Google
Developers

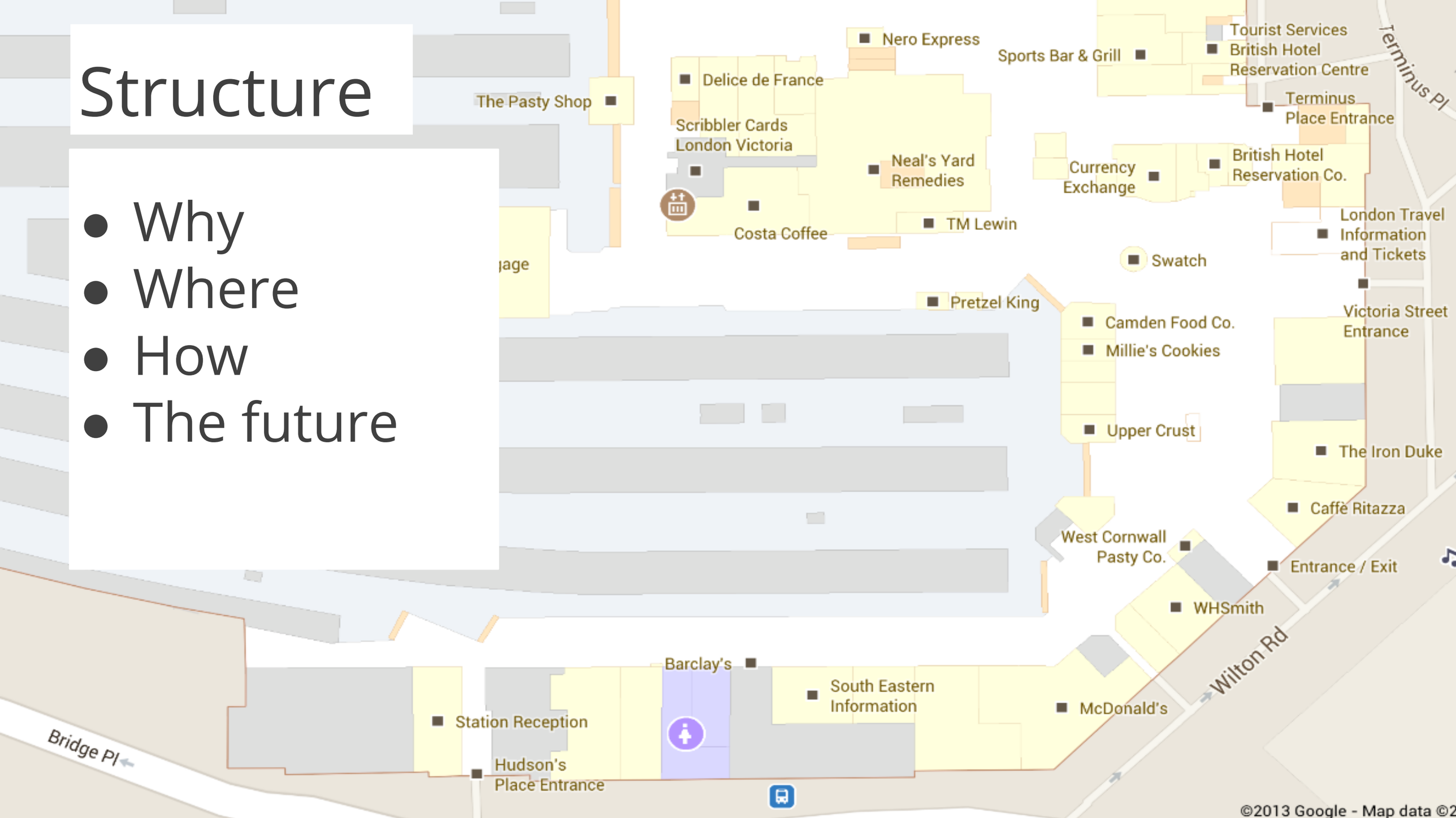
Indoor Maps: The Next Frontier

Waleed Kadous & Sarah Peterson

Senior Staff Software Engineer &
Business Product Manager

Structure

- Why
- Where
- How
- The future

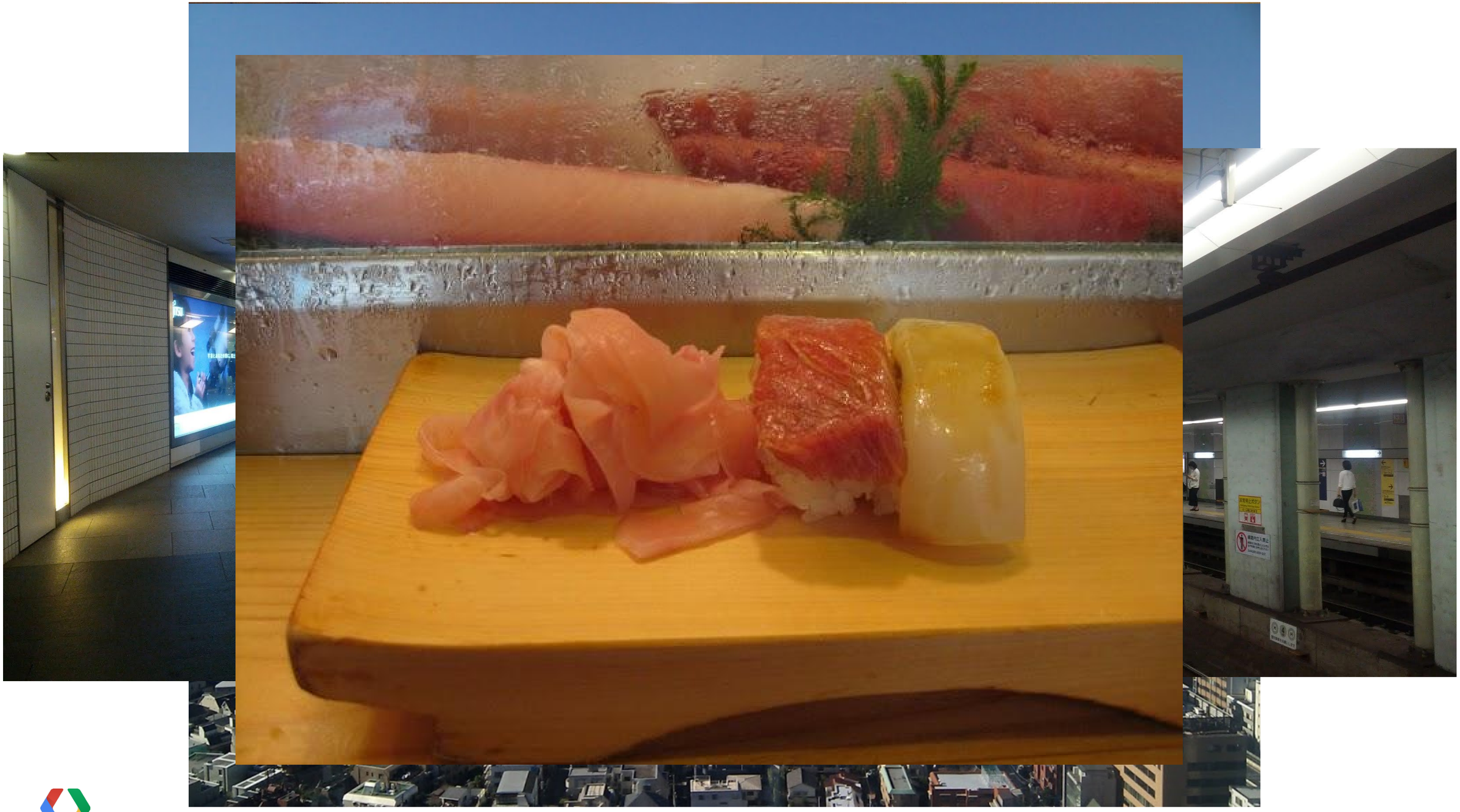


Indoor maps? Why?

Why care about the indoors?

Where do you spend most of your time?

What about people in Tokyo?



Is there an ATM inside this mall?

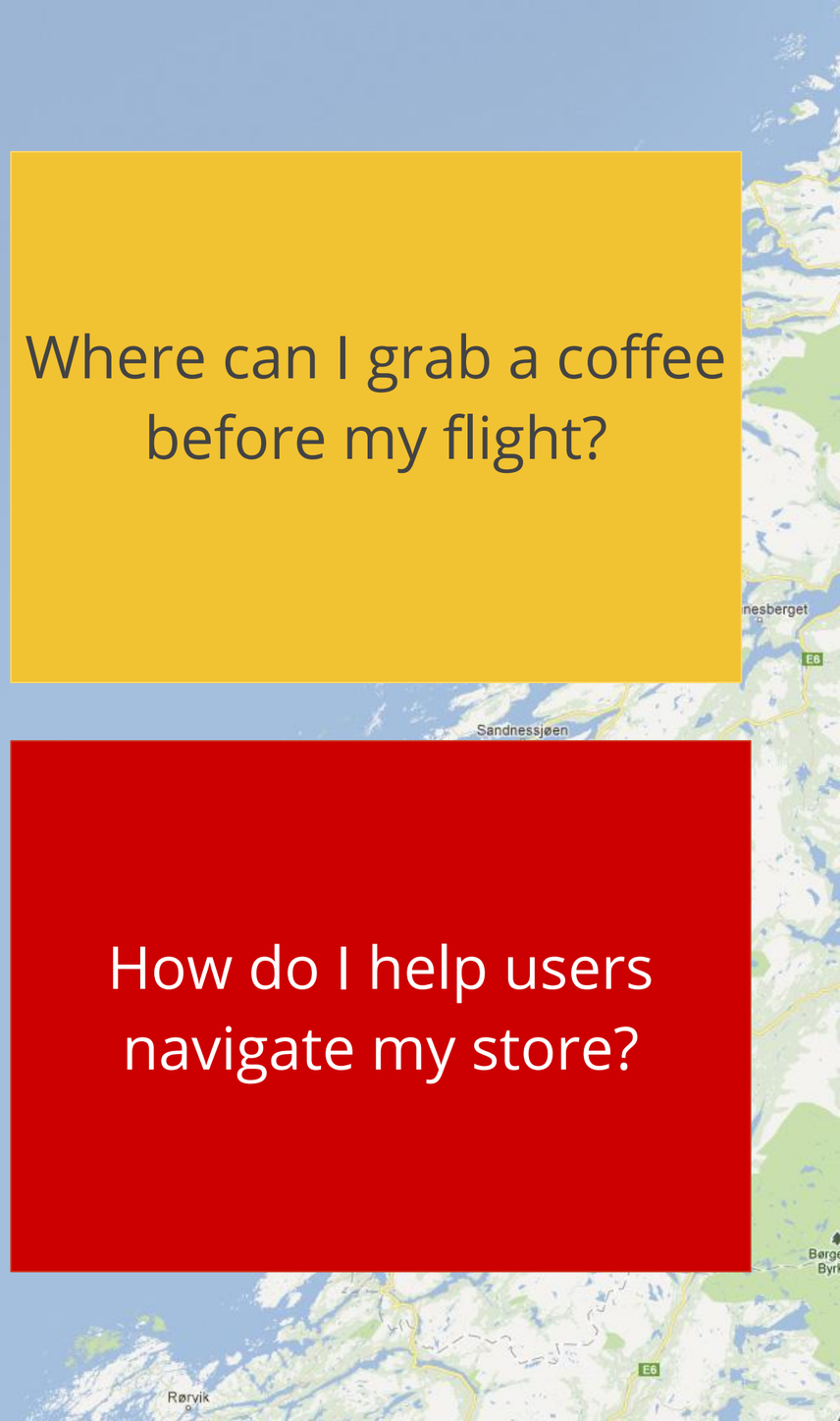
Cool museum! Where's the dinosaur exhibit?

Where can I grab a coffee before my flight?

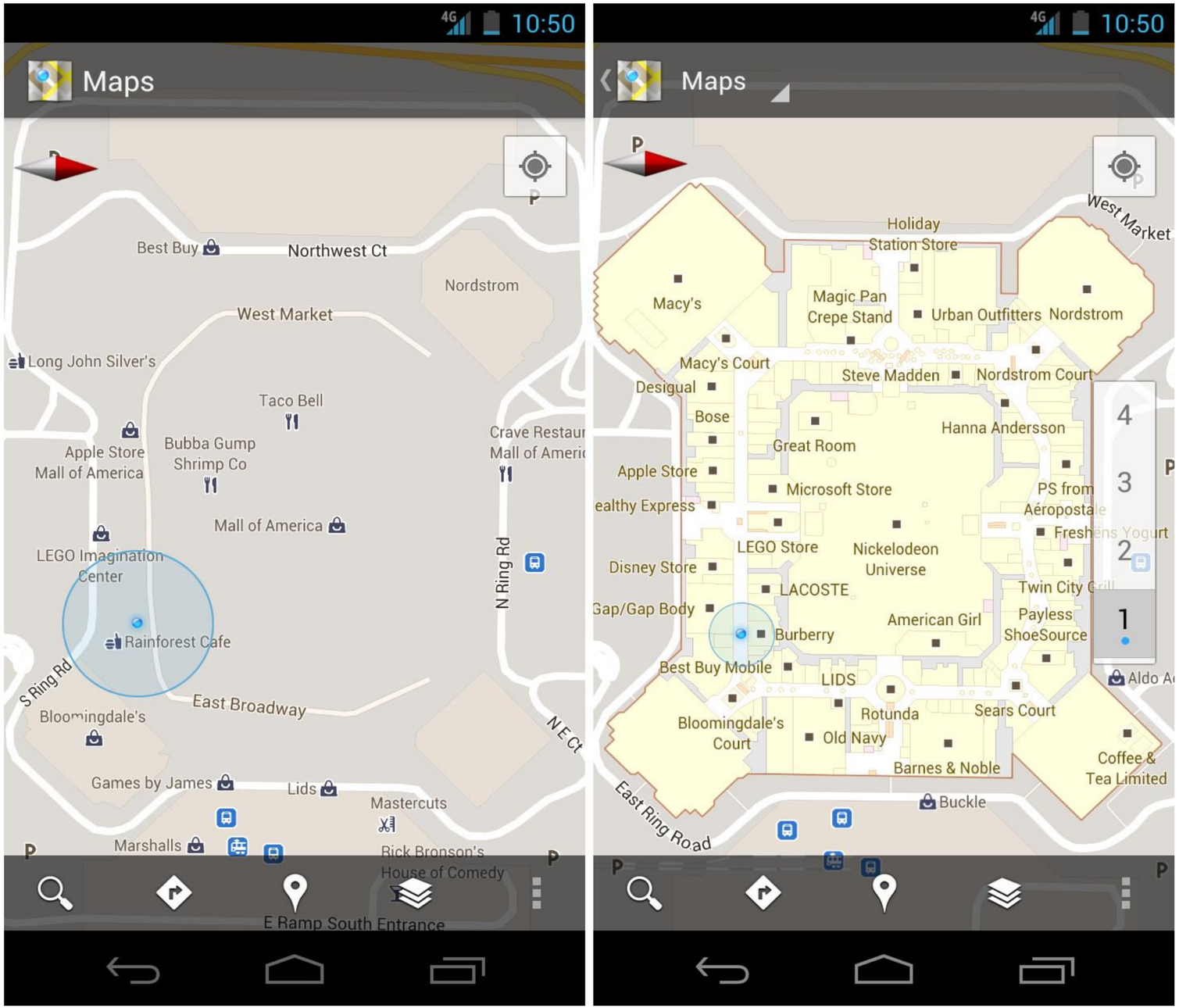
Where are the restrooms?

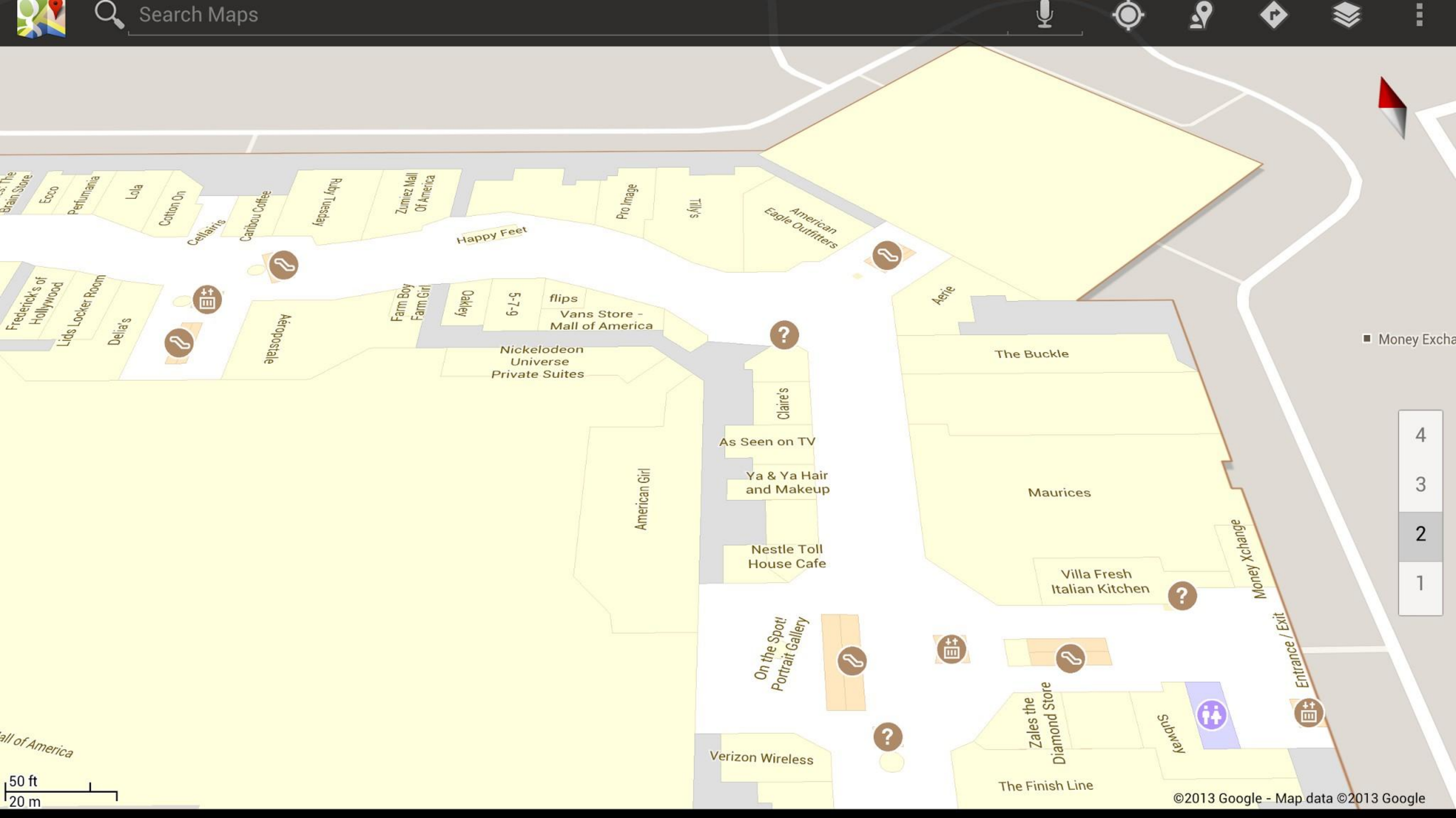
How do I get to the right platform for my train?

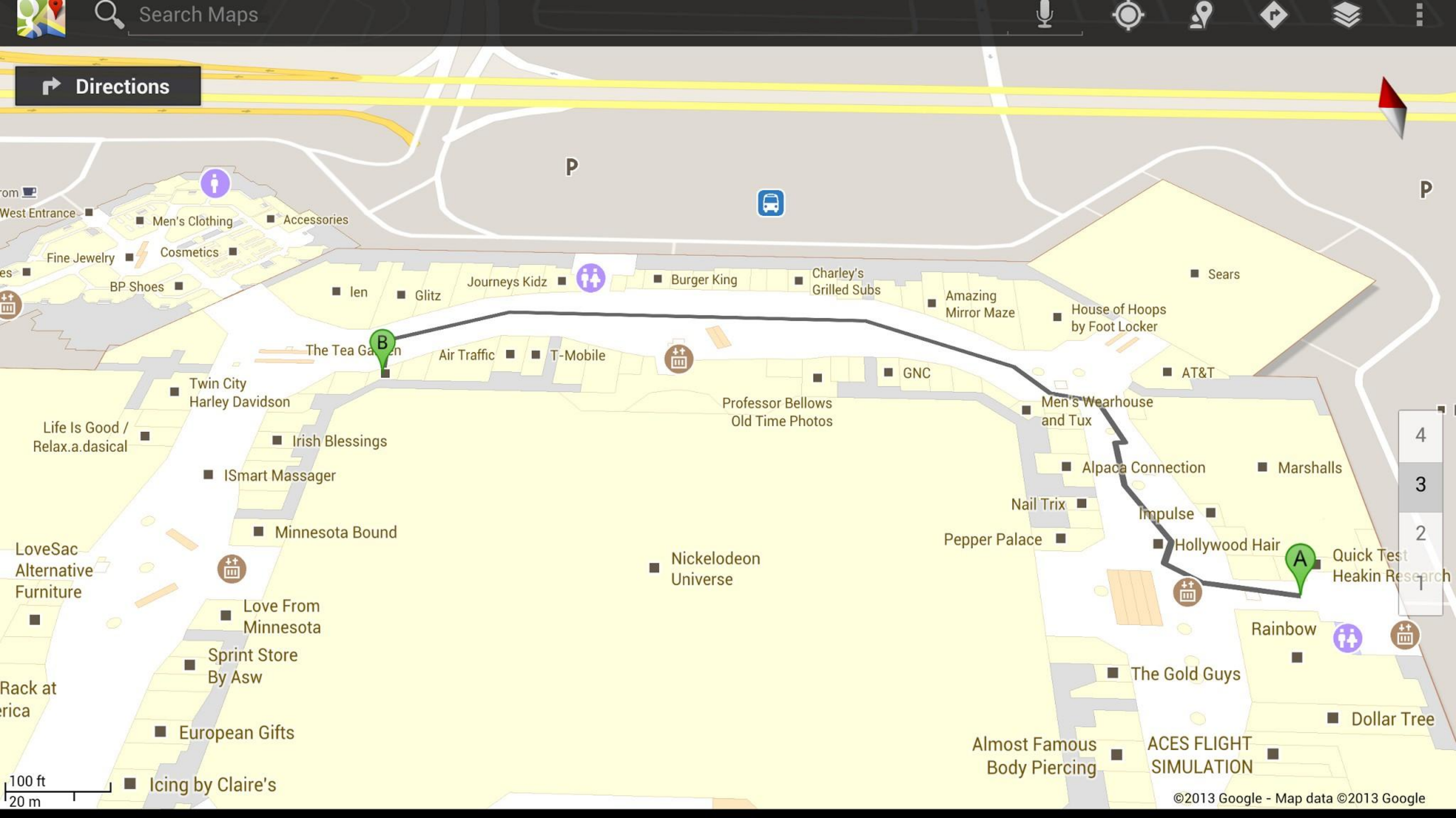
How do I help users navigate my store?



Before & After




Search Maps
Ecco
Perfumania
Lola
Cotton On
Cellairis
Caribou Coffee
Ruby Tuesday
Zumiez Mall Of America
Pro Image
Tilly's
American Eagle Outfitters
Happy Feet
Frederick's of Hollywood
Lids Locker Room
Delia's
Aeropostale
Farm Boy Farm Girl
Oakley
5-7-9
flips
Vans Store - Mall of America
Nickelodeon Universe Private Suites
Aerie
The Buckle
Claire's
As Seen on TV
Ya & Ya Hair and Makeup
American Girl
Maurices
Nestle Toll House Cafe
Villa Fresh Italian Kitchen
Money Xchange
On the Spot! Portrait Gallery
Entrance / Exit
Zales the Diamond Store
Subway
Verizon Wireless
The Finish Line
Money Excha
4
3
2
1
50 ft
20 m
©2013 Google - Map data ©2013 Google


Search Maps
Directions
P
P
P
West Entrance
Men's Clothing
Accessories
Fine Jewelry
Cosmetics
BP Shoes
Journeys Kidz
Burger King
Charley's Grilled Subs
Amazing Mirror Maze
Sears
House of Hoops by Foot Locker
Glitz
B
Air Traffic
T-Mobile
GNC
AT&T
Twin City Harley Davidson
Professor Bellows Old Time Photos
Men's Wearhouse and Tux
Life Is Good / Relax.a.dasical
Irish Blessings
ISmart Massager
Alpaca Connection
Marshalls
Nail Trix
Impulse
Minnesota Bound
Pepper Palace
Hollywood Hair
Quick Test
Heakin Research
A
LoveSac Alternative Furniture
Nickelodeon Universe
Love From Minnesota
Sprint Store By Asw
Rainbow
The Gold Guys
Dollar Tree
European Gifts
Almost Famous Body Piercing
ACES FLIGHT SIMULATION
Icing by Claire's
4
3
2
1
100 ft
20 m
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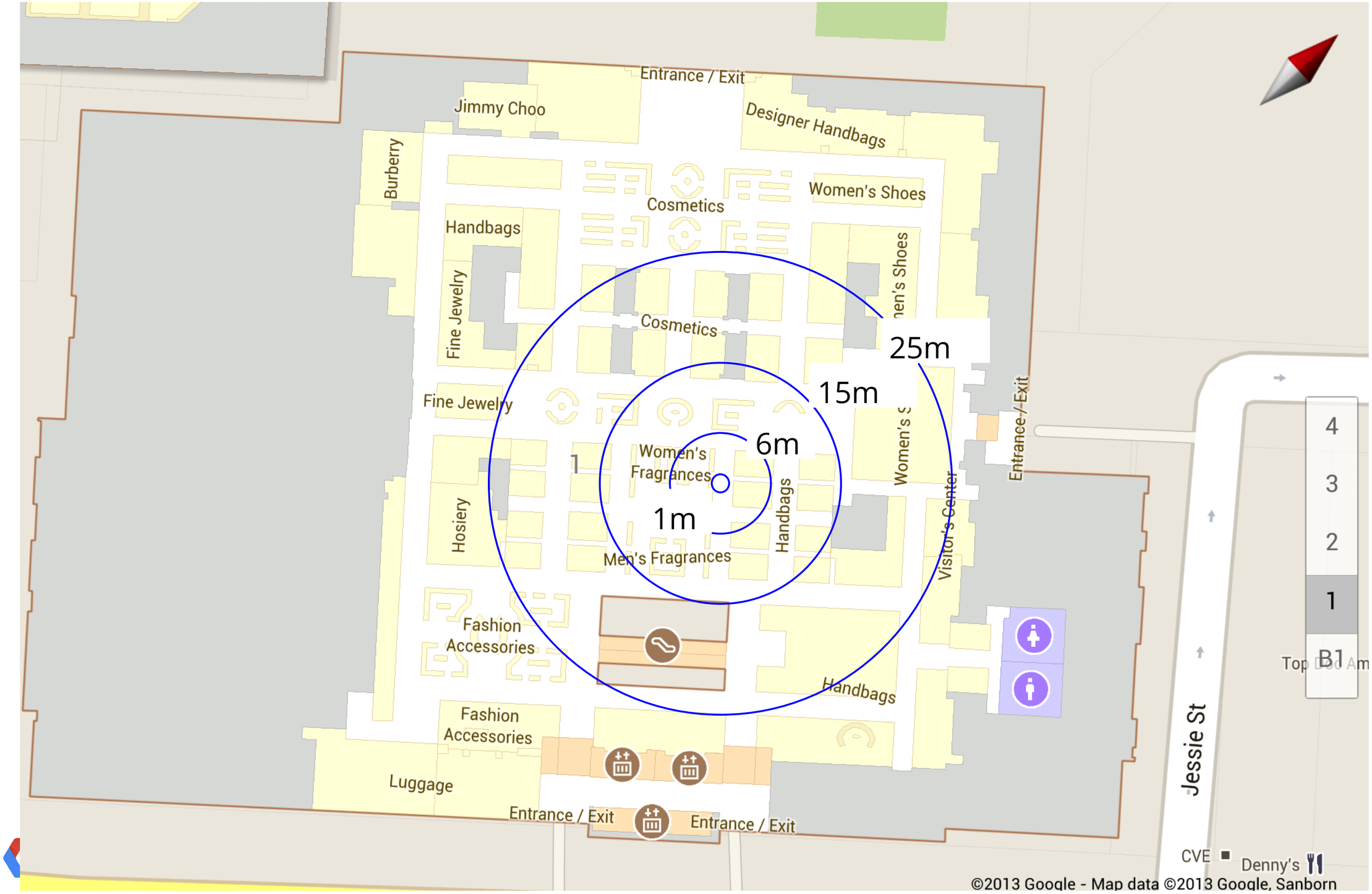

Entrance / Exit
Jimmy Choo
Designer Handbags
Burberry
Cosmetics
Women's Shoes
Handbags
Fine Jewelry
Cosmetics
25m
15m
6m
1m
Fine Jewelry
Women's Fragrances
Hosiery
Handbags
Men's Fragrances
Visitor's Center
Entrance / Exit
Fashion Accessories
Handbags
Fashion Accessories
Luggage
Entrance / Exit
Entrance / Exit
Jessie St
4
3
2
1
B1
CVE
Denny's
©2013 Google - Map data ©2013 Google, Sanborn

What excites us?

Indoor maps coverage

+

high quality indoor location

+

self service tools

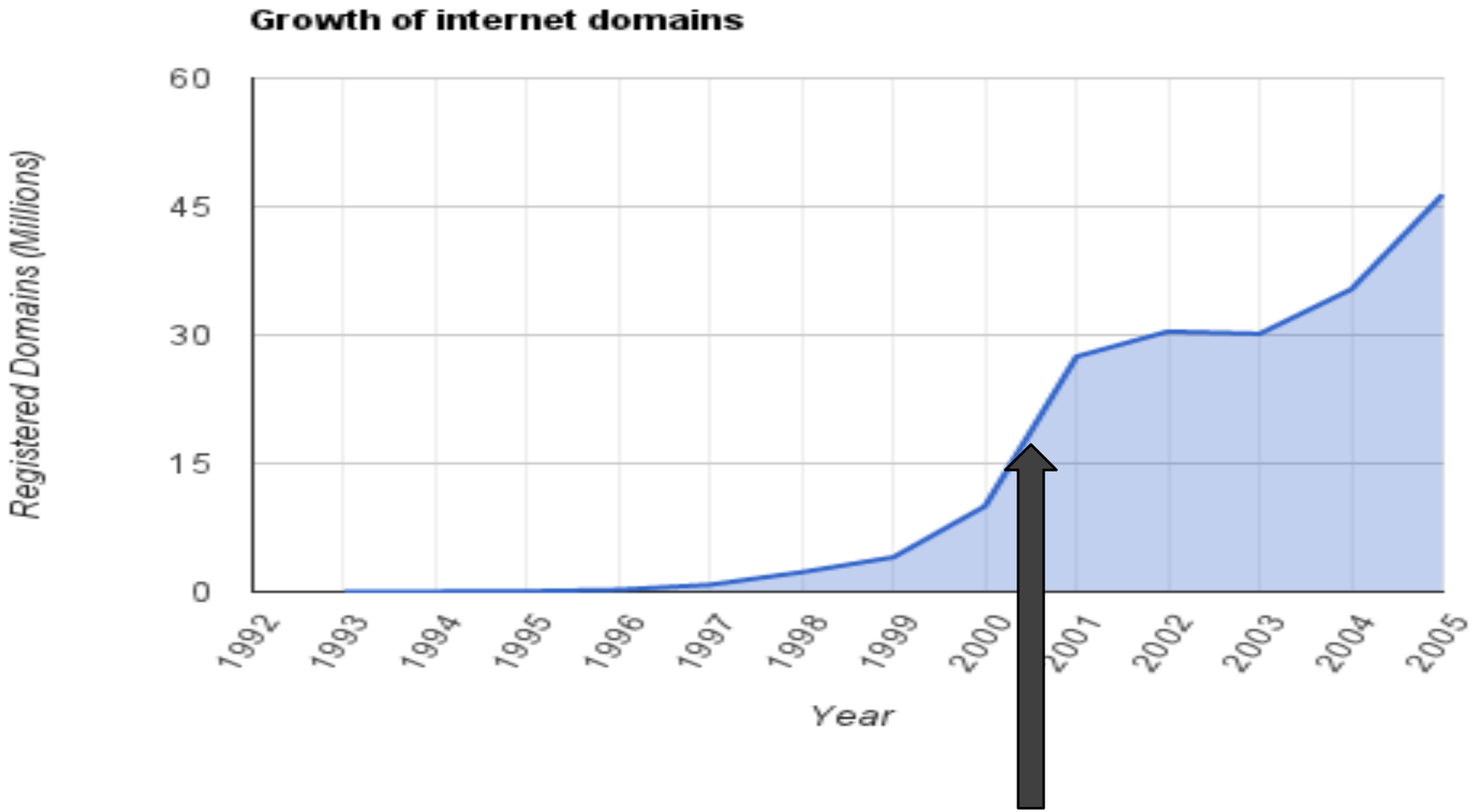
+

growing developer APIs

=

tipping point?

Tipping point?



Indoor maps & location

vs

the web

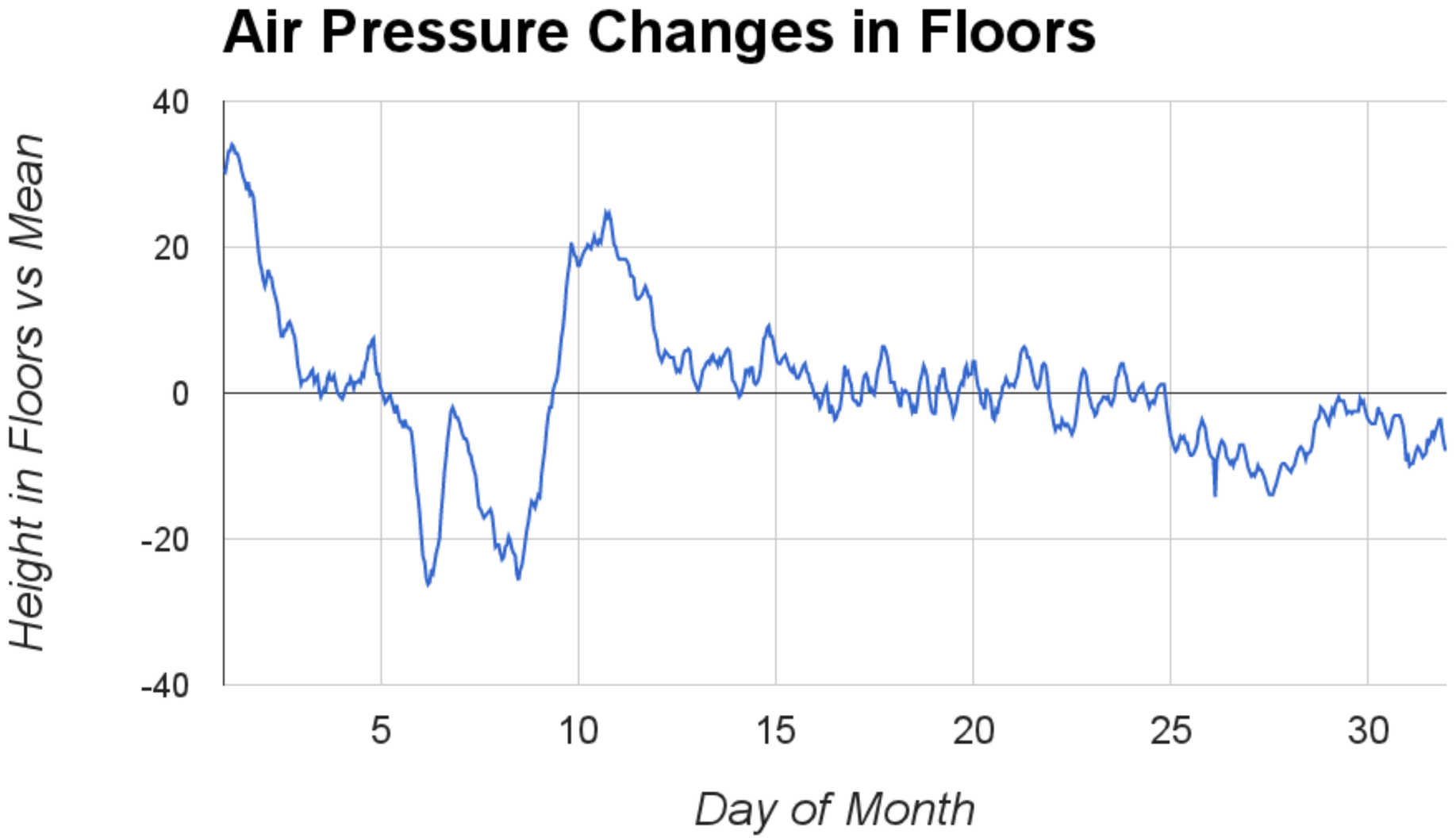
Tipping point: 33x growth in 4 years

Source: Hobbes' Internet Timeline + ZookNIC zooknic.com

What makes indoor hard?

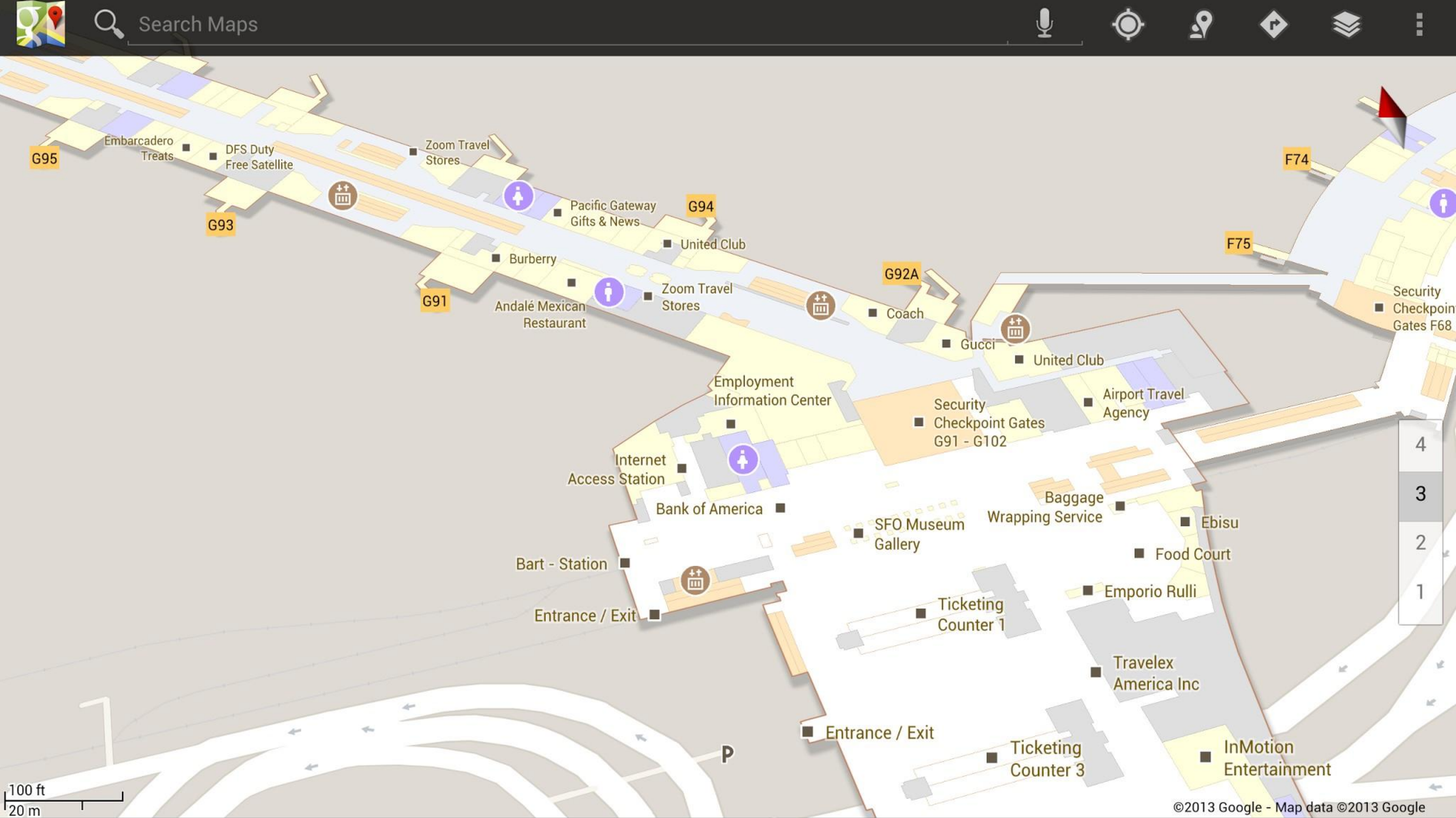
- Maps
  - Where from?
  - How to verify?
- Location
  - GPS doesn't work
  - What floor am I on?
  - Higher bar

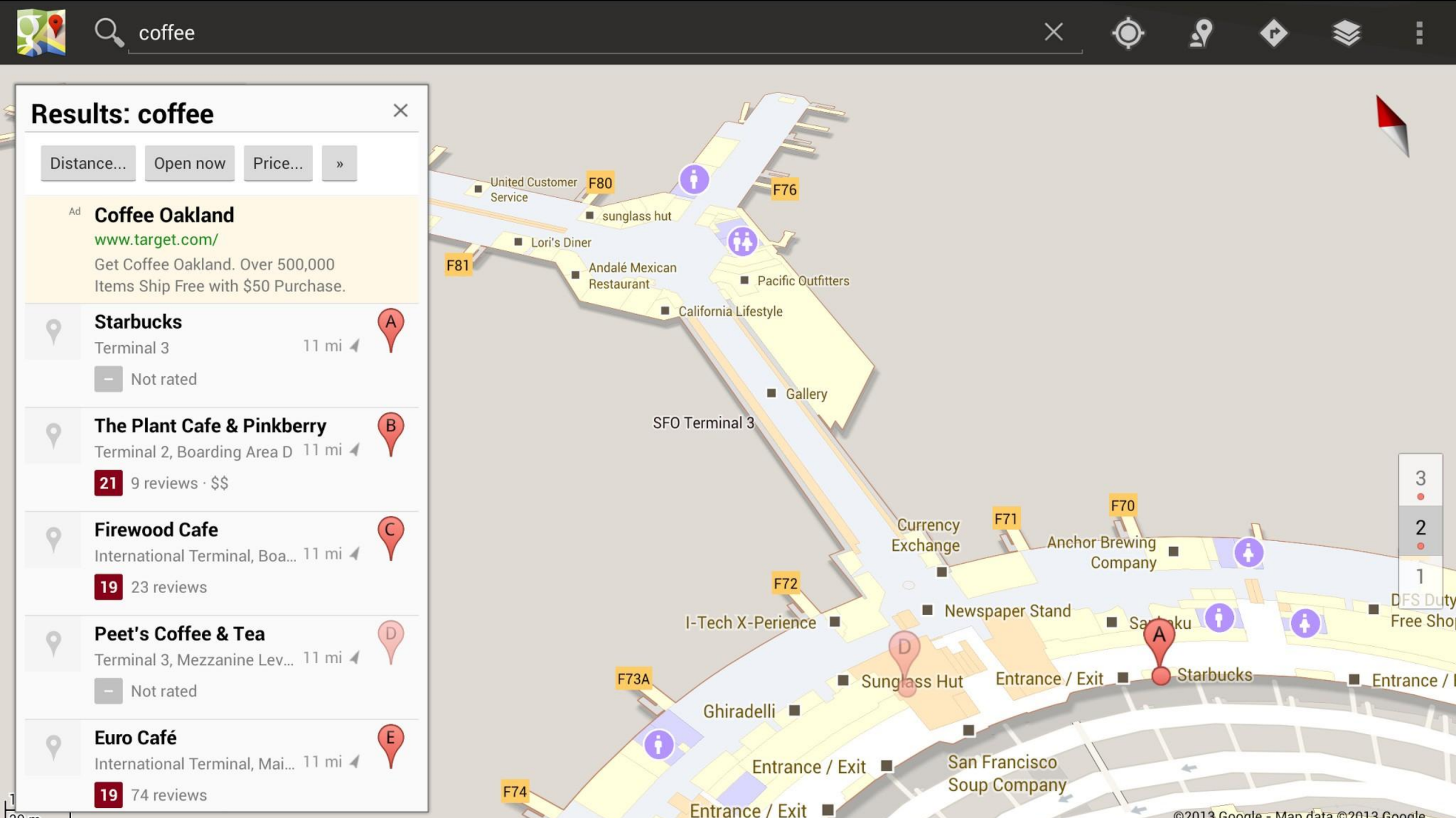
Example: Why not use barometer to tell floor?

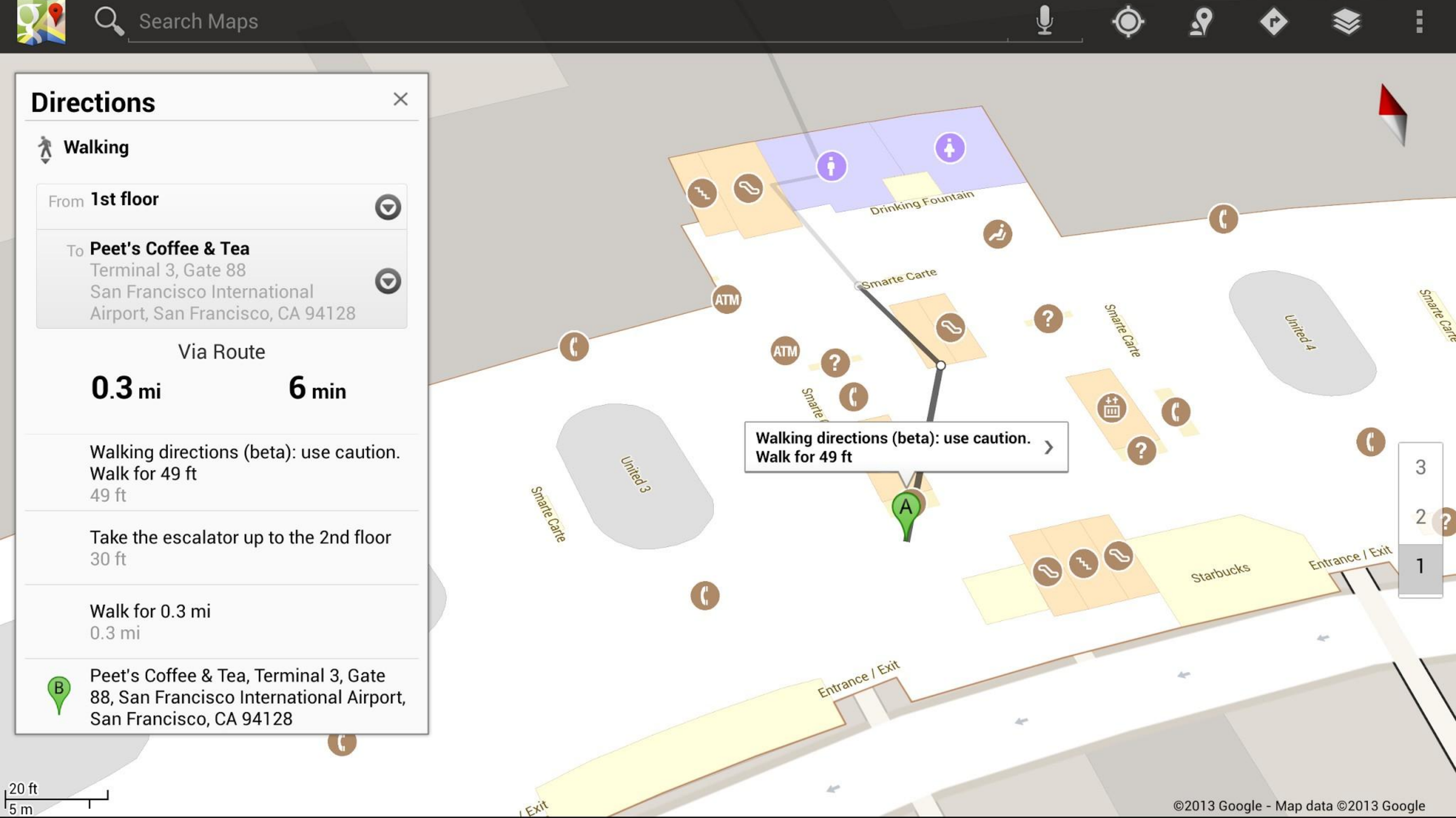


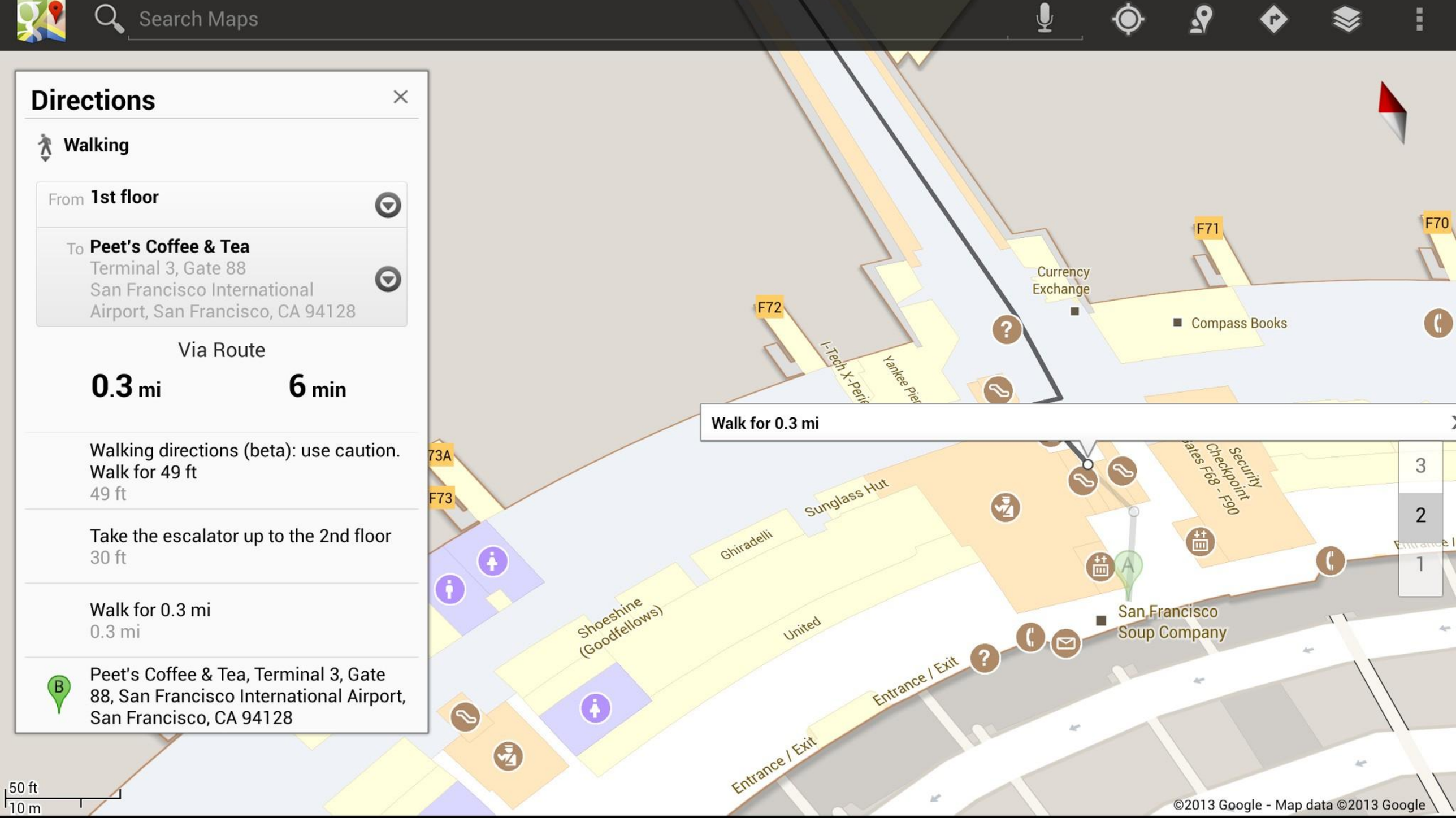
Where are we?

What's the current state of indoors?


Search Maps
G95
Embarcadero Treats
DFS Duty Free Satellite
Zoom Travel Stores
G93
Pacific Gateway Gifts & News
G94
United Club
Burberry
G91
Andalé Mexican Restaurant
Zoom Travel Stores
G92A
Coach
Gucci
United Club
F74
F75
Security Checkpoin Gates F68
Employment Information Center
Security Checkpoint Gates G91 - G102
Airport Travel Agency
Internet Access Station
Bank of America
Baggage Wrapping Service
Ebisu
SFO Museum Gallery
Food Court
Bart - Station
Emporio Rulli
Entrance / Exit
Ticketing Counter 1
Travelex America Inc
Entrance / Exit
Ticketing Counter 3
InMotion Entertainment
P
4
3
2
1
100 ft
20 m
©2013 Google - Map data ©2013 Google


coffee
Results: coffee
Distance...
Open now
Price...
»
Ad
Coffee Oakland
www.target.com/
Get Coffee Oakland. Over 500,000 Items Ship Free with $50 Purchase.
Starbucks
Terminal 3
11 mi
A
Not rated
The Plant Cafe & Pinkberry
Terminal 2, Boarding Area D
11 mi
B
21
9 reviews · $$
Firewood Cafe
International Terminal, Boa...
11 mi
C
19
23 reviews
Peet's Coffee & Tea
Terminal 3, Mezzanine Lev...
11 mi
D
Not rated
Euro Café
International Terminal, Mai...
11 mi
E
19
74 reviews
United Customer Service
F80
F76
sunglass hut
Lori's Diner
F81
Andalé Mexican Restaurant
Pacific Outfitters
California Lifestyle
Gallery
SFO Terminal 3
Currency Exchange
F71
F70
Anchor Brewing Company
F72
I-Tech X-Perience
Newspaper Stand
Sunglass Hut
Entrance / Exit
Starbucks
F73A
Ghiradelli
Entrance / Exit
San Francisco Soup Company
F74
Entrance / Exit
3
2
1
©2013 Google - Map data ©2013 Google


Search Maps
Directions
Walking
From 1st floor
To Peet's Coffee & Tea
Terminal 3, Gate 88
San Francisco International
Airport, San Francisco, CA 94128
Via Route
0.3 mi
6 min
Walking directions (beta): use caution.
Walk for 49 ft
49 ft
Take the escalator up to the 2nd floor
30 ft
Walk for 0.3 mi
0.3 mi
Peet's Coffee & Tea, Terminal 3, Gate 88, San Francisco International Airport, San Francisco, CA 94128
Drinking Fountain
Smarte Carte
ATM
United 3
United 4
Starbucks
Entrance / Exit
3
2
1
20 ft
5 m
©2013 Google - Map data ©2013 Google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49 ft
Take the escalator up to the 2nd floor
30 ft
Walk for 0.3 mi
0.3 mi
Peet's Coffee & Tea, Terminal 3, Gate 88, San Francisco International Airport, San Francisco, CA 94128
Walk for 0.3 mi
F70
F71
F72
F73
73A
Currency Exchange
Compass Books
Sunglass Hut
Ghiradelli
Shoeshine (Goodfellows)
United
San Francisco Soup Company
Entrance / Exit
Entrance / Exit
Security Checkpoint
3
2
1
50 ft
10 m
©2013 Google - Map data ©2013 Google

Search Maps

Directions

Walking

From **1st floor**

To **Peet's Coffee & Tea**
Terminal 3, Gate 88
San Francisco International
Airport, San Francisco, CA 94128

Via Route

0.3 mi **6 min**

Walking directions (beta): use caution.
Walk for 49 ft
49 ft

Take the escalator up to the 2nd floor
30 ft

Walk for 0.3 mi
0.3 mi

B Peet's Coffee & Tea, Terminal 3, Gate 88, San Francisco International Airport, San Francisco, CA 94128

50 ft
20 m

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Today: launched in 13 countries

USA

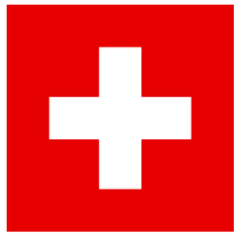
Japan

Canada

UK

France

Germany



Switzerland

Belgium

Denmark

Sweden

Spain

Singapore

Australia

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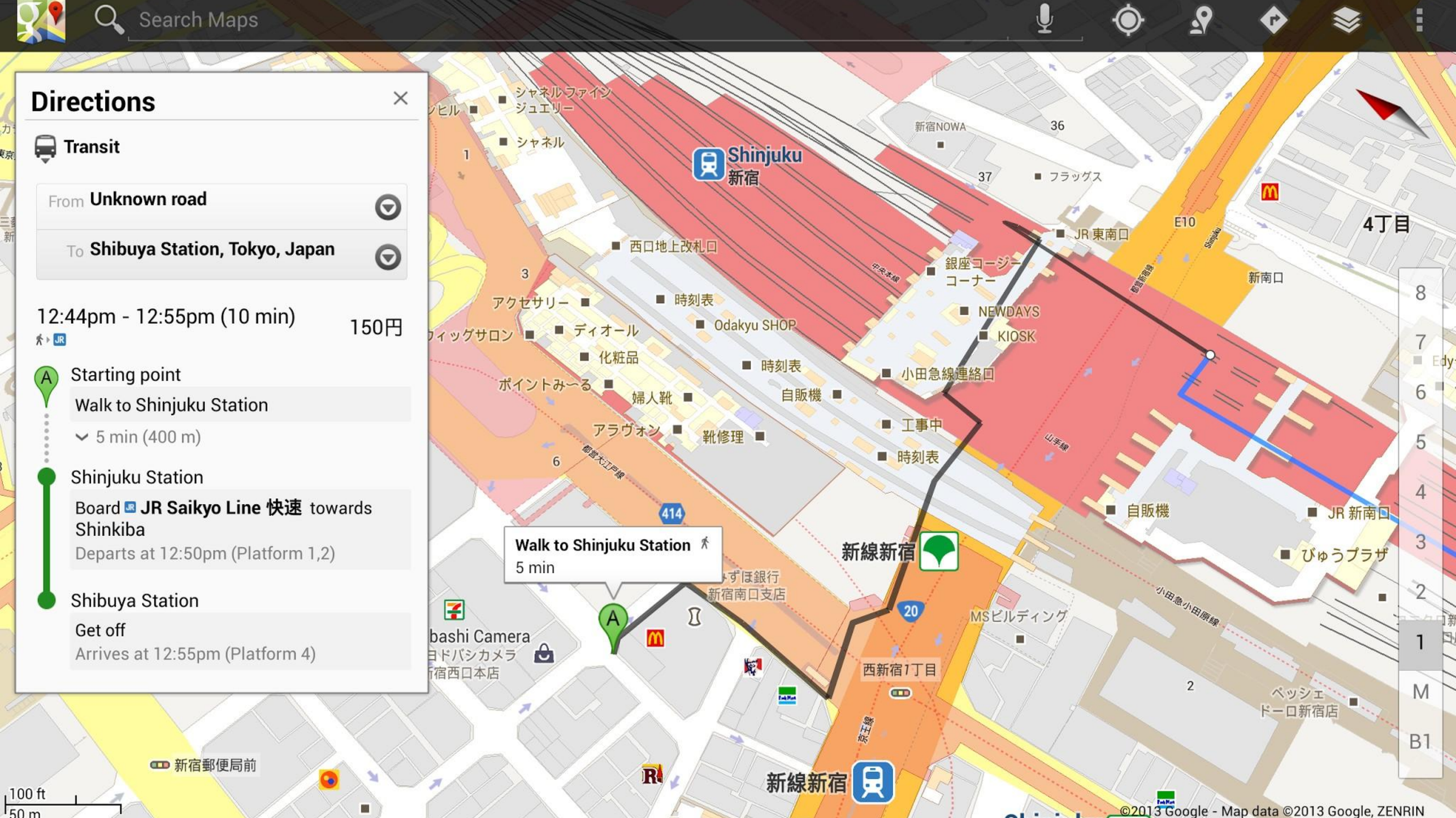
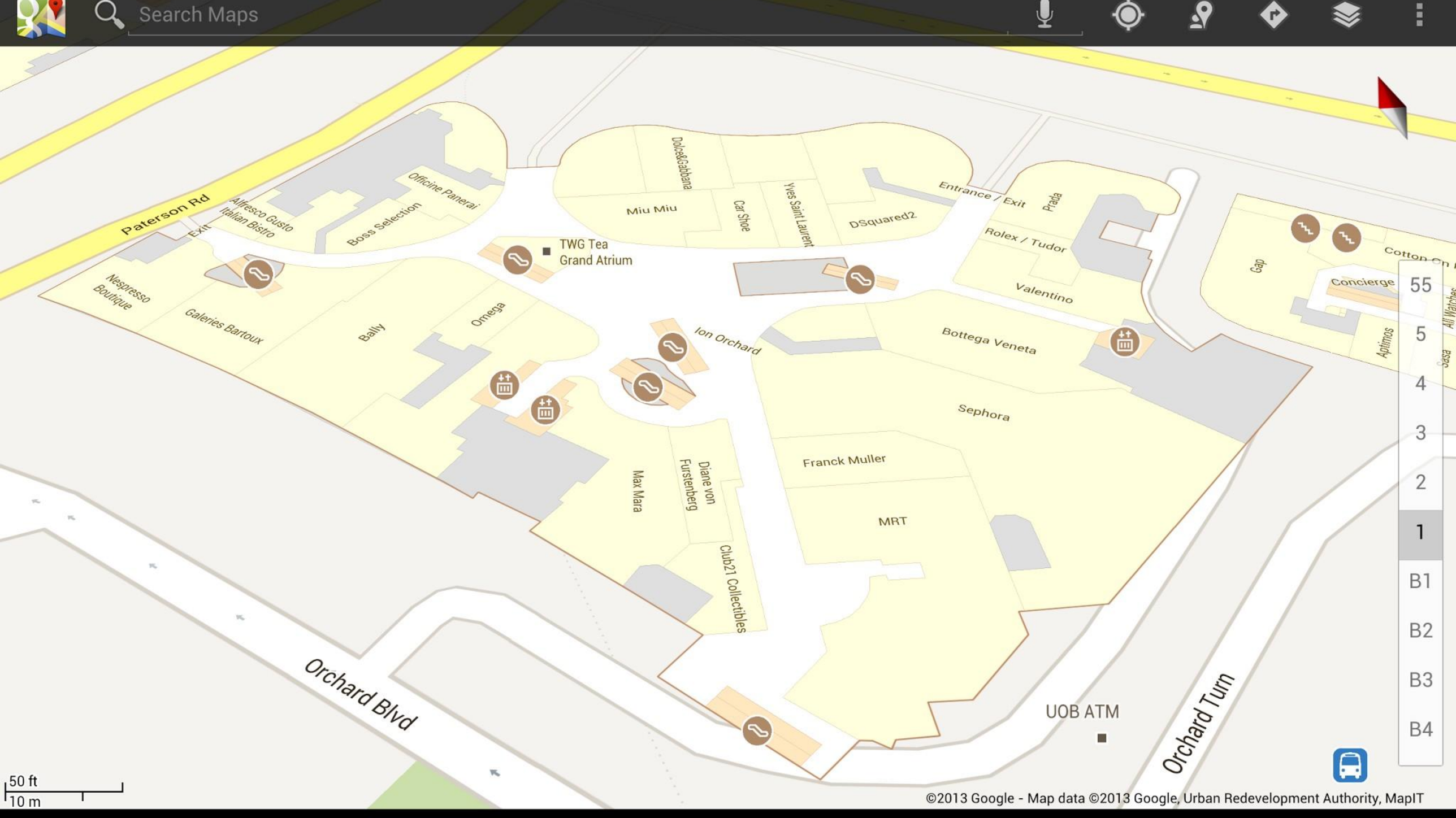

Search Maps
Directions
Transit
From Unknown road
To Shibuya Station, Tokyo, Japan
12:44pm - 12:55pm (10 min)
150円
Starting point
Walk to Shinjuku Station
5 min (400 m)
Shinjuku Station
Board JR Saikyo Line 快速 towards Shinkiba
Departs at 12:50pm (Platform 1,2)
Shibuya Station
Get off
Arrives at 12:55pm (Platform 4)
Walk to Shinjuku Station
5 min
Shinjuku
新宿
新線新宿
新線新宿
4丁目
新宿NOWA
フラッグス
JR 東南口
新南口
JR 新南口
びゅうプラザ
自販機
NEWDAYS
KIOSK
小田急線連絡口
工事中
時刻表
自販機
Odakyu SHOP
時刻表
西口地上改札口
アクセサリー
ディオール
化粧品
ポイントみーる
婦人靴
アラヴォン
靴修理
シャネルファインジュエリー
シャネル
銀座コージーコーナー
MSビルディング
西新宿1丁目
ペッシェドーロ新宿店
新宿郵便局前
新宿南口支店
新宿西口本店
100 ft
50 m
©2013 Google - Map data ©2013 Google, ZENRIN


Search Maps
Paterson Rd
Exit
Alfresco Gusto Italian Bistro
Officine Panerai
Boss Selection
Dolce&Gabbana
Miu Miu
Car Shoe
Yves Saint Laurent
DSquared2
TWG Tea
Grand Atrium
Entrance / Exit
Prada
Rolex / Tudor
Valentino
Gap
Cotton On
Concierge
Aptimos
Nespresso Boutique
Galeries Bartoux
Bally
Omega
Ion Orchard
Bottega Veneta
Sephora
Franck Muller
MRT
Max Mara
Diane von Furstenberg
Club21 Collectibles
UOB ATM
Orchard Blvd
Orchard Turn
55
5
4
3
2
1
B1
B2
B3
B4
50 ft
10 m
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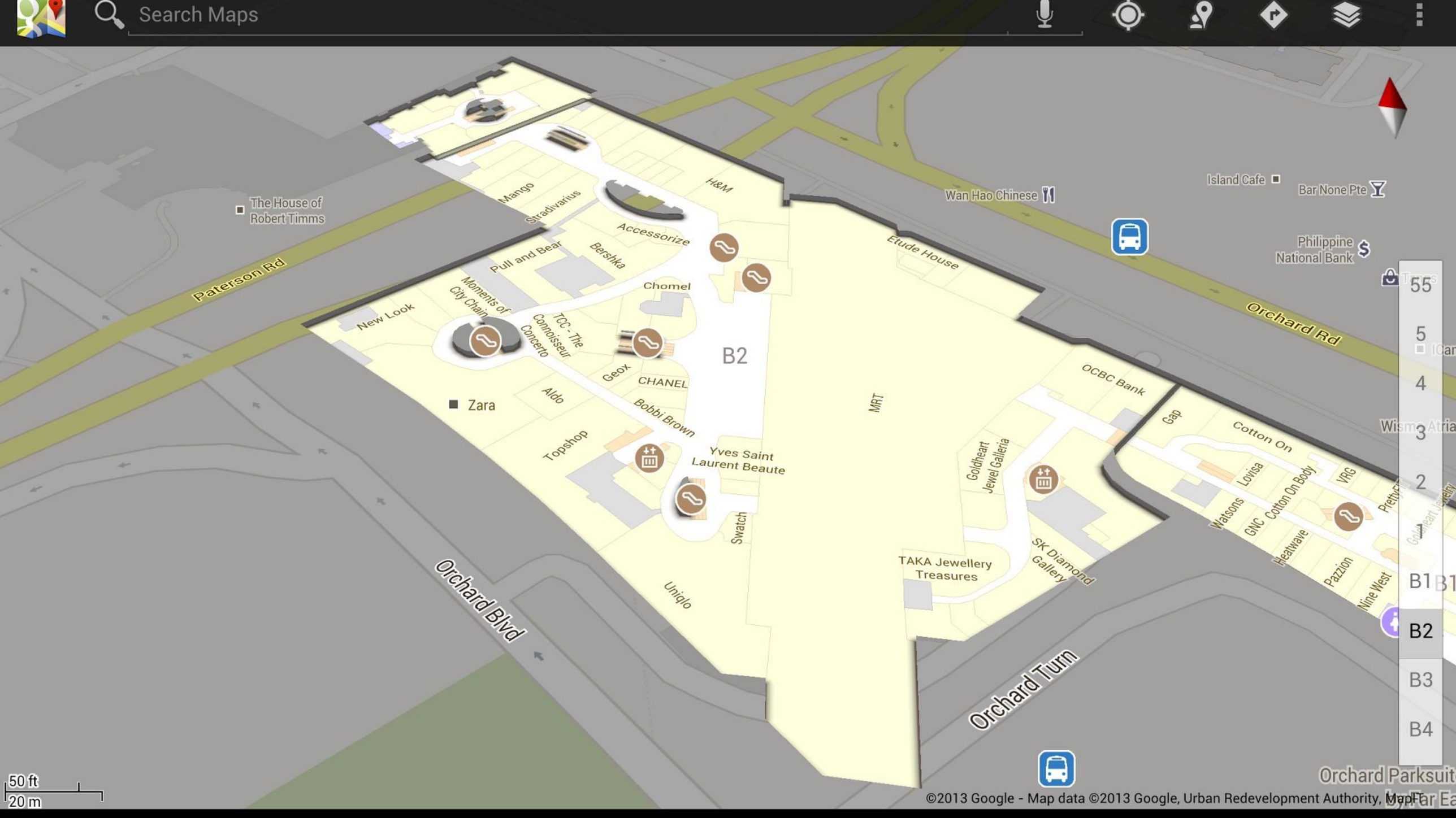
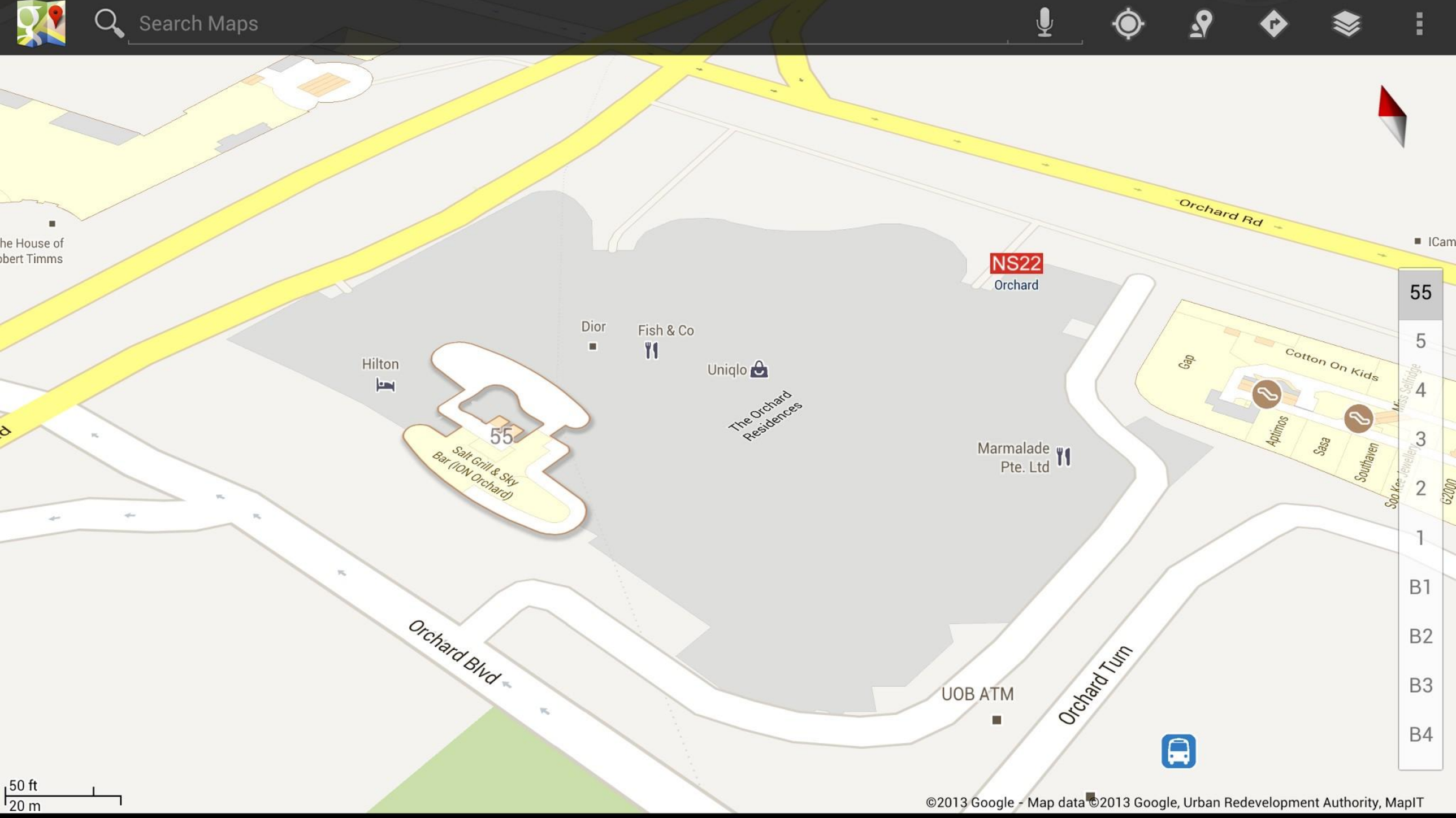
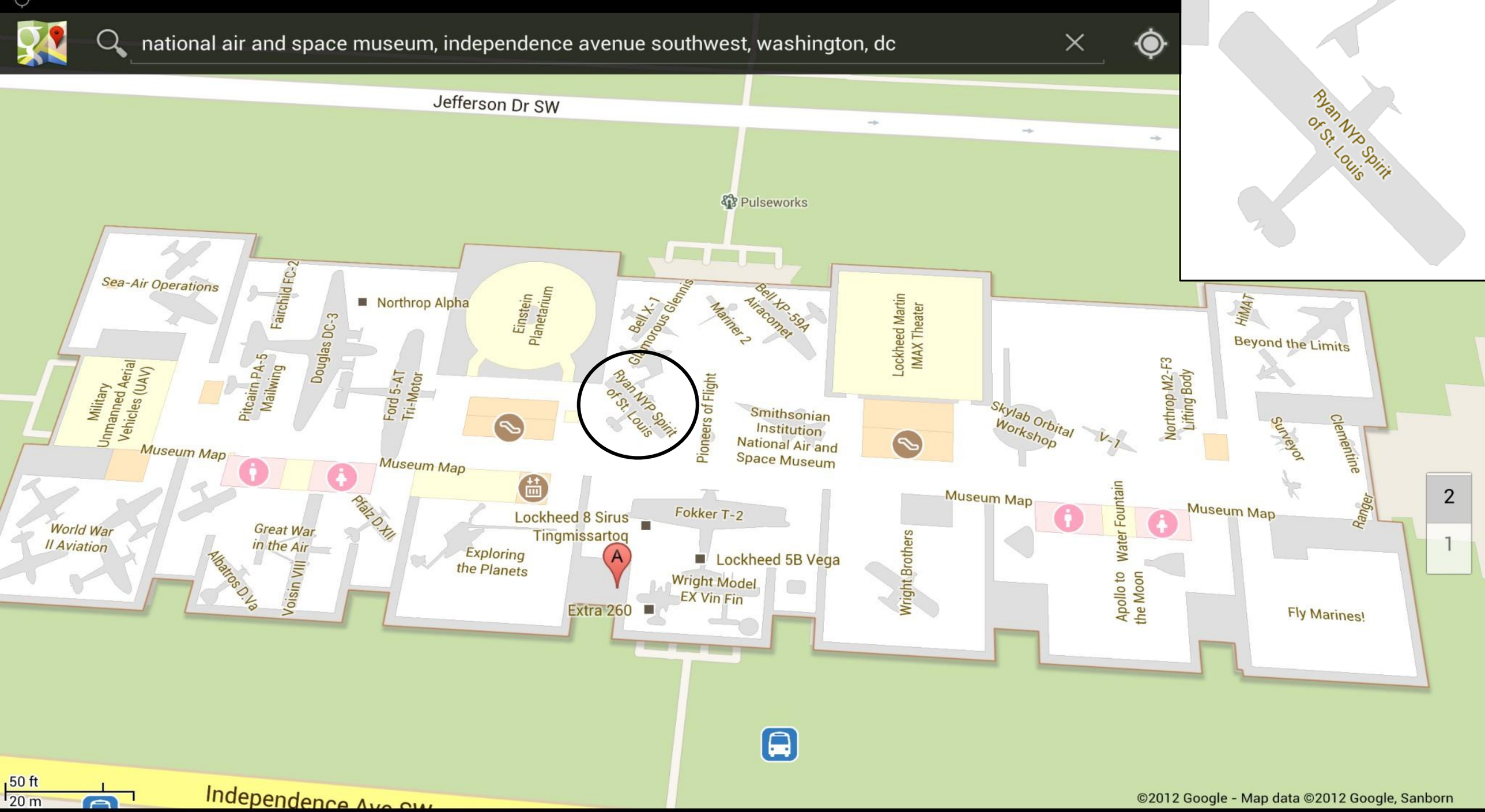

Search Maps
The House of Robert Timms
Paterson Rd
Mango
Stradivarius
H&M
Accessorize
Pull and Bear
Bershka
Chomel
New Look
Moments of City Chain
TCC - The Connoisseur Concerto
Geox
CHANEL
B2
Zara
Aldo
Bobbi Brown
Topshop
Yves Saint Laurent Beaute
Swatch
Uniqlo
Orchard Blvd
MRT
Etude House
Wan Hao Chinese
Island Cafe
Bar None Pte
Philippine National Bank
Orchard Rd
OCBC Bank
Gap
Cotton On
Lovisa
Cotton On Body
VRG
Watsons
GNC
Heatwave
Pazzion
Nine West
Goldheart Jewel Galleria
SK Diamond Gallery
TAKA Jewellery Treasures
Orchard Turn
55
5
4
3
2
1
B1
B2
B3
B4
50 ft
20 m
©2013 Google - Map data ©2013 Google, Urban Redevelopment Authority, MapFa


Search Maps
Orchard Rd
NS22
Orchard
Dior
Fish & Co
Uniqlo
Hilton
55
Salt Grill & Sky Bar (ION Orchard)
The Orchard Residences
Marmalade Pte. Ltd
Gap
Cotton On Kids
Aptimos
Sasa
Southaven
Orchard Blvd
Orchard Turn
UOB ATM
55
5
4
3
2
1
B1
B2
B3
B4
50 ft
20 m
©2013 Google - Map data ©2013 Google, Urban Redevelopment Authority, MapIT


national air and space museum, independence avenue southwest, washington, dc
Jefferson Dr SW
Pulseworks
Sea-Air Operations
Fairchild FC-2
Douglas DC-3
Northrop Alpha
Einstein Planetarium
Bell X-1
Glamorous Glennis
Mariner 2
Bell XP-59A Airacomet
Lockheed Martin IMAX Theater
HiMAT
Beyond the Limits
Military Unmanned Aerial Vehicles (UAV)
Pitcairn PA-5 Mailwing
Ford 5-AT Tri-Motor
Ryan NYP Spirit of St. Louis
Pioneers of Flight
Smithsonian Institution National Air and Space Museum
Skylab Orbital Workshop
V-1
Northrop M2-F3 Lifting Body
Surveyor
Clementine
Museum Map
Museum Map
Museum Map
Museum Map
Pfalz D.XII
Great War in the Air
Albatros D.Va
Voisin VIII
World War II Aviation
Exploring the Planets
Lockheed 8 Sirius Tingmissartoq
Fokker T-2
Lockheed 5B Vega
Wright Model EX Vin Fin
Extra 260
Wright Brothers
Water Fountain
Apollo to the Moon
Hangar
Fly Marines!
2
1
50 ft
20 m
Independence Ave SW
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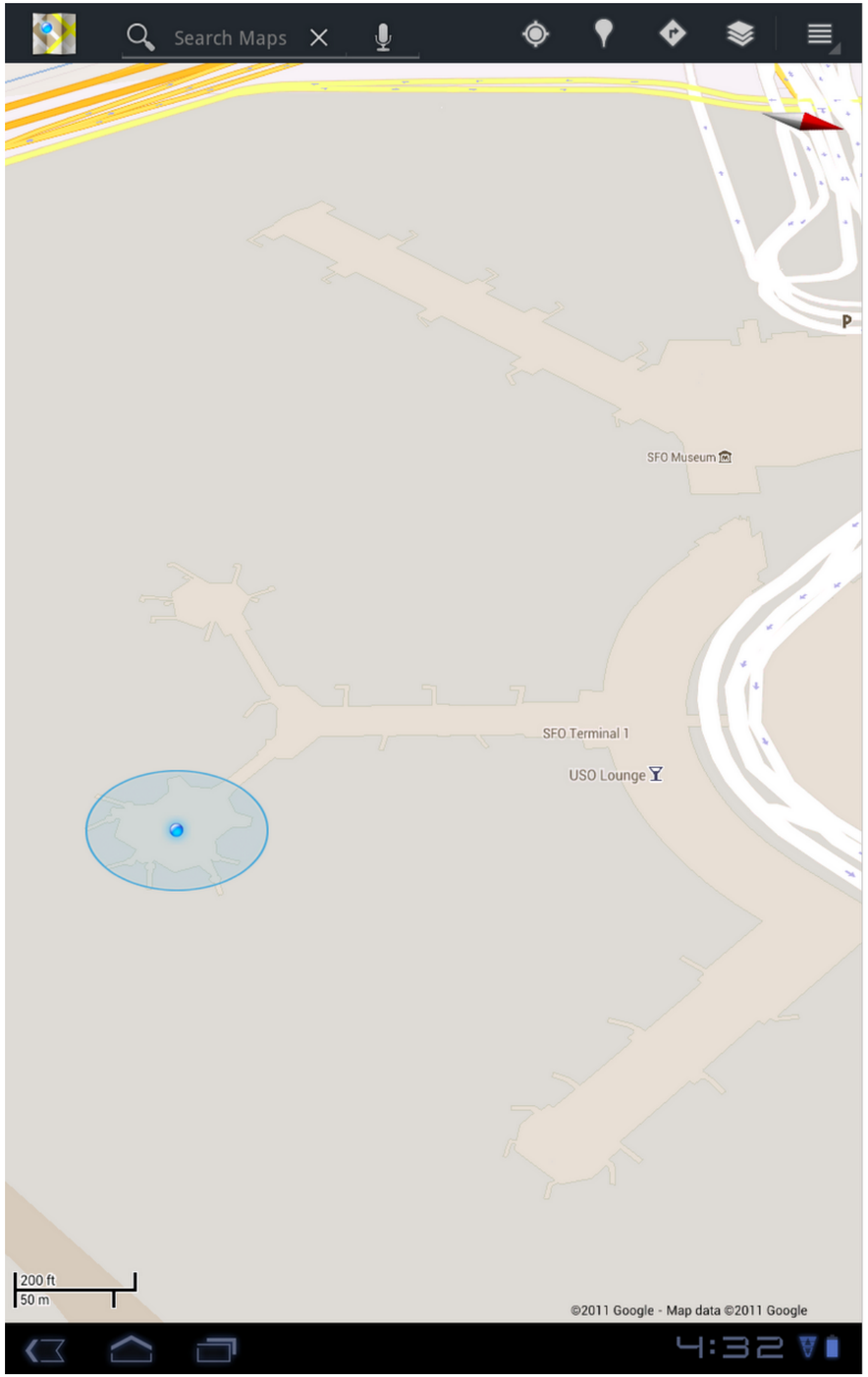

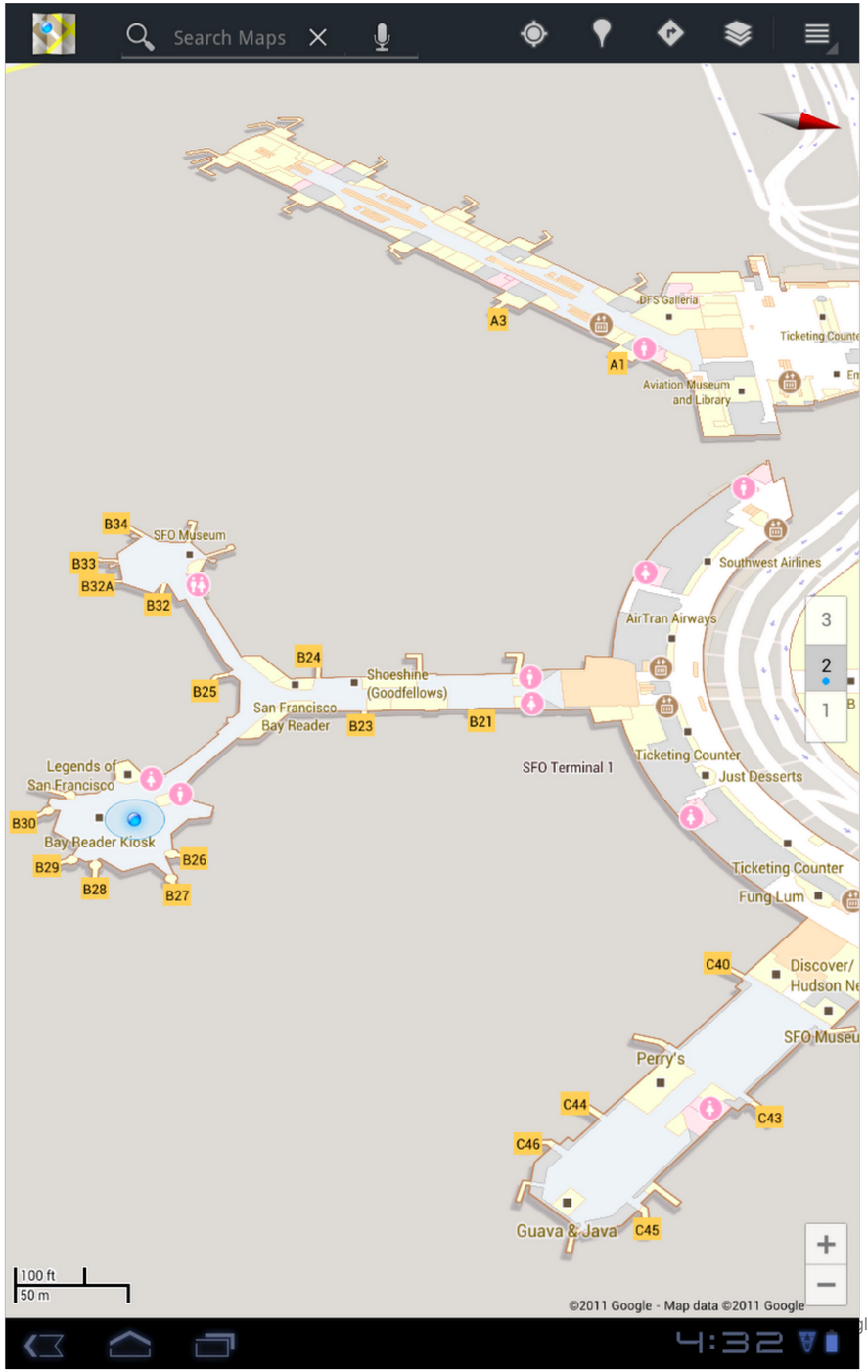

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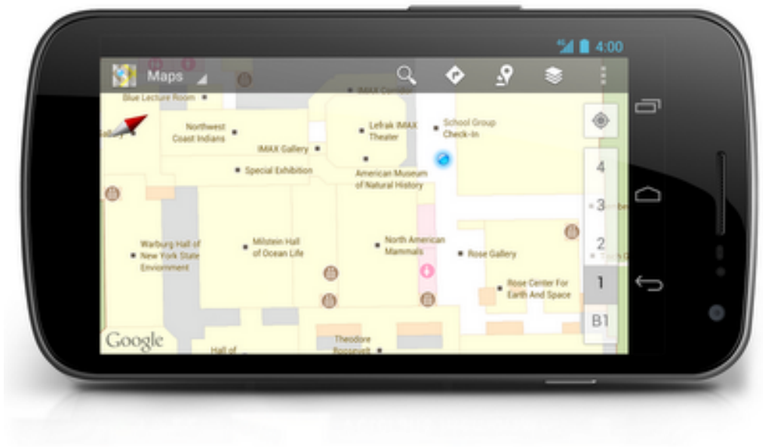
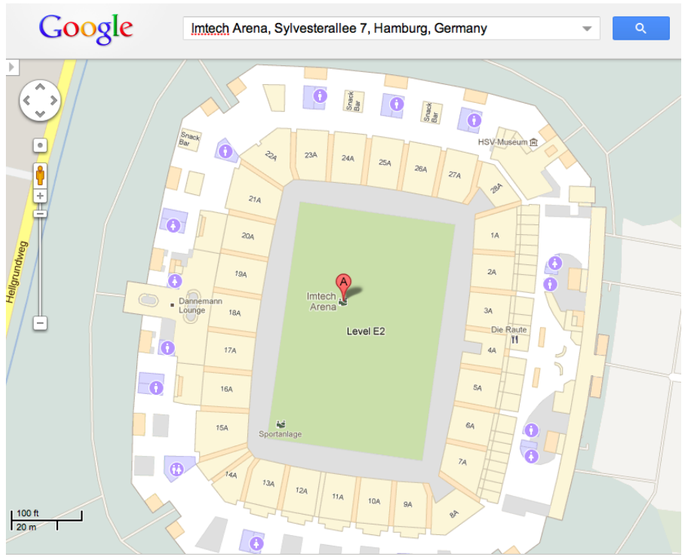
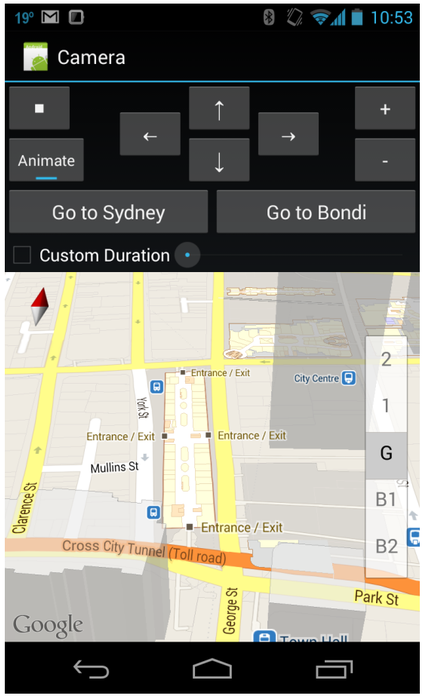
Available today



Android



Desktop
(single floor)



Google Maps
Android API v2

How does it work?

Step 1: create an indoor map of the venue

Add your floor plan

maps.google.com/floorplans/

Google Maps Floor Plans

Add your floor plans to Google Maps

Help people find their way around public spaces. Here's how:

Add them yourself

1. Find the building on the map.
2. Upload pictures of your floor plans or directories of a floor.
3. Line up your floor plan with satellite images in Google Maps.
4. Submit! This will help us improve Google Maps.

Once processed, anyone will be able to see your floor plans in Google Maps for Android.

Add a floor plan now

or

Google can help

If you'd like help uploading your own floorplans, let us know and we can help. Request help if you:

- Represent a large organization
- Have more than 5 floor plans
- Need help uploading

Request Help

NOTE: Google Maps Floor Plans is still in Beta. We're still working out the kinks in how we process your floor plans, so right now we can't give estimates on when your floor plans will appear in Google Maps for Android.

If you encounter any problems or have questions, post a comment in our forum. Thank you for helping Google Maps!

Find your building

Google maps floor plans beta

1. Locate | 2. Upload | 3. Align | 4. Submit | All your floor plans

Search for the building:

1600 amphitheatre parkway

Showing buildings near:

1600 Amphitheatre Parkway, Mountain View, CA 94043, USA

Use this building

Need help?

Watch this instructional video to learn how to submit your floor plan.

Upload your floor plan

Google maps floor plans beta

1. Locate | **2. Upload** | 3. Align | 4. Submit | All your floor plans

Upload a floor plan, map, or blue-print of a floor in this building:

Building name:

Google Building 43

like 'Boise International Airport'

Floor label:

1

Enter the label for this floor just as it would appear in an elevator:

B2 L M 1 2 3 4 5 6

Floor number:

1 (ground floor)

How many stories above ground is this floor.

Floor plan file:

Choose File google_bldg43.png

Accepts JPG, PNG, PDF, BMP, and GIF files

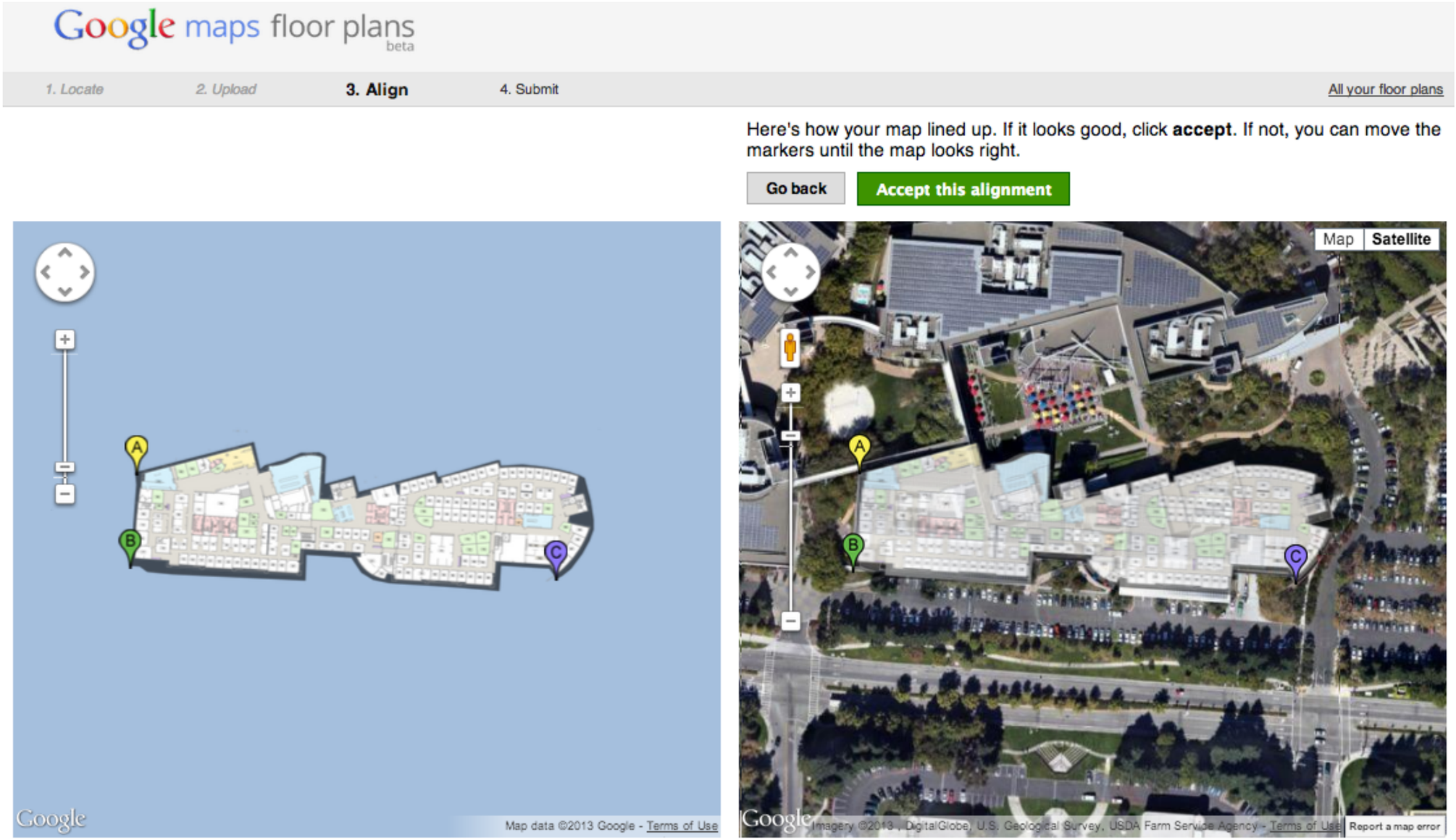
Make sure you have permission to use the floor plan you are uploading.

Upload map for this floor **Go back**

1600 Amphitheatre Parkway, Mountain View, CA 94043, USA

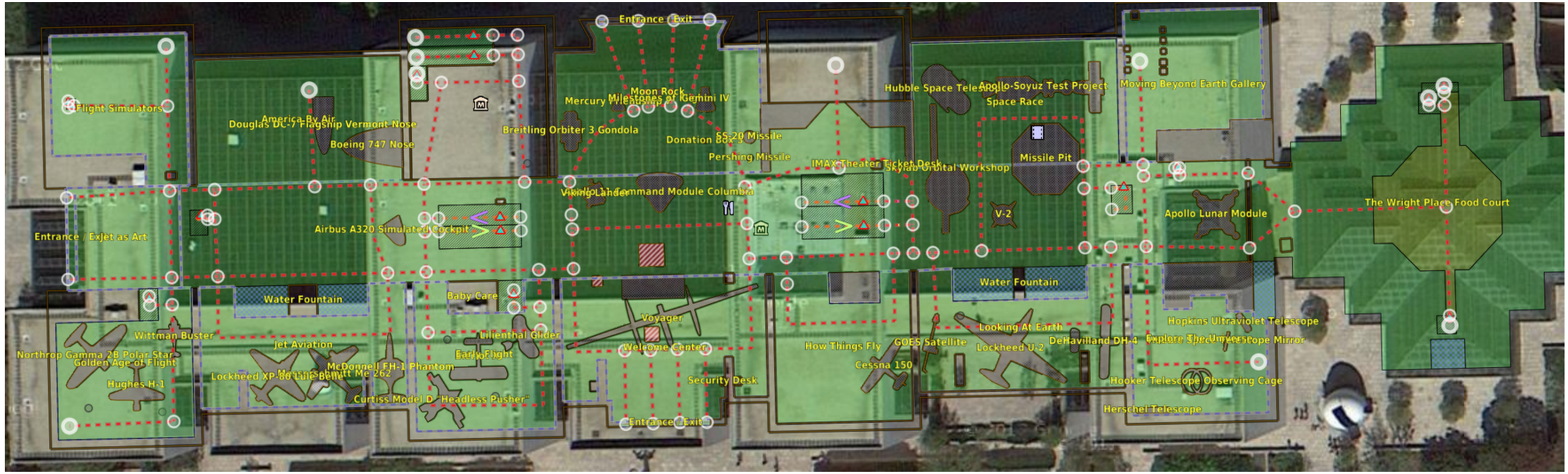
Have a lot of floor plans to upload? Click here to be contacted by a member of our team.

Align the floor plan to the building



...accept and hit submit.

And we'll trace your maps



You can learn a lot more about mapping at the Project Ground Truth session in Room 9 right after this

Step 2: provide high quality indoor location

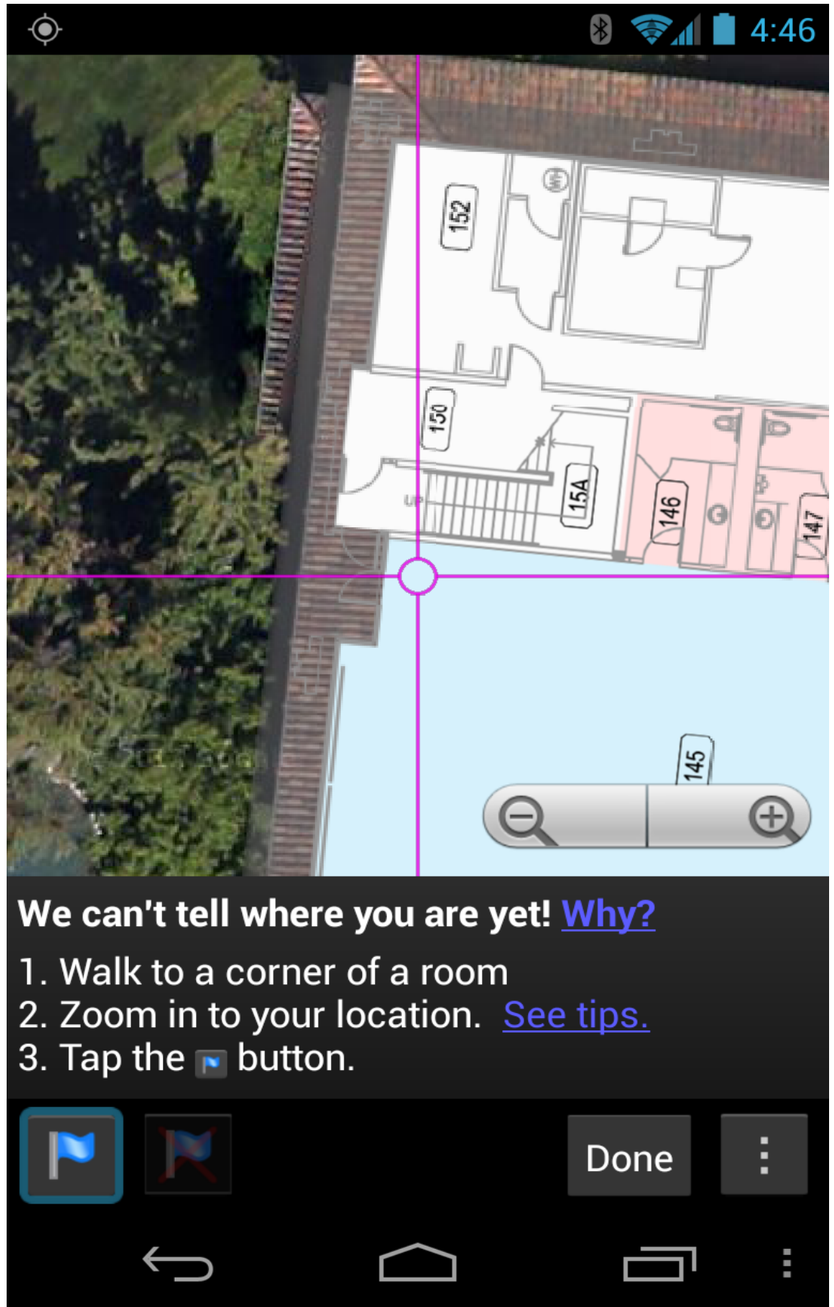
Video showing high quality vs normal quality

Normal Quality

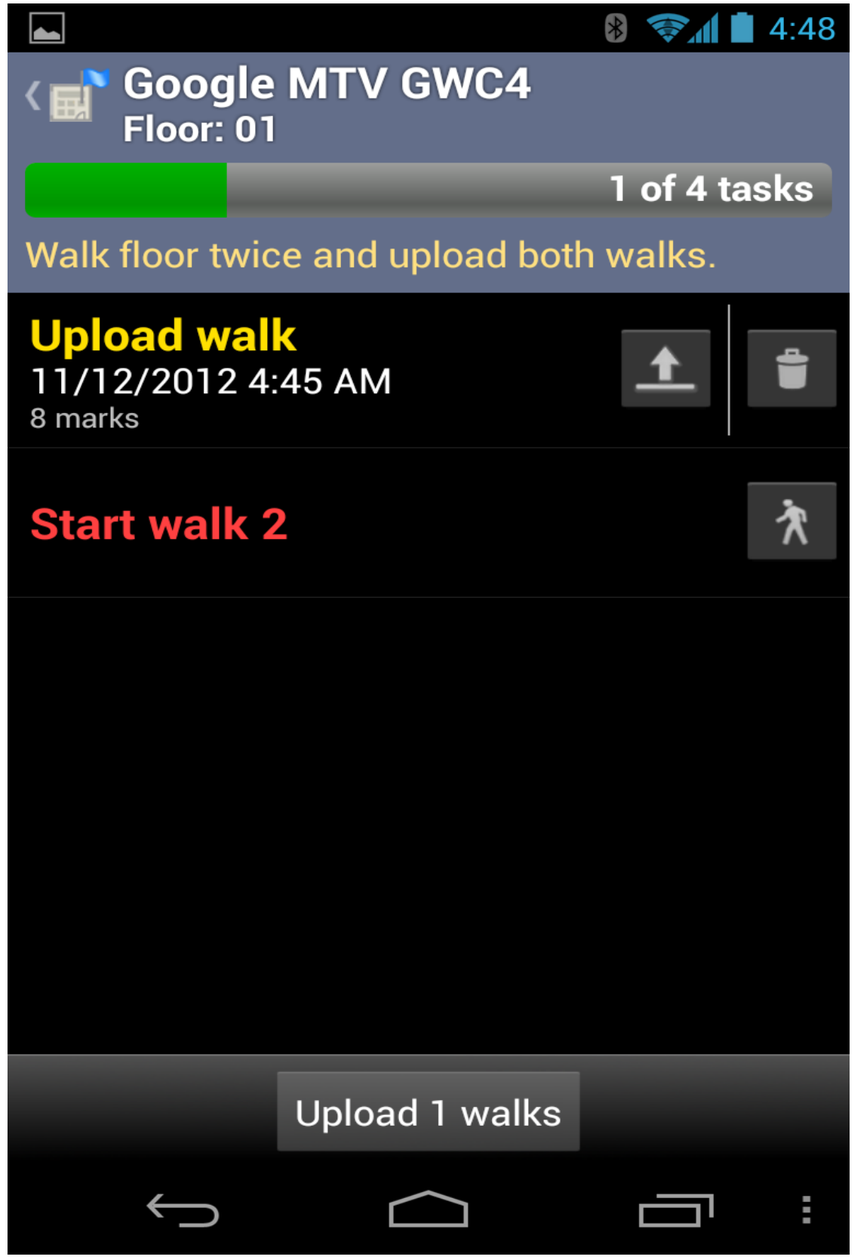
High Quality

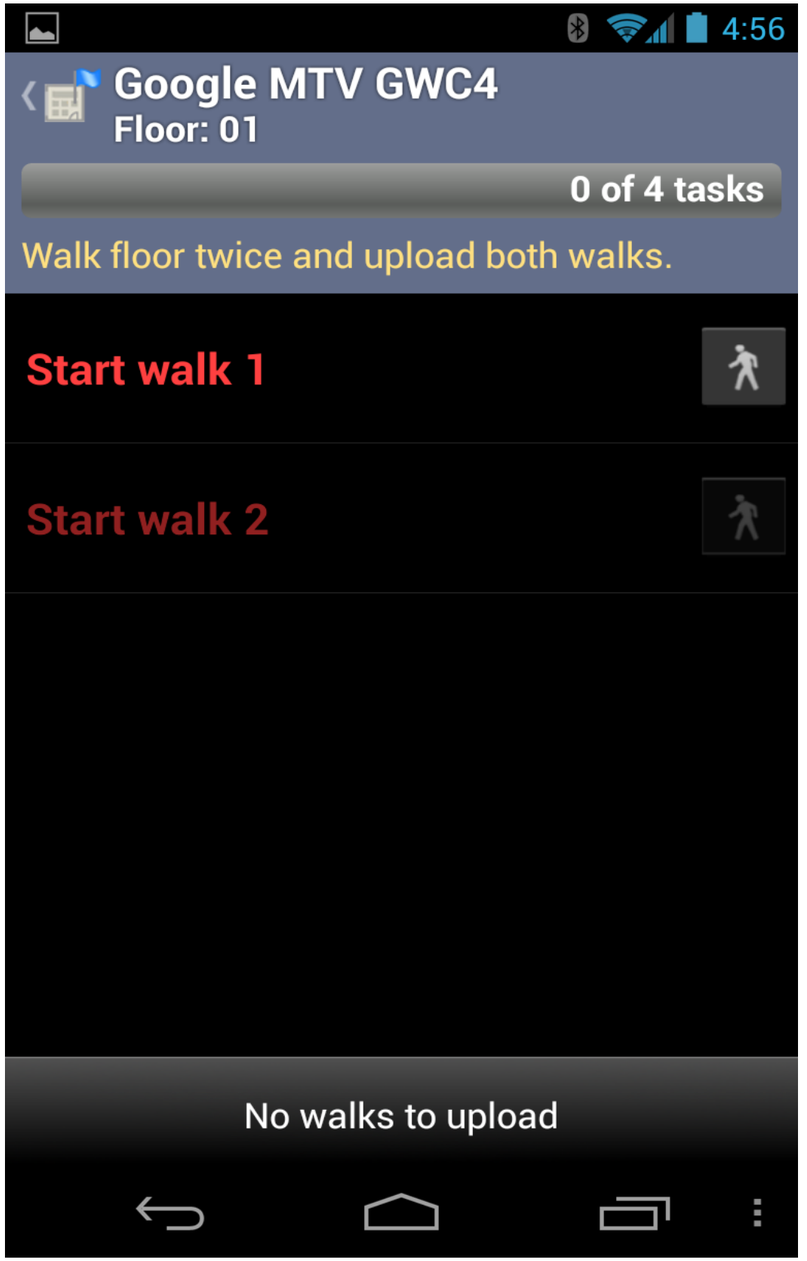
Note: Results are from Fused Location Provider, just announced.

Collect data with Google Maps Floor Plan Marker app



Floor Plans Marker



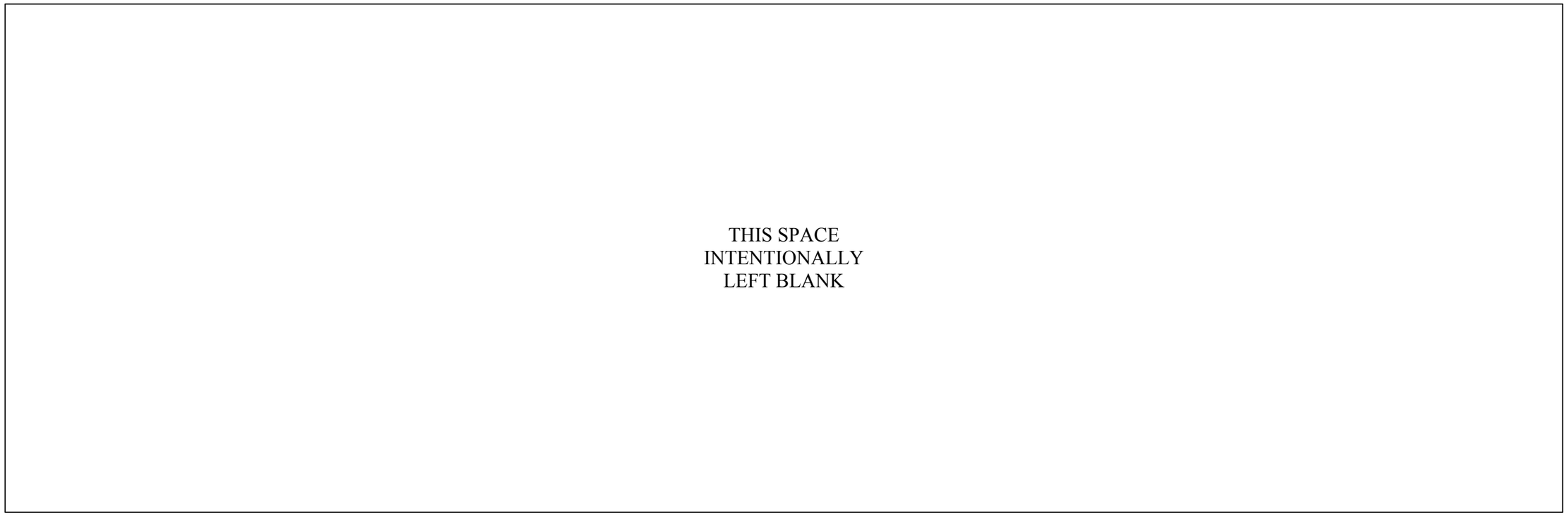


How?

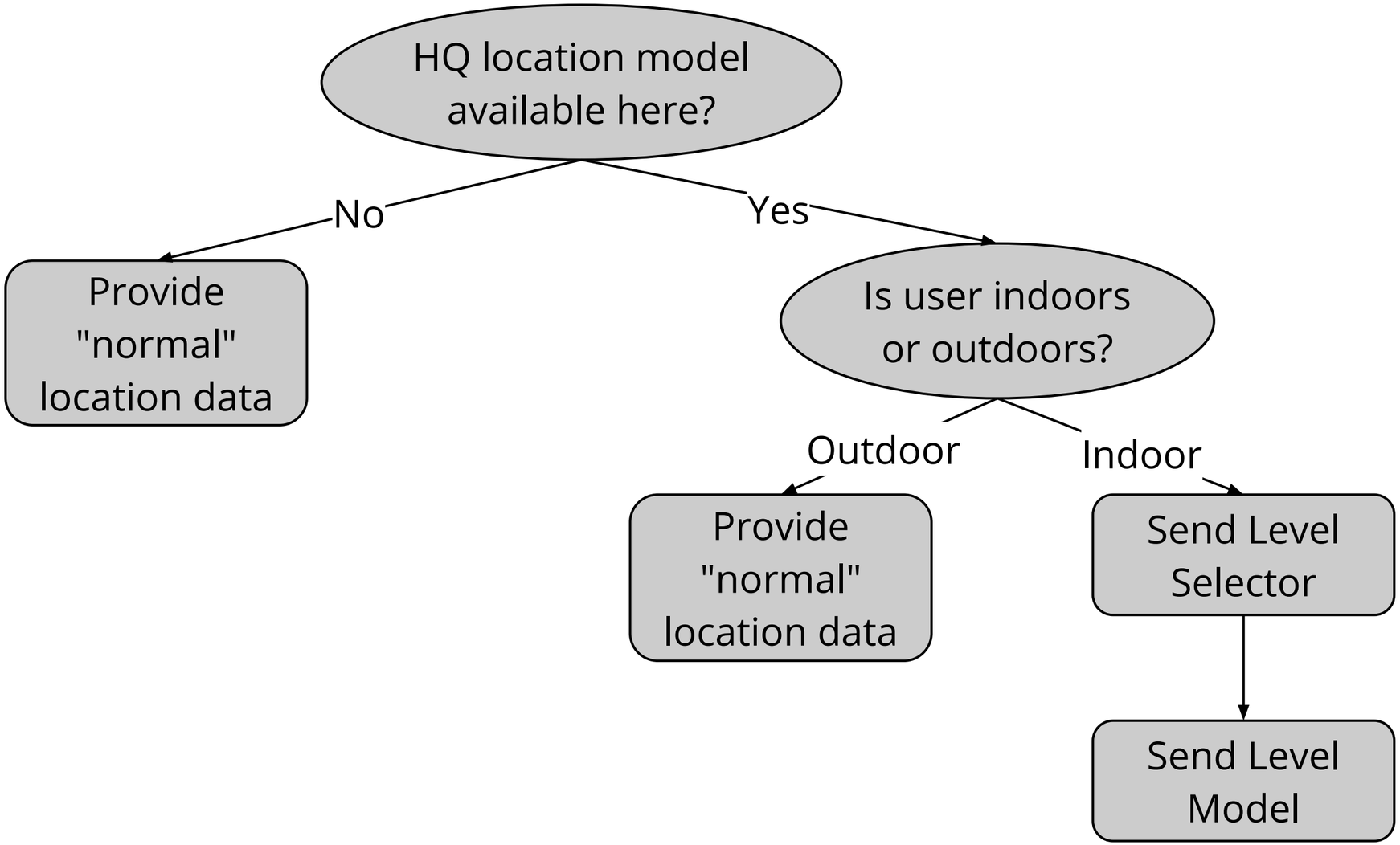
- Wifi + GPS + Sensors
- Wifi probably most useful
  - Never designed with location in mind
  - Affected by people, metal, geometry.
  - Can not simply measure distance from APs.
  - Phones aren't standardized

What makes Wifi good for location?

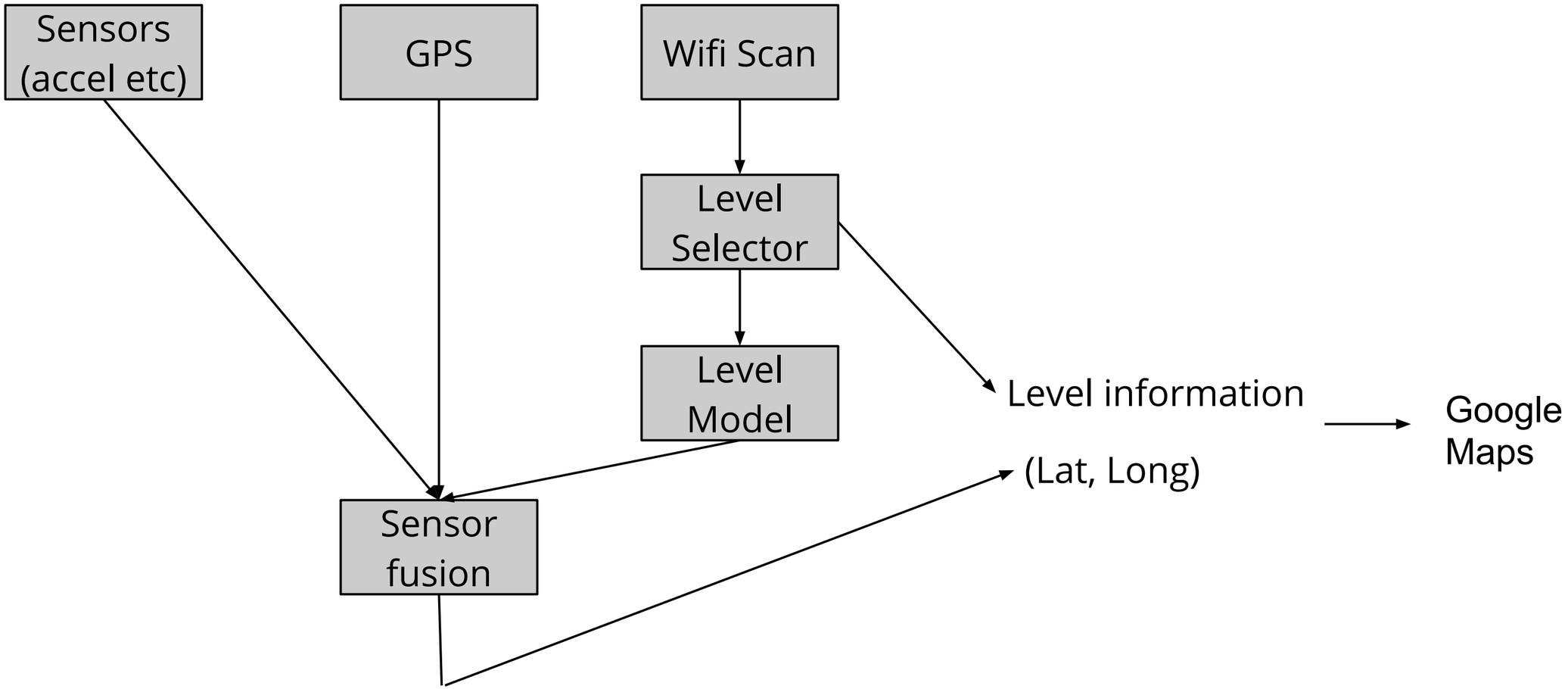
- It's in a lot of places



Location: How our servers send data



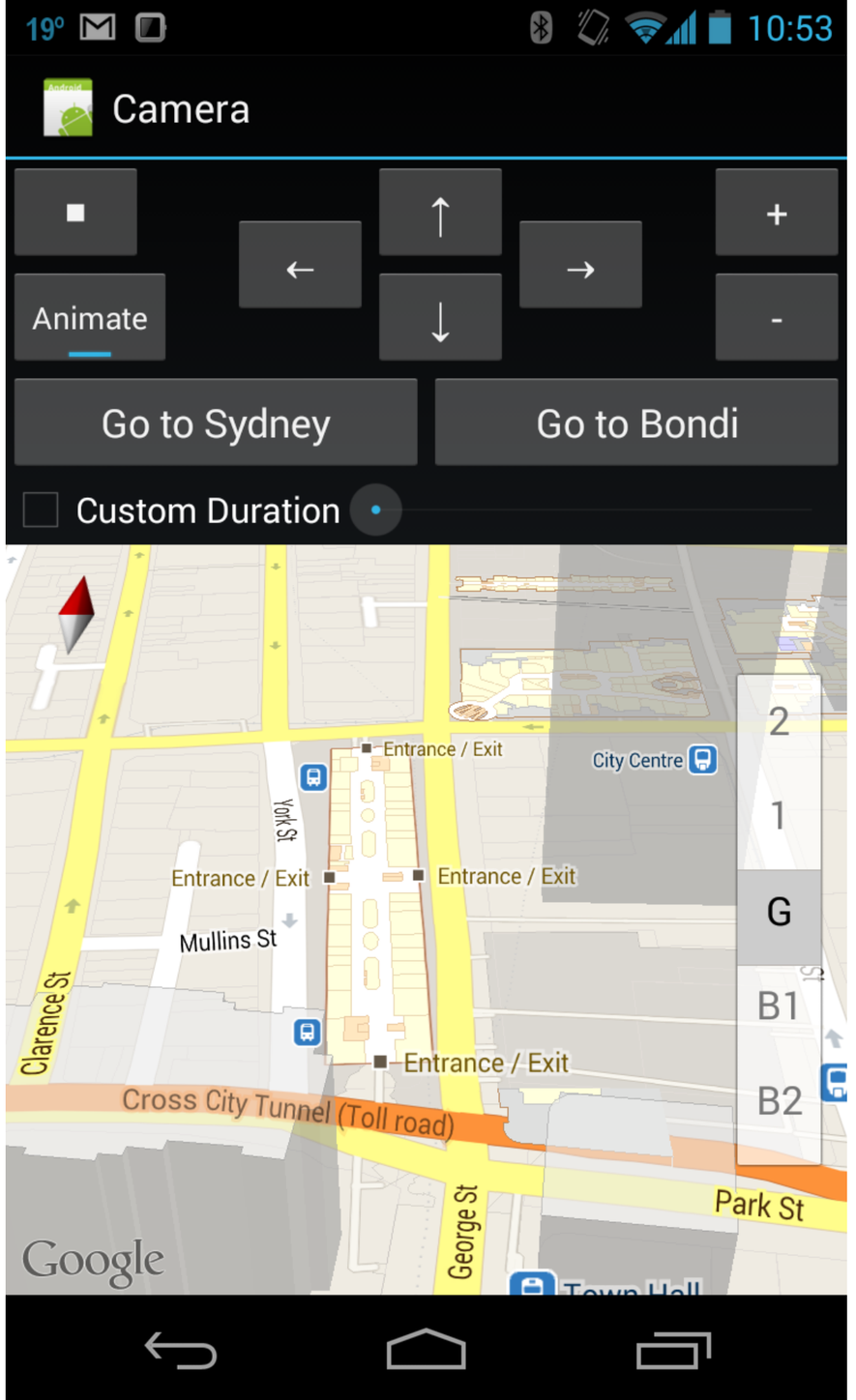
What happens on the phone?



The future

Right now

- Google Maps Android API v2
  - Supports indoor display, including level display
  - Works on tablets and phones
  - Also supports camera controls
- LocationClient in Google Play Services
  - High quality lat/long available indoors
  - Level is not yet surfaced



The future: Short term

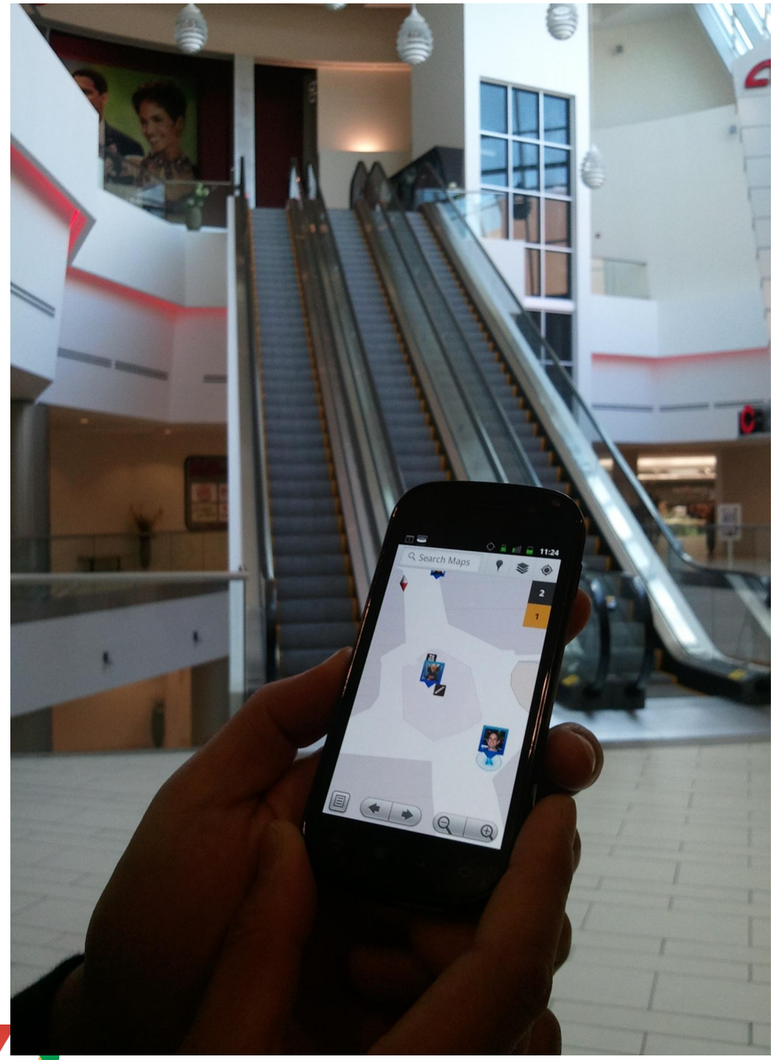
- More venues
- Better indoor location
- More improvements to APIs for developers

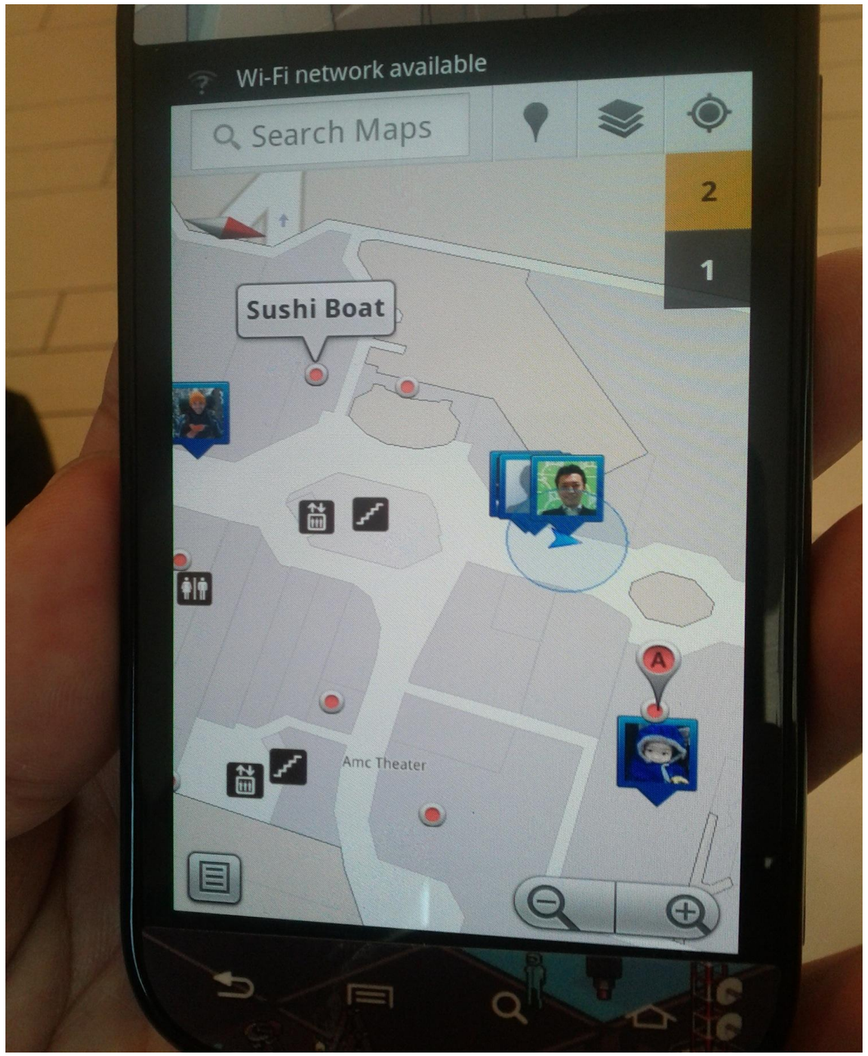
The future: Long Term

- Are there more compelling apps?
  - Google maps + navigation are cool.
  - Is there more?
- Contextual apps
  - Run in background vs foreground
  - Make phones smarter

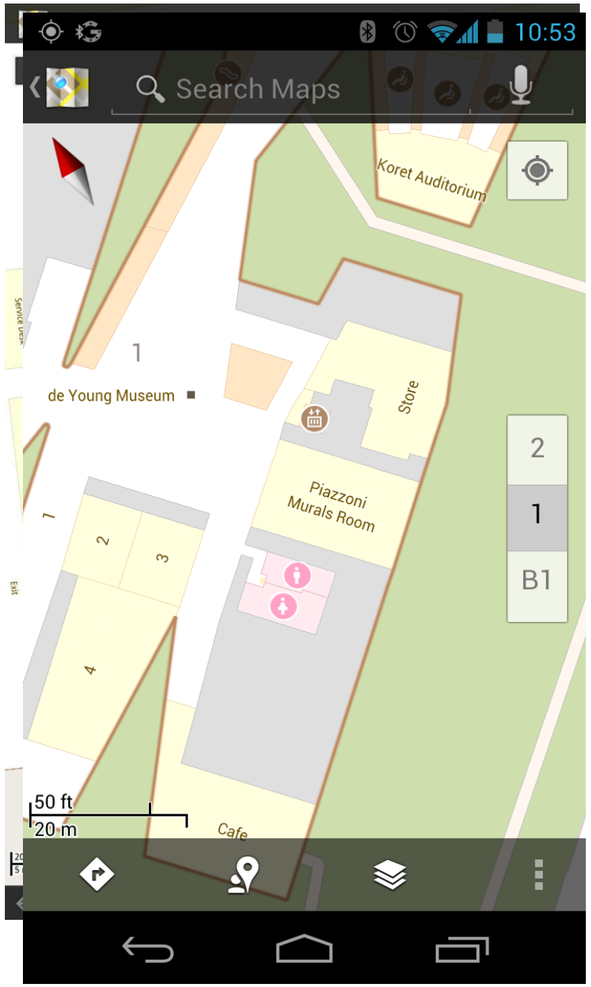
Example 1: Friends in a mall

NOTE: Demo app, not a launched product





Example 2: Invisible search term



"painting"

"painting"

Imagery supplied by Polka Dot Images/Getty Images

The Age of Context and Indoors

- Where do people spend 90% of their time?
- Task-oriented interfaces are very powerful.
- But is there another "background" mode?

Key takeaways

- Google's mission: Organize the world's information
- Stuff is happening right now
  - 3 country launches in the last 3 months
- Opening up to developers more and more
- Exciting contextual applications possible -- new territory
- What cool things can you do indoors?

<Thank You!/>

Other location and maps events:

- Ground Truth: Next!
- Beyond the Blue Dot: New features in Android Location
- Google Maps Android API v2/When Android Meet Maps
- maps.google.com/floorplans
- google: Google Maps Floorplan Marker

developers.google.com/maps

Appendix

Sensor Collection Library used by Google Maps Floorplans Marker:

http://code.google.com/p/sensor-data-collection-library/