



# Directionality in Transit Answers

Michael Huang · UX Design Intern, Google Geo · Summer '19

Before We Begin

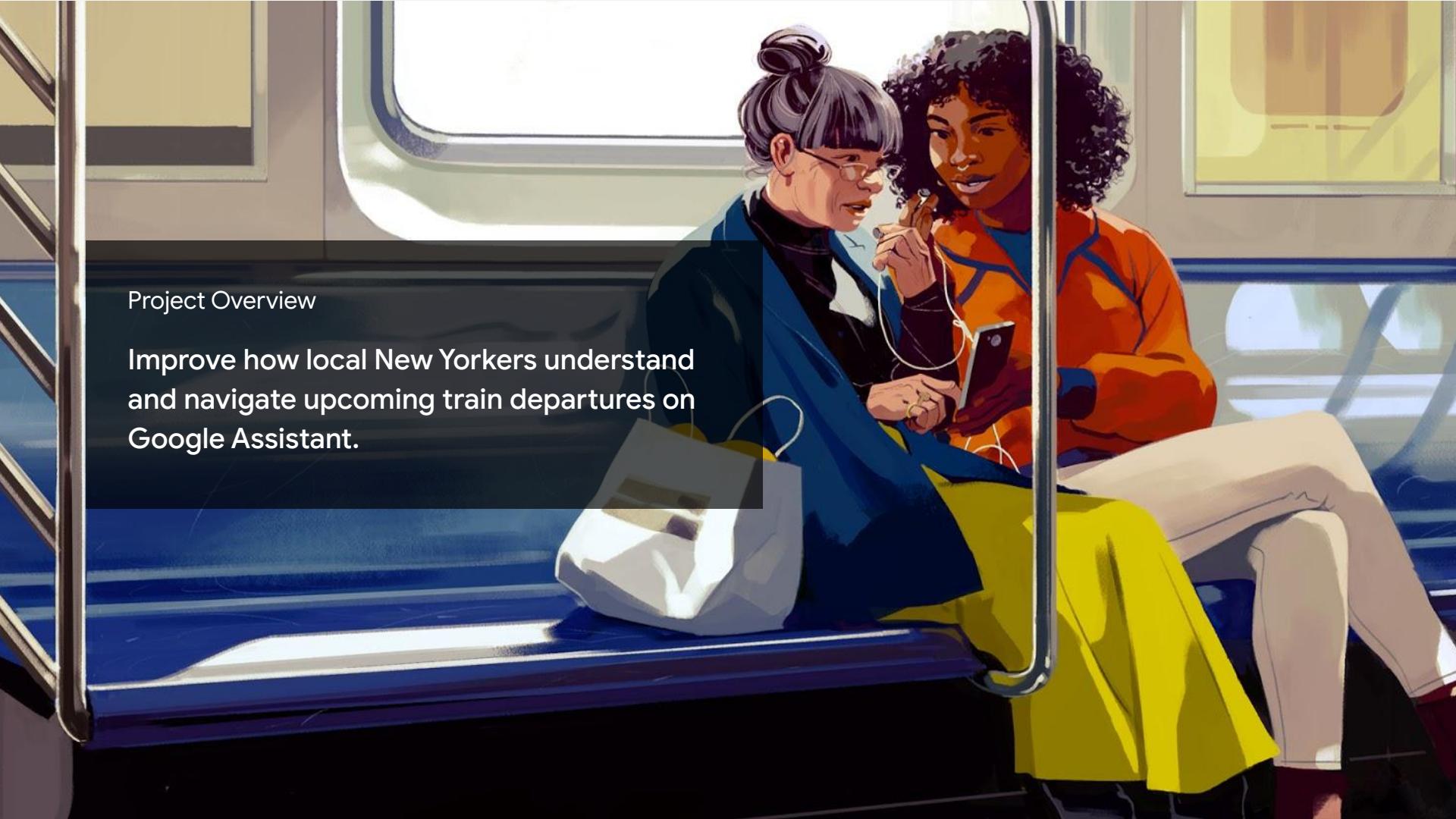
## NDA Notice

This was completed as a 3.5-week starter project for a feature that has been shipped. Some specific designs and research findings have been **redacted under NDA**.

My main project is also **under NDA**, so unfortunately I can't disclose those details here.

Thanks in advance, and hope you enjoy!



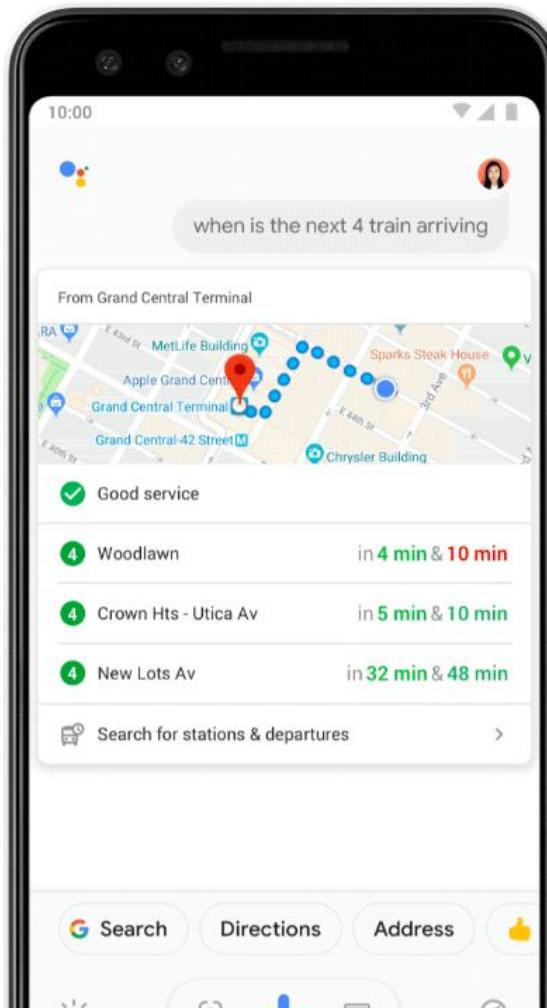


## Project Overview

**Improve how local New Yorkers understand  
and navigate upcoming train departures on  
Google Assistant.**

## Feature Audit

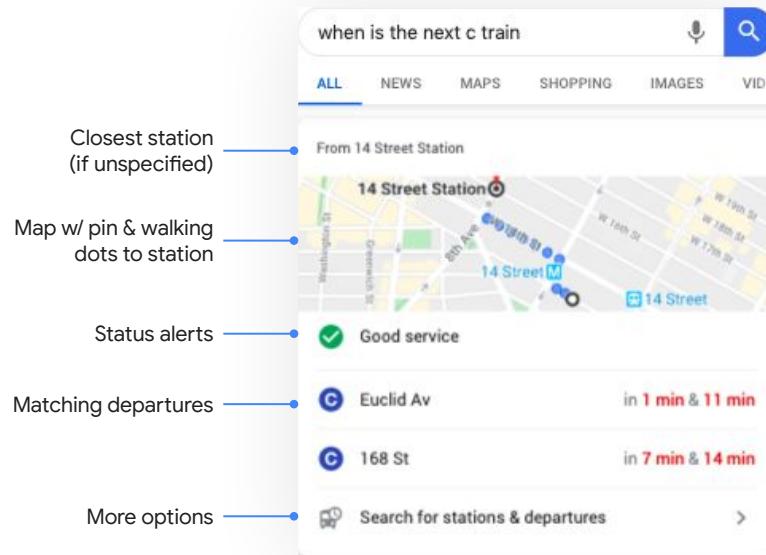
# Existing UI



## Feature Audit

# GUI Response

## GUI Response

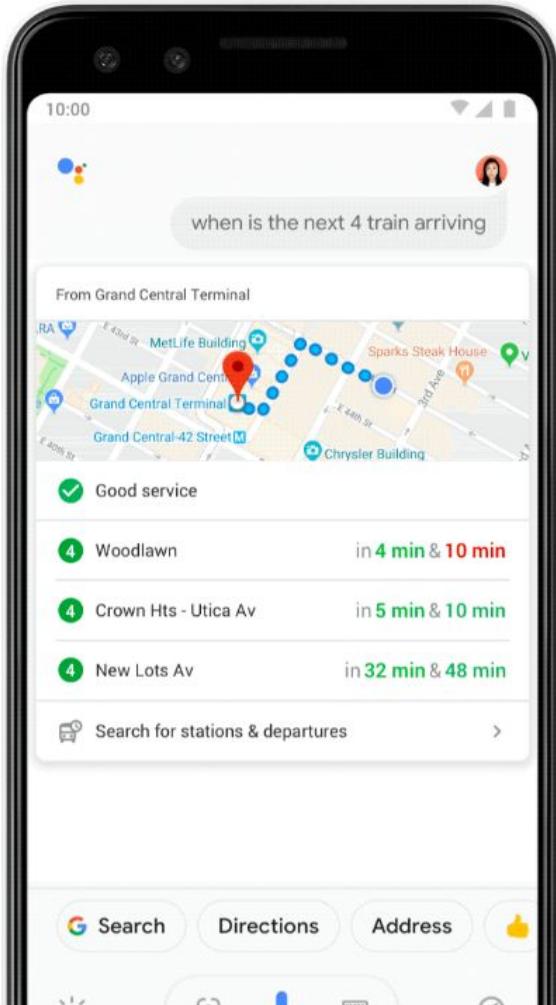


## VUI Response

### VUI Response



*"The nearest station with a train service is **14th street station**. The next **C** toward **Euclid Av** is leaving in **1 minute** and then in **11 minutes**. Meanwhile, the next **C** towards **168 St** leaves there in **7 minutes** and then in **14 minutes**."*



Evaluative Research

## User Feedback

What are the biggest pain points around the current experience of finding transit info on Assistant?

## User Feedback\*

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**Summary:** Even born and bred New Yorkers have **trouble remembering trains** by the last stop label (e.g. Far Rockaway -- Mott Ave.). These labels map poorly onto existing mental models of directionality.

Research Study #1

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**Summary:** Train-takers rely heavily on **signs and signals in the real world** to support wayfinding and stay on top of changes to the line.

Research Study #2

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**Summary:** A **lack of affordances** for finding relevant departures directly on the GUI impeded users' ability to navigate with Assistant.

Research Study #3

\*modified for NDA.

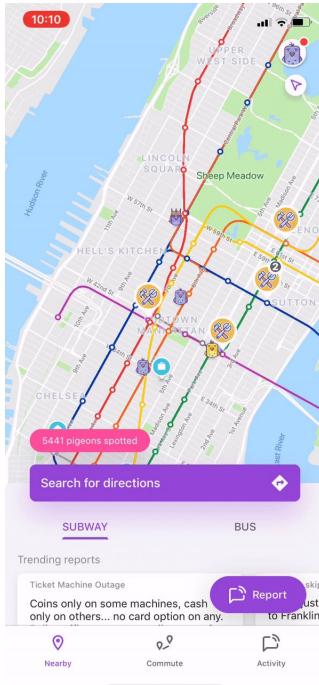
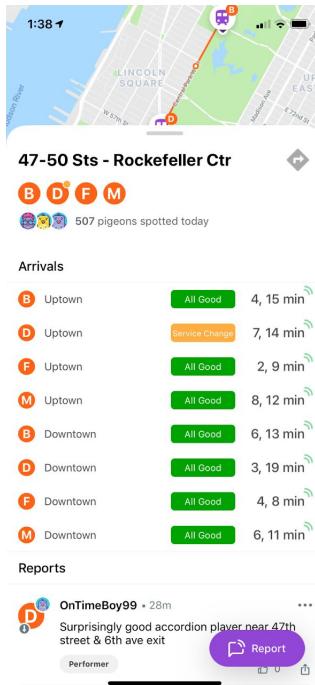
## Takeaways

1. To improve understanding, make transit answers look and sound “local”
2. Information displayed on the phone should align with signs & signals IRL
3. Direct control on the GUI is key to connecting users to their most relevant departures

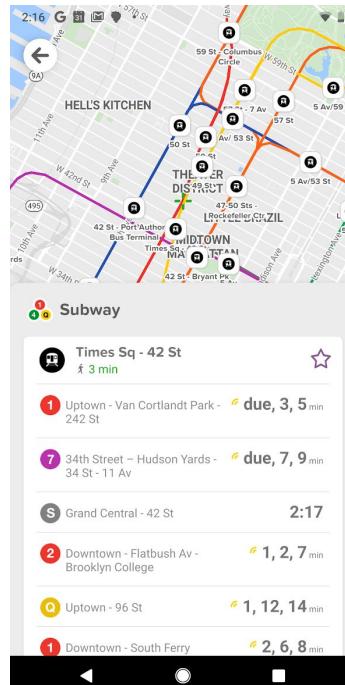
## Landscape Analysis

# Competitive Audit

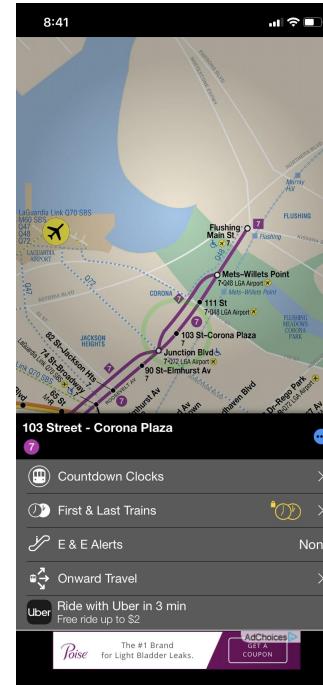
Pigeon (iOS)



CityMapper (iOS + Android)



MTA app (iOS + Android)



## Landscape Analysis

# Internal Exploration -- Google Maps Mobile (GMM)

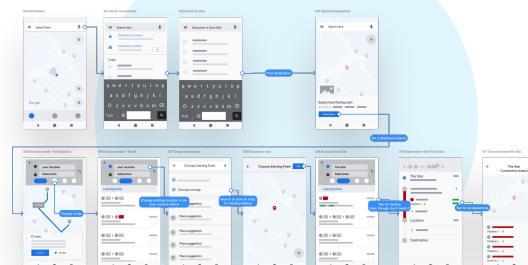
### Searching

6 screens & dead ends



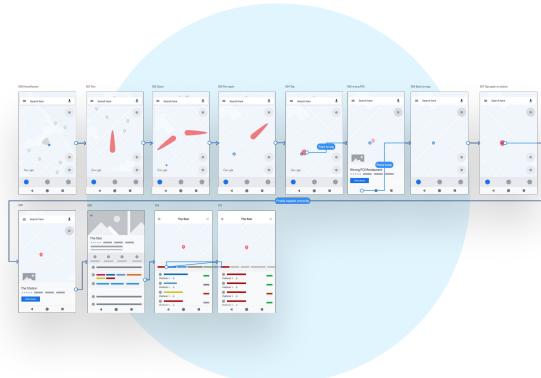
### Directions

10 steps



### Tapping on a station

+5 pans and zooms & miss taps



How might we...

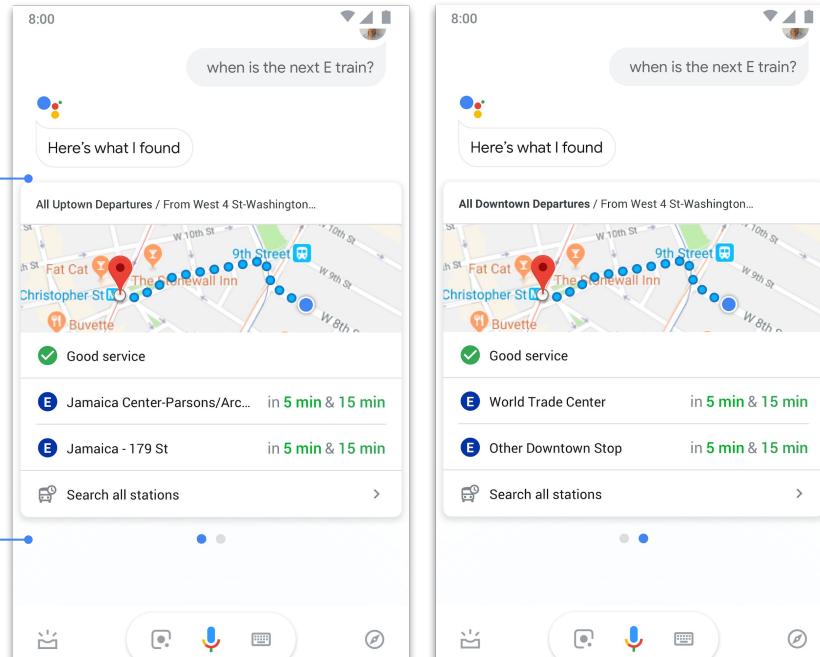
**Provide New York's transit-takers with easy  
access to relevant and digestible information  
about their upcoming departures?**

## Design Explorations

# Answer Cards: Structure & Interactivity

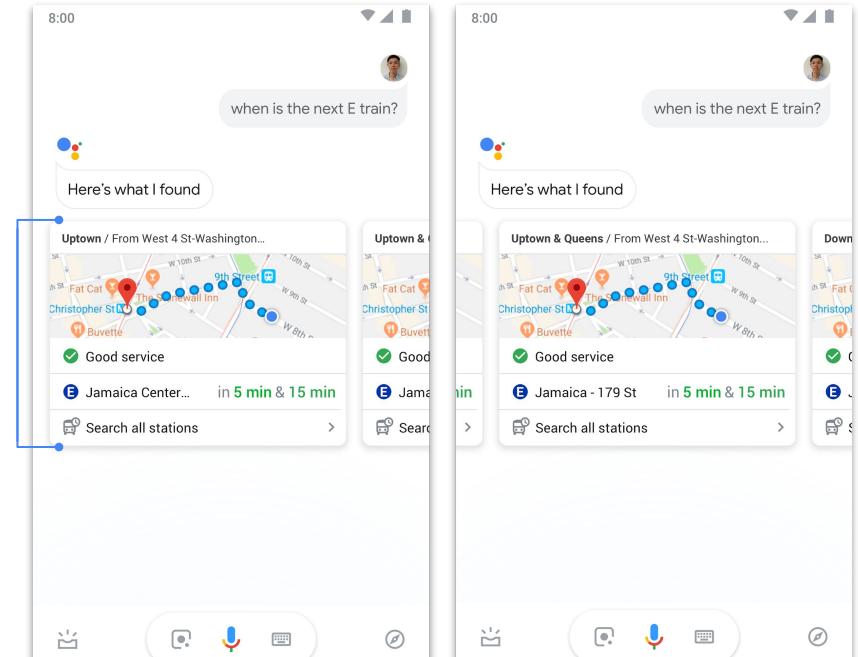
## A / Directions Carousel

H-scroll for uptown & downtown. Clear distinction, but heavy interaction for just two cards.



## B / Departures Carousel

H-scroll for individual departures from a station. Able to swipe to the right one, but not built for scale.

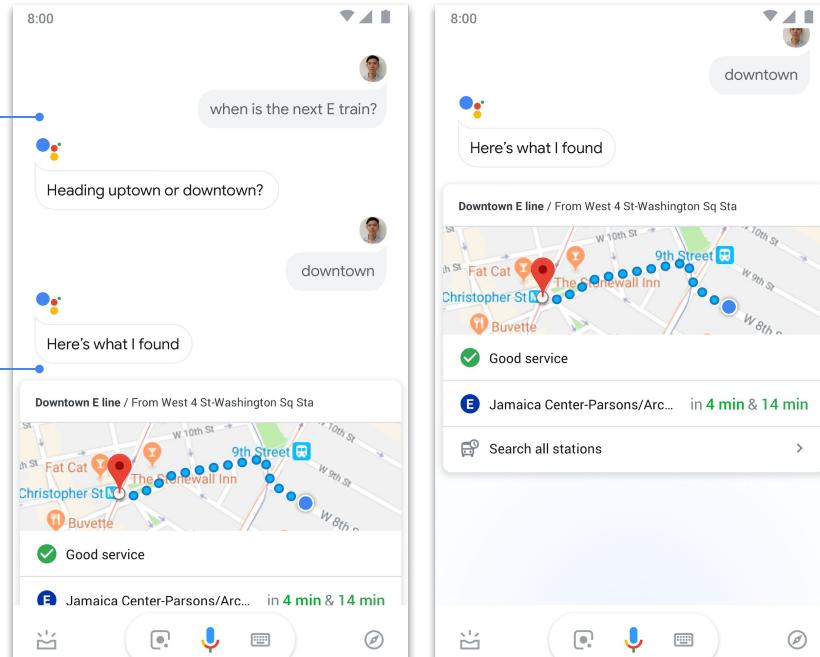


## Design Explorations

# Answer Cards: Structure & Interactivity

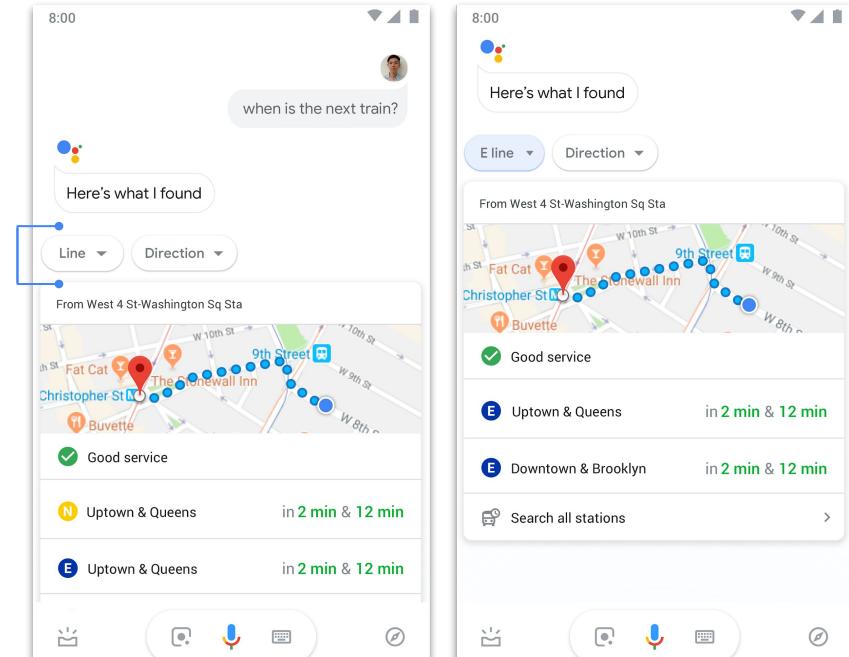
## C / Multi-Turn

Assistant asks to specify direction or line before surfacing results. Impact/feasibility tradeoff.



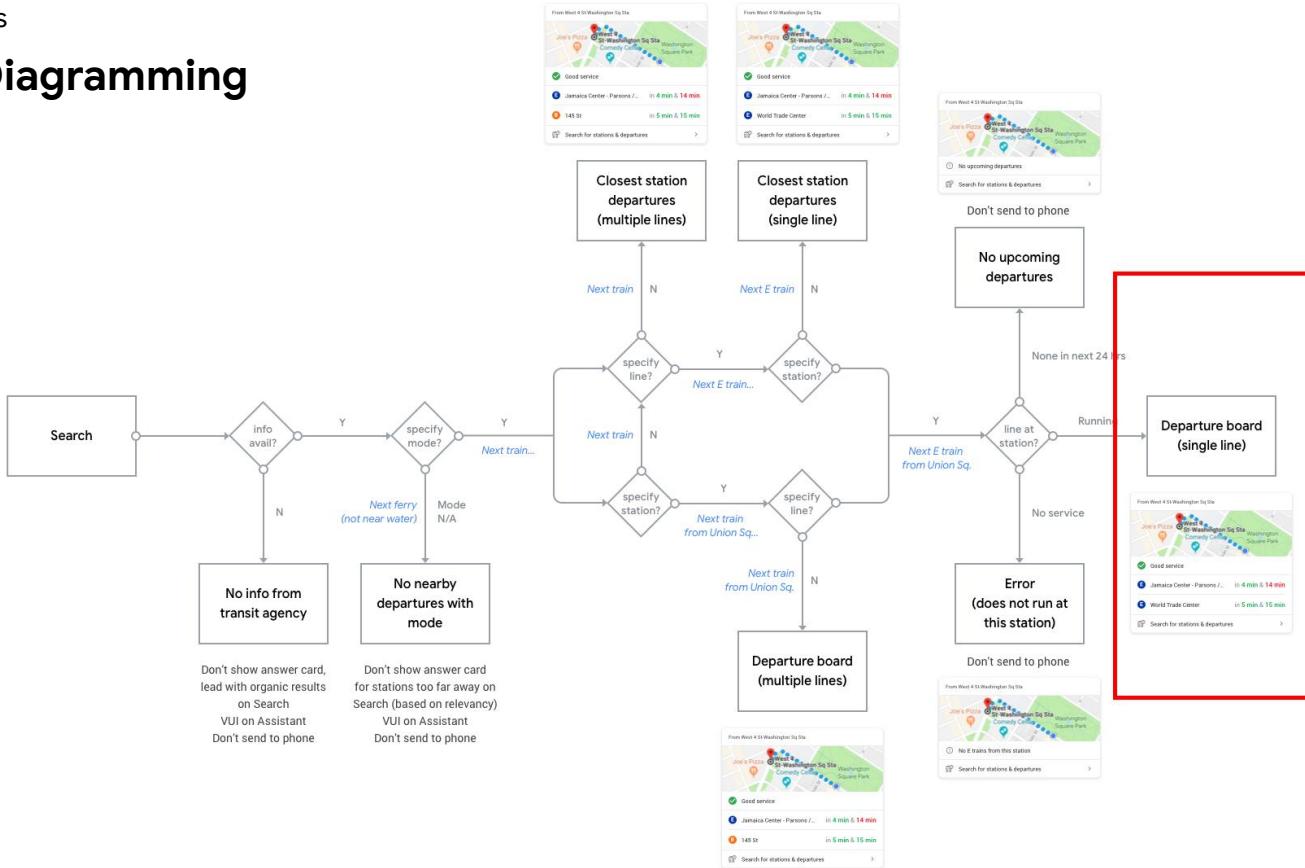
## D / Filter Chips

Users can refine the answer to their initial query directly, by narrowing the desired line or direction.



## Design Explorations

# VUI: Flow Diagramming



## Design Explorations

# VUI Consistency

**Current response to:**

**“When is the next train?”**

**45 words, ~16 sec**



*“The nearest station with a train service is 14th street station. The next A toward Inwood-207 street is leaving now and then in 2 minutes. Meanwhile, the next A towards Far Rockaway - Mott Av leaves there in 3 minutes and then in 20 minutes.”*

**A / Line + Directionality**

**25 words, ~9 sec**



*“At 14th street station, the next **uptown A** departs now and in 2 minutes. The **downtown** departs in 3 minutes and then in 20 minutes.*

**B / Line + Dir + Borough**

**27 words, ~9.5 sec**



*“At 14th street station, the next **uptown A** departs now and in 2 minutes. The **downtown towards Queens** departs in 3 minutes and then in 20 minutes.*

**C / Line + Dir + Headsign**

**44 words, ~14 sec**



*“At 14th street station, the next **uptown A towards Inwood-207 street** departs now and in 2 minutes. The **downtown towards Far Rockaway-Mott Av** departs in 3 minutes and then in 20 minutes.*

**D / Line + Dir + Borough + Headsign**

**48 words, ~15 sec**

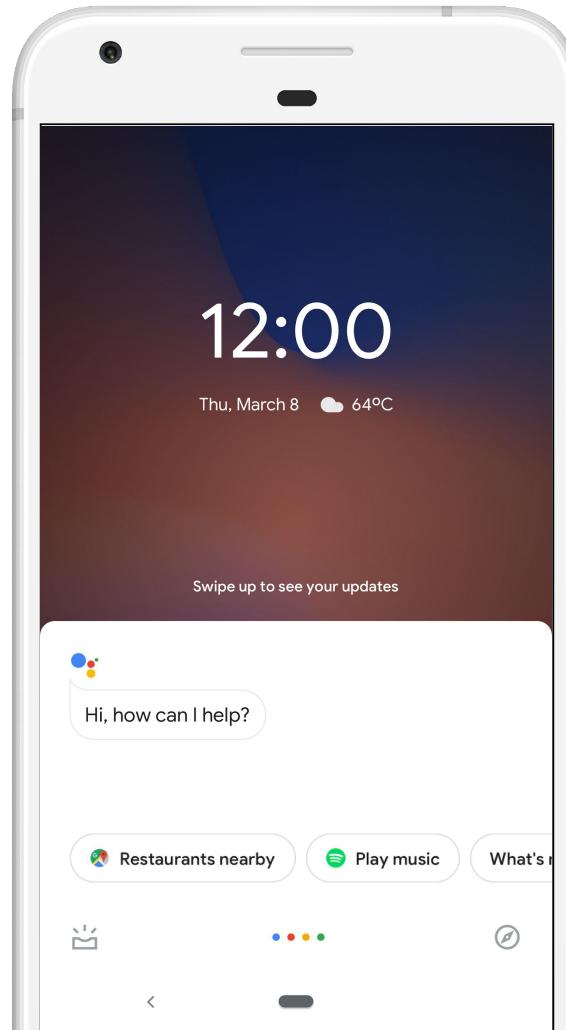


*“At 14th street station, the next **uptown A train towards Inwood-207 street** departs now and in 2 minutes. The **downtown and Queens-bound train towards Far Rockaway-Mott Av** departs in 3 minutes and then in 20 minutes.*

Design Concept

## Initial Prototype

Cmd+click to play (with audio!) ➡



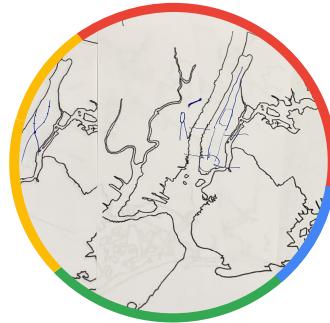
Testing & Validation

## Usability Study

Prototype Walkthrough



Mental Models Exercise



(BONUS) Pigeon Team Chat



Part of a larger deck of research insights (under NDA, sorry!)

## Takeaways

1. **Low discoverability of filter chips impeded users from finding the most relevant results**
2. **Users liked seeing the closest station by default, but it wasn't clear they could select a different one**
3. **Language around directionality should reflect local mental models around boroughs and destinations**

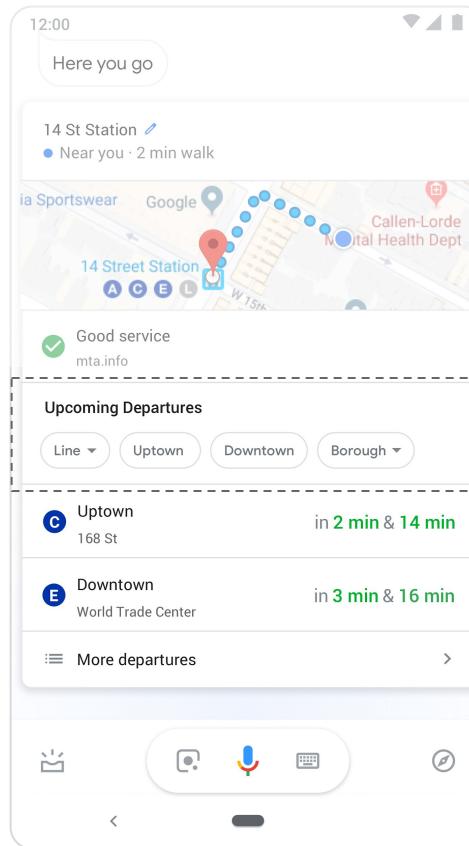
## Design Explorations

# Filter Placement & Treatment

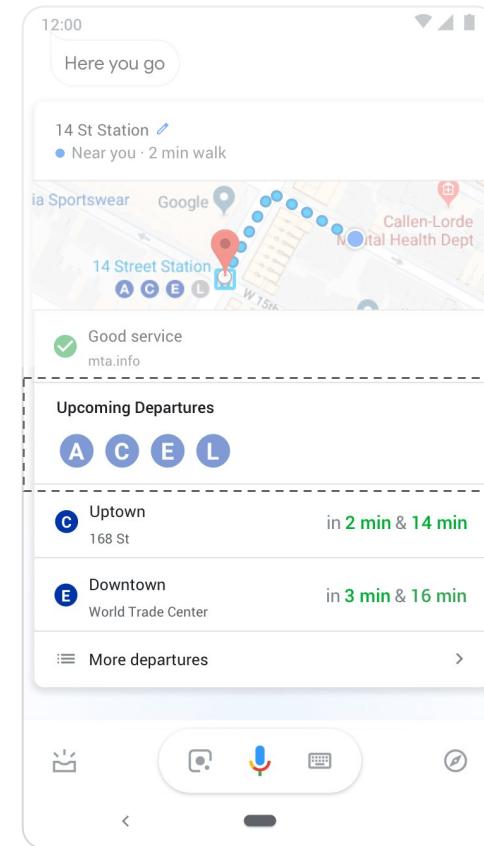
**A / Proximity to departures below creates better association and improves discoverability.**

**B / Benefits of A, plus more visual prominence. Issues with scaling and borough-based queries.**

**A / Placement**



**B / Placement + Viz Treatment**

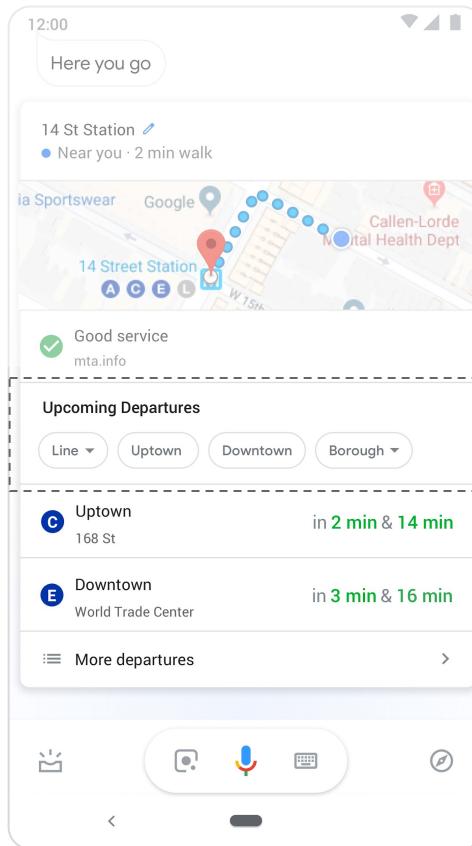


# Filter Placement & Treatment

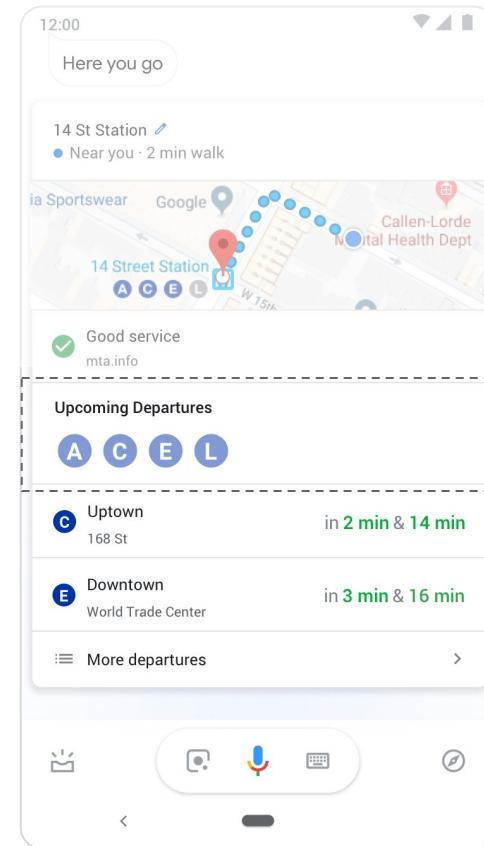
A / Proximity to departures below creates better association and improves discoverability.

B / Benefits of A, plus more visual prominence. Issues with scaling and borough-based queries.

A / Placement



B / Placement + Viz Treatment



## Design Explorations

# Improving How Users ‘Edit’ Stations

### A / As-is

Action unclear; ‘Edit station’ copy feels like changing info about the current station

This screenshot shows the current state of the station edit interface. At the top, it says "From 14 St Station". Below that is a map showing the station's location and nearby landmarks like "La Sportswear" and "Google". A red pin marks the station on the map. To the right of the map, there is a blue button labeled "Edit station". Below the map, there is a green checkmark icon followed by the text "Good service mta.info". At the bottom, there are buttons for "Line ▾", "Uptown", "Downtown", and "Borough ▾".

<b>E</b> Uptown & Queens Jamaica-179 St	in <b>2 min &amp; 12 min</b>
<b>E</b> Downtown World Trade Center	in <b>3 min &amp; 13 min</b>
More departures from this station >	

### B / Icon CTA

Lightweight, but still can be interpreted as changing info about the current station

This screenshot shows a variation where the "Edit station" button is replaced by a blue square icon containing a white pencil symbol. The rest of the interface is identical to screenshot A.

<b>E</b> Uptown & Queens Jamaica-179 St	in <b>2 min &amp; 12 min</b>
<b>E</b> Downtown World Trade Center	in <b>3 min &amp; 13 min</b>
More departures from this station >	

### C / ‘Change’ CTA

Lightweight; position next to station header makes its affordance more clear

This screenshot shows the "Change" button positioned directly next to the station header "From 14 St Station". The rest of the interface is identical to screenshot A.

<b>E</b> Uptown & Queens Jamaica-179 St	in <b>2 min &amp; 12 min</b>
<b>E</b> Downtown World Trade Center	in <b>3 min &amp; 13 min</b>
More departures from this station >	

### D / ‘Search All’ Cell

Most explicit, but pushed down the visual path; doesn’t scale well for Google Search

This screenshot shows a "SEARCH ALL STATIONS" button at the bottom of the page. The rest of the interface is identical to screenshot A.

<b>E</b> Uptown & Queens Jamaica-179 St	in <b>2 min &amp; 12 min</b>
<b>E</b> Downtown World Trade Center	in <b>3 min &amp; 13 min</b>
More departures from this station >	

## Design Explorations

# Improving How Users ‘Edit’ Stations

### A / As-is

Action unclear; ‘Edit station’ copy feels like changing info about the current station

From 14 St Station

• Near you • 5 min Edit station

Good service mta.info

Line ▾ Uptown Downtown Borough ▾

E Uptown & Queens Jamaica-179 St in 2 min & 12 min

E Downtown World Trade Center in 3 min & 13 min

≡ More departures from this station >

### B / Icon CTA

Lightweight, but still can be interpreted as changing info about the current station

From 14 St Station

• Near you • 5 min

Good service mta.info

Line ▾ Uptown Downtown Borough ▾

E Uptown & Queens Jamaica-179 St in 2 min & 12 min

E Downtown World Trade Center in 3 min & 13 min

≡ More departures from this station >

### C / ‘Change’ CTA

Lightweight; position next to station header makes its affordance more clear

From 14 St Station Change

• Near you • 5 min

Good service mta.info

Line ▾ Uptown Downtown Borough ▾

E Uptown & Queens Jamaica-179 St in 2 min & 12 min

E Downtown World Trade Center in 3 min & 13 min

≡ More departures from this station >

### D / ‘Search All’ Cell

Most explicit, but pushed down the visual path; doesn’t scale well for Google Search

From 14 St Station

• Near you • 5 min

Good service mta.info

Line ▾ Uptown Downtown Borough ▾

E Uptown & Queens Jamaica-179 St in 2 min & 12 min

E Downtown World Trade Center in 3 min & 13 min

≡ More departures from this station >

SEARCH ALL STATIONS

## Design Explorations

# Context Cases

**Outside Manhattan**

Broadway Jct Station Change  
Near you · 5 min

Good service mta.info

Upcoming Departures

- A line ▾ Borough ▾
- A Manhattan Inwood - 207 St in 2 min & 14 min
- A Far Rockaway - Mott Av in 3 min & 16 min
- A Ozone Park - Lefferts Blvd in 4 min & 14 min

More departures from this station >

**Within Manhattan**

14 St Station Change  
Near you · 2 min

Good service mta.info

Upcoming Departures

- A line ▾ Uptown ▾ Downtown ▾ Borough ▾
- A Uptown Inwood - 207 St in 2 min & 14 min
- A Downtown & Brooklyn Far Rockaway - Mott Av in 3 min & 16 min
- A Downtown & Brooklyn Ozone Park - Lefferts Blvd in 4 min & 14 min

More departures from this station >

**Crosstown**

Grand Central Terminal Change  
Near you · 5 min

Good service mta.info

Upcoming Departures

- 7 line ▾ Direction ▾ Borough ▾
- 7 Queens Flushing - Main St in 2 min & 14 min
- 7 34 St - 11 Av in 3 min & 16 min

More departures from this station >

Location-based filter chips

Only show headsign if current & last stops are in the same borough (e.g. both Brooklyn)

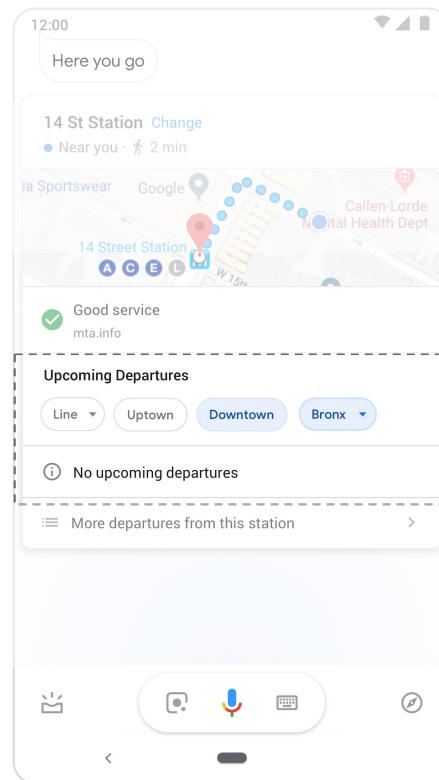
# Error States

**A / Visually lightweight; doesn't interrupt the interaction. But, less explicit.**

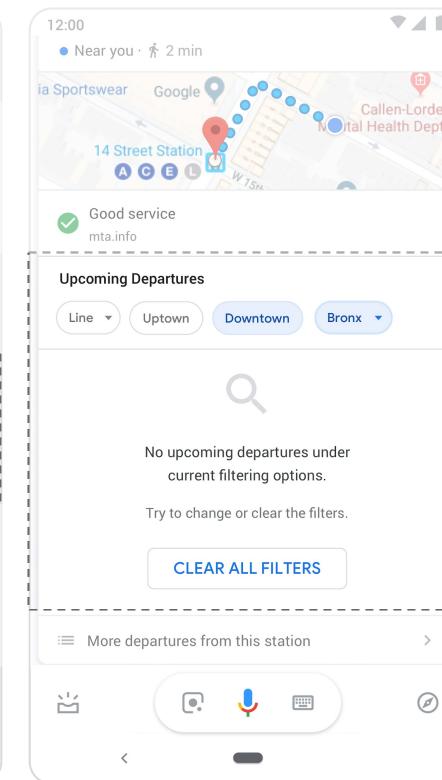
**B / Provides guidance to the user for error correction, but takes up too much space.**

**C / Only viable when the user's initial query produces an error.**

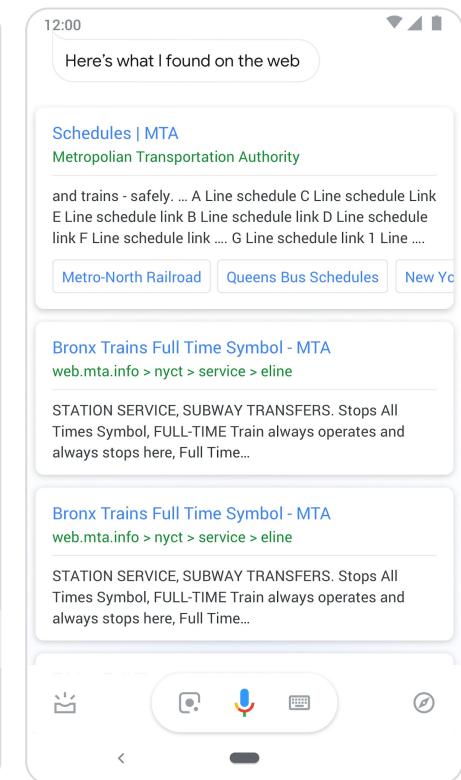
**A / Error & No CTA**



**B / Error & CTA Button**



**C / Organic Search Results**



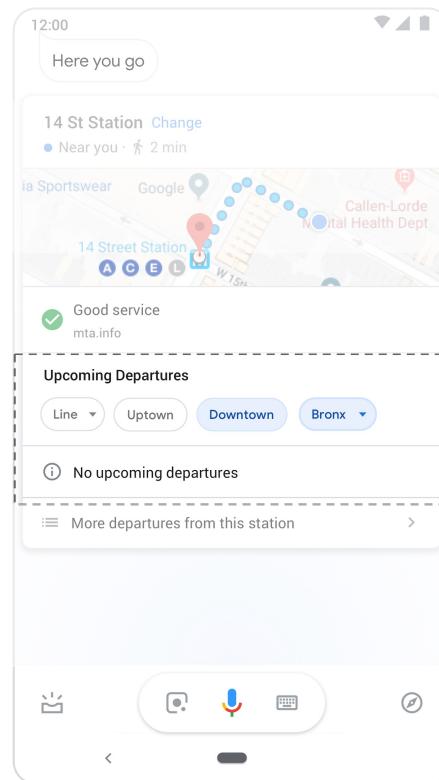
# Error States

A / Visually lightweight; doesn't interrupt the interaction. But, less explicit.

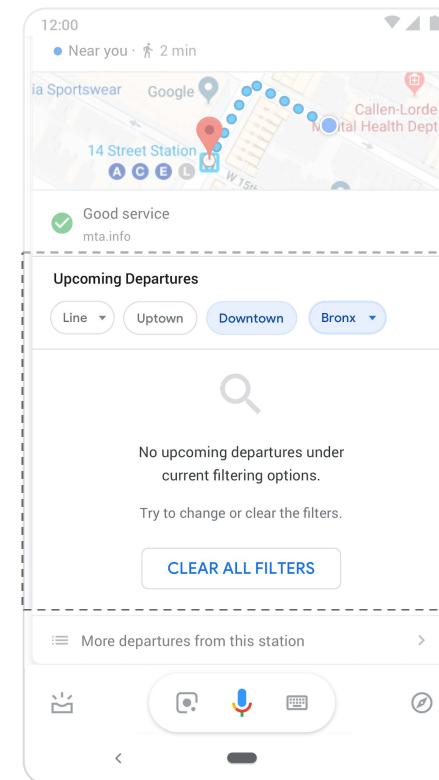
B / Provides guidance to the user for error correction, but takes up too much space.

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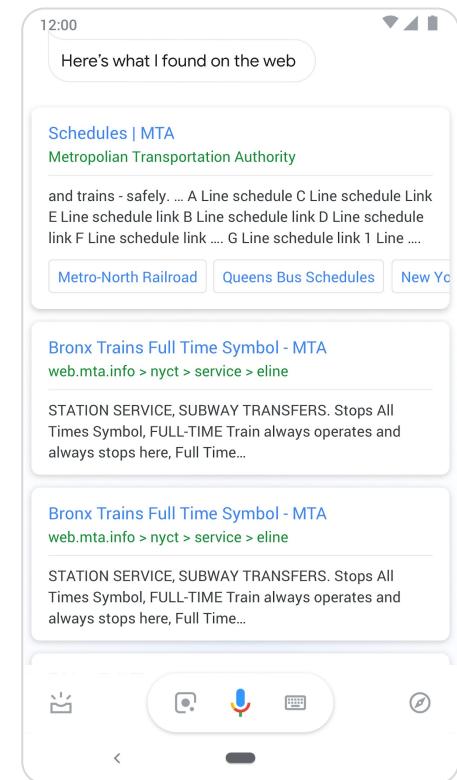
A / Error & No CTA



B / Error & CTA Button

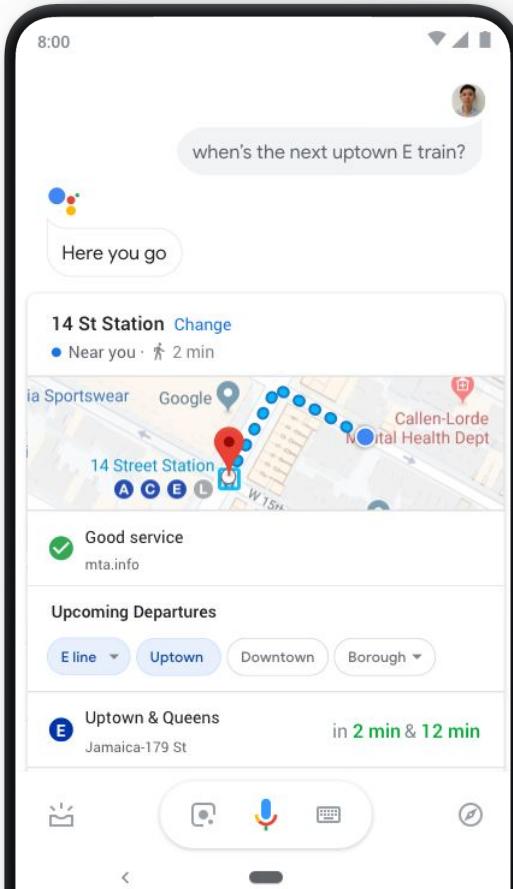
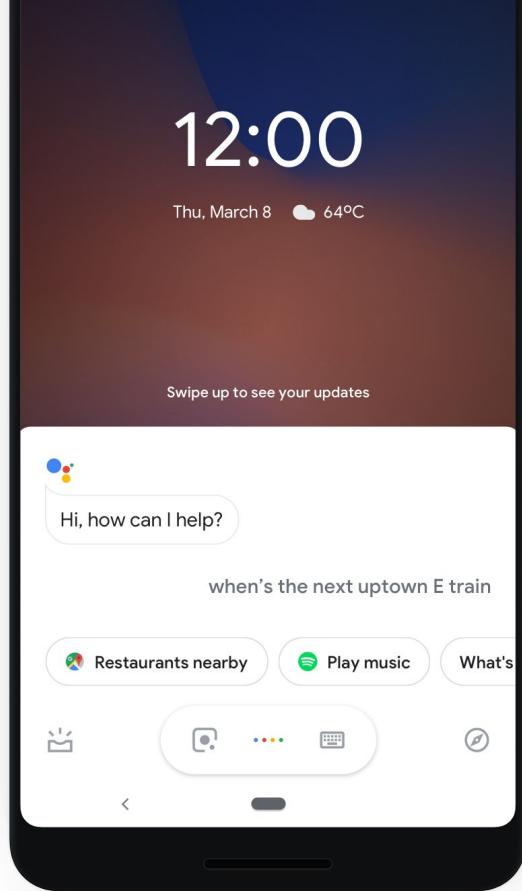


C / Organic Search Results



Transit Answer

# Final Design



Monday, Apr 29 | ☀ 56°

Transit Answer

## Final Design

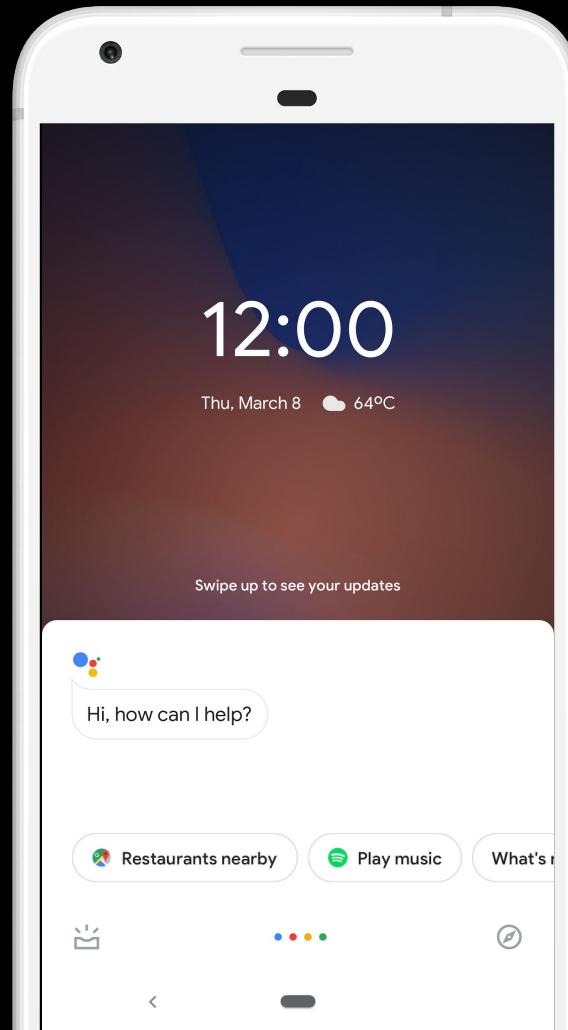


A screenshot of a mobile web browser on a smartphone. The top status bar shows the time "8:00" and signal strength. The main content is a Google search results page for "next E train uptown". The first result is a transit card for "14 St Station Change", indicating "Near you" with a walking distance of "2 min". It includes a map showing the station's location near "Sportswear" and "Google", with a red pin marking the entrance. Below the map, a review from "mta.info" says "Good service" with a green checkmark. The next section, "Upcoming Departures", shows the "E line" with "Uptown" selected, listing "Uptown & Queens" services to "Jamaica-179 St" arriving "in 2 min & 12 min". A link to "More departures from this station" is shown. At the bottom, there is a link to "Schedules | MTA Metropolitan Transportation Authority".

Transit Answer

## Final Prototype

Cmd+click to play (with audio!) ➡



## Testing & Validation

### Positive Feedback :)

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“This [departures] is pretty informative... I can just click on the train I want. The directions with the boroughs make sense if I know I want to go to Brooklyn.”

Participant 7

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“I like when I don't have to have extra clicks or interaction to get the information I want... The info is front and center.”

Participant 4

---

“I wouldn't know the train is going uptown if it just told me the last stop... [having this] makes it easier to connect it with where I'm going.”

Participant 8

---

“I wouldn't want just the last stop because it's not what's displayed at the gates... those signs already use [direction].”

Participant 8

Big Picture

## What's the Impact?\*

Next departures **consistently ranks** in top queries for transit information globally.

By improving the UI for New York as a base case, we can **scale our learnings** to inform how we show and localize next departures for a **global addressable market**.

Next departures

New York

40%

30%

20%

10%

0%

Next departures

25.4%  
25.2%  
21.0%  
20.0%  
6.2%  
2.1%

(Redacted)

40%

30%

20%

10%

0%

Next departures

16.9%  
28.7%  
28.0%  
5.0%  
16.1%  
5.4%

(Redacted)

40%

30%

20%

10%

0%

Next departures

32.9%  
14.3%  
22.6%  
22.8%  
5.3%  
2.0%

(Redacted)

40%

30%

20%

10%

0%

Next departures

40.7%  
27.5%  
19.4%  
7.0%  
3.8%  
1.5%

\*modified for NDA.

Big Picture

## Scaling Up

Nathan Jenni ► subtle asian traits  
5 hrs · 

Grand Central ain't shit

When you have to meet your friend at Shinjuku Station



IG: @tokyoworld

Ah shit, here we go again.

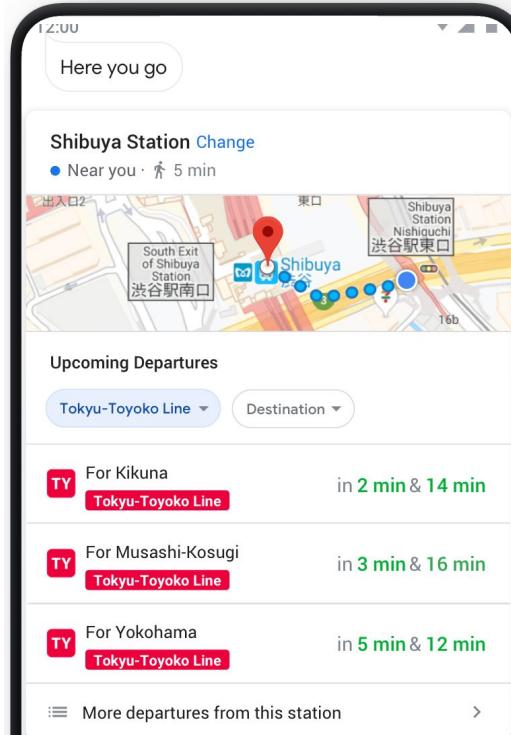
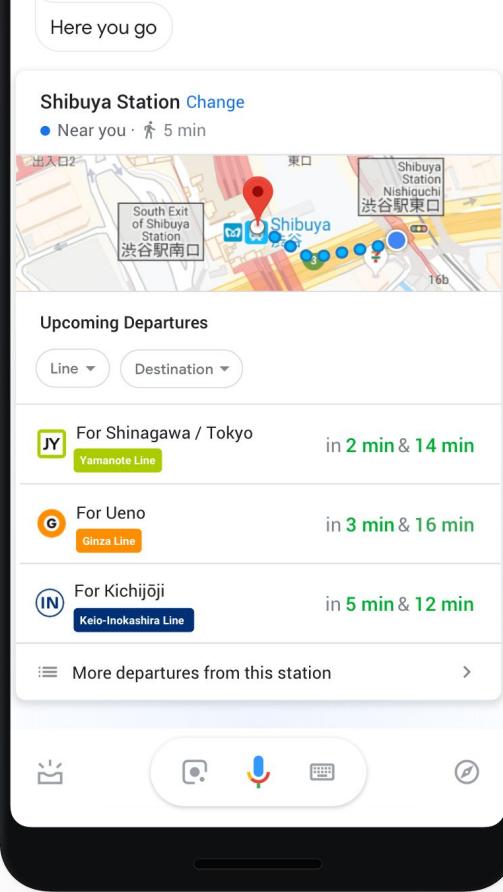
4.6K

1.7K Comments

Like Comment

Big Picture

# Scaling Up



XFN Collaboration: Engineering

# Ready, Set, Launch

TLA Launch Statistics

File Edit View Insert Format Data Tools Add-ons Help

Comment only

param:q

1	A	B	C	D	E	F	G	H	I
2									
3	next uptown 4 train								
4	uptown d train from herald swaye								
5	next downtown e train at 53rd and 5th avenue								
6	hey google when is the next downtown 1 train								
7	next downtown a train								
8	next downtown d train 34th street								
9	next 1 train uptown								
10	when is the next downtown e train coming								
11	next 6 train downtown 14th street								
12	next uptown a train from 42nd street								
13	next downtown d train on 161st street								
14	next downtown m train 34th street								
15	next downtown f train								
16	next downtown e train at 53rd and 5th avenue								
17	1 train downtown from 181								
18	next a train downtown								
19	when is the next q train downtown								
20	next downtown d train								
21	next uptown a train 34th st								
22	wheres the 4 train from 86st uptown now								
23	next downtown e train at 53rd and 5th avenue								
24	next c train downtown								
25	when is the next downtown train out of 175th street a train								

search Assistant Queries triggered uptown/downtown queries triggered queries with directionality Issues Explore

Launch data for query volume and intent (metrics redacted)

Query: When is the next 6 train leaving [from] 10036, New York, NY, USA (copy)

Query Details

From Grand Central Terminal

The Campbell  
T-Mobile  
Grand Central Terminal

Good service

6 downtown Brooklyn Brid... at 1:34 PM & 1:38 PM

6 uptown Parkchester at 1:37 PM & 1:44 PM

6 uptown Pelham Bay Park at 1:40 PM & 1:49 PM

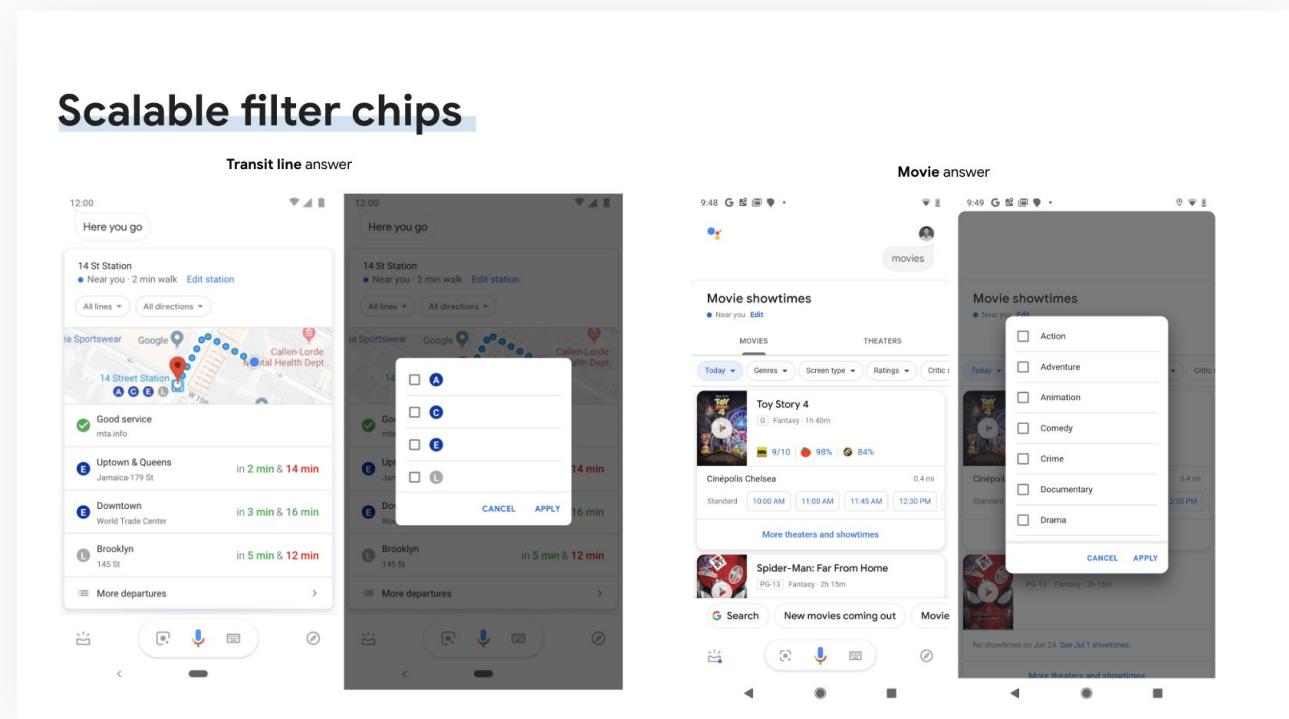
Search for stations & departures

Proof-of-concept for directionality

XFN Collaboration: Product

## Alignment and Vision

### Scalable filter chips



Slide from 1 (of 2) PM/UX reviews where I presented work on Transit Answers

**Thank you!**

