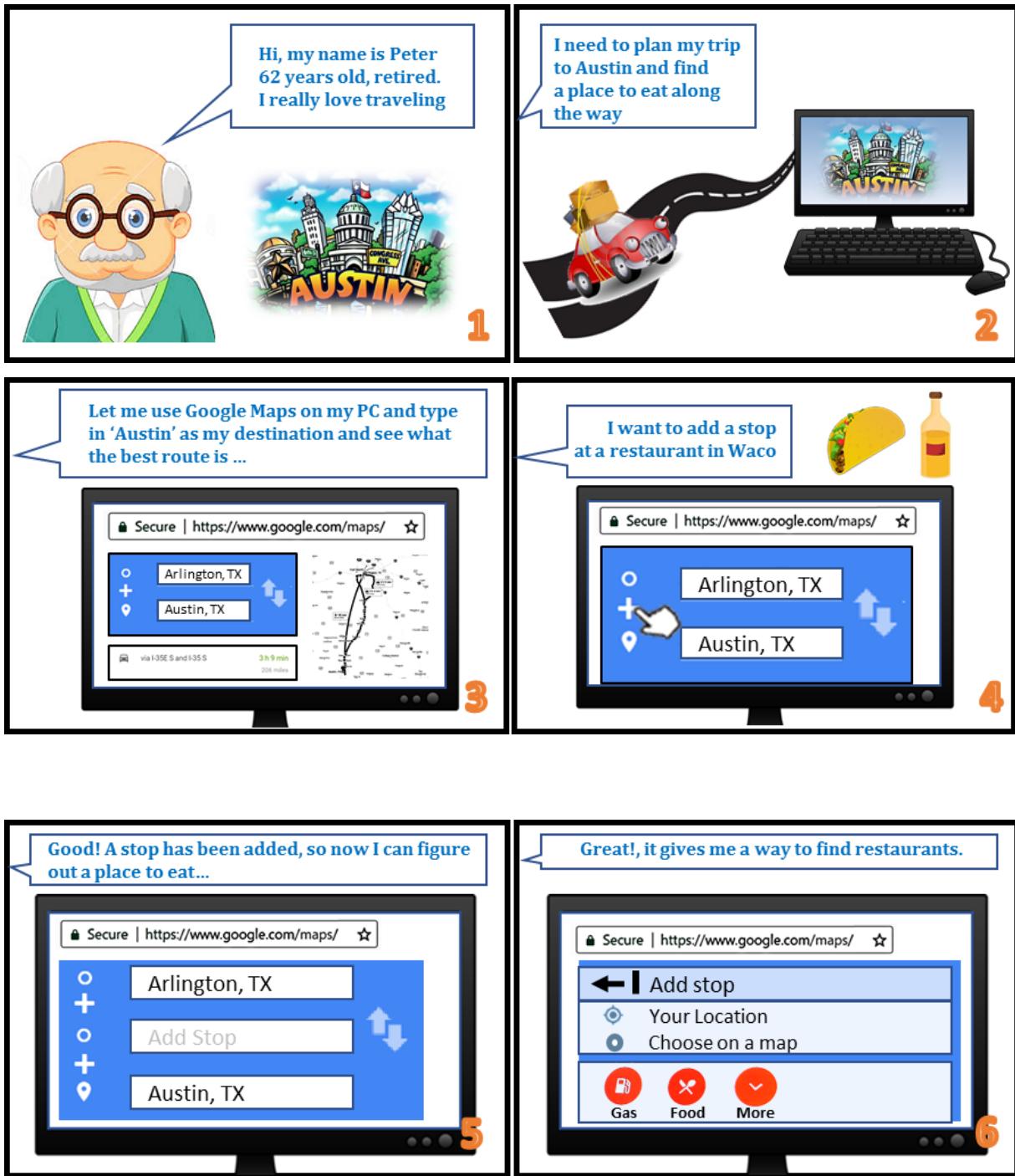


## Group 2, Exercise 4: Storyboarding with Scenarios



## Group 2, Exercise 4: Storyboarding with Scenarios

## Design Storyboard



## Group 2, Exercise 4: Storyboarding with Scenarios

