



SFMTA

Moving Minds

The Next Generation of Real-Time Transit Information in San Francisco

APTA Sustainability & Multimodal Planning Workshop

Vancouver, BC

July 30, 2018

A National Perspective

- After a **+36%** ridership increase between 1995 and 2014, the transit industry is confronted by declining ridership
- Nationally, bus ridership has fallen **-6%** from 2014 to 2016 alone

CITYLAB

What's Behind Declining Transit Ridership Nationwide?

LAURA BLISS FEB 24, 2017

Pick a culprit: The rise of ride-hailing services, budget cuts, cheap oil, or bad service.



METRO LOS ANGELES

Metro's declining ridership, explained

Ridership is down nearly 20 percent since 2013

By Matt Tinoco | Aug 29, 2017, 10:00am PDT

THE WALL STREET JOURNAL

America's Buses Lose Riders, Imperiling Their Future

Transit cornerstone is on the decline, stinging low-income workers whose commuting options are slim

PLANETIZEN

Time to Worry About Declining Bus Ridership Again

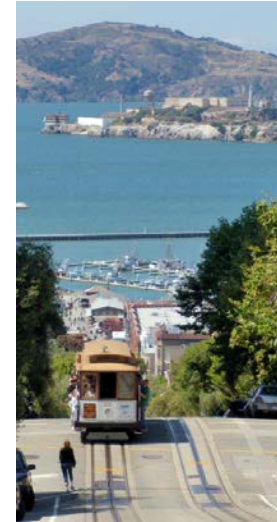
The news about the decline of bus ridership around the country is making the rounds again. The future of bus transit as we know it seems to be in question.

San Francisco: A Transit-First City

- Bus ridership is up **+4%** over the past two years
- Muni provides 725,000 average weekday boardings



Electric Trolley Coach



Cable Car

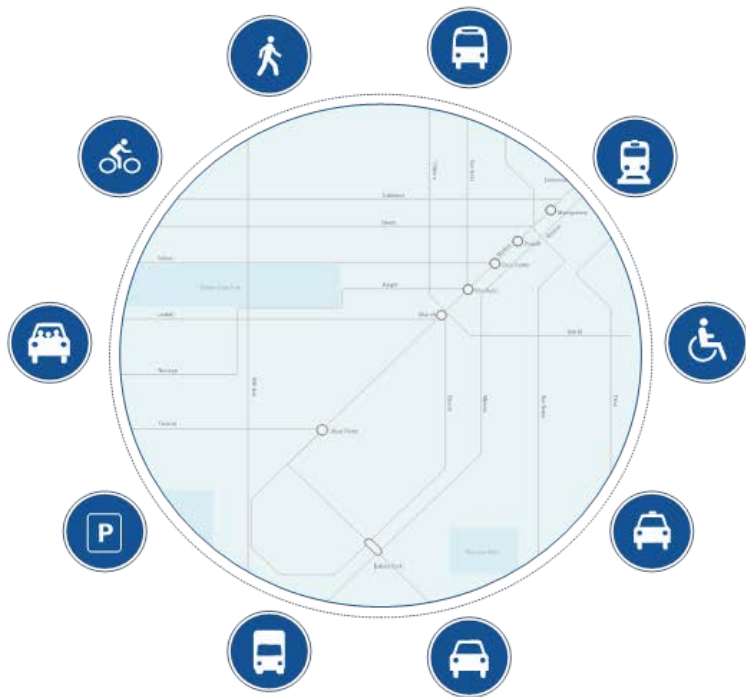


Light Rail Vehicle

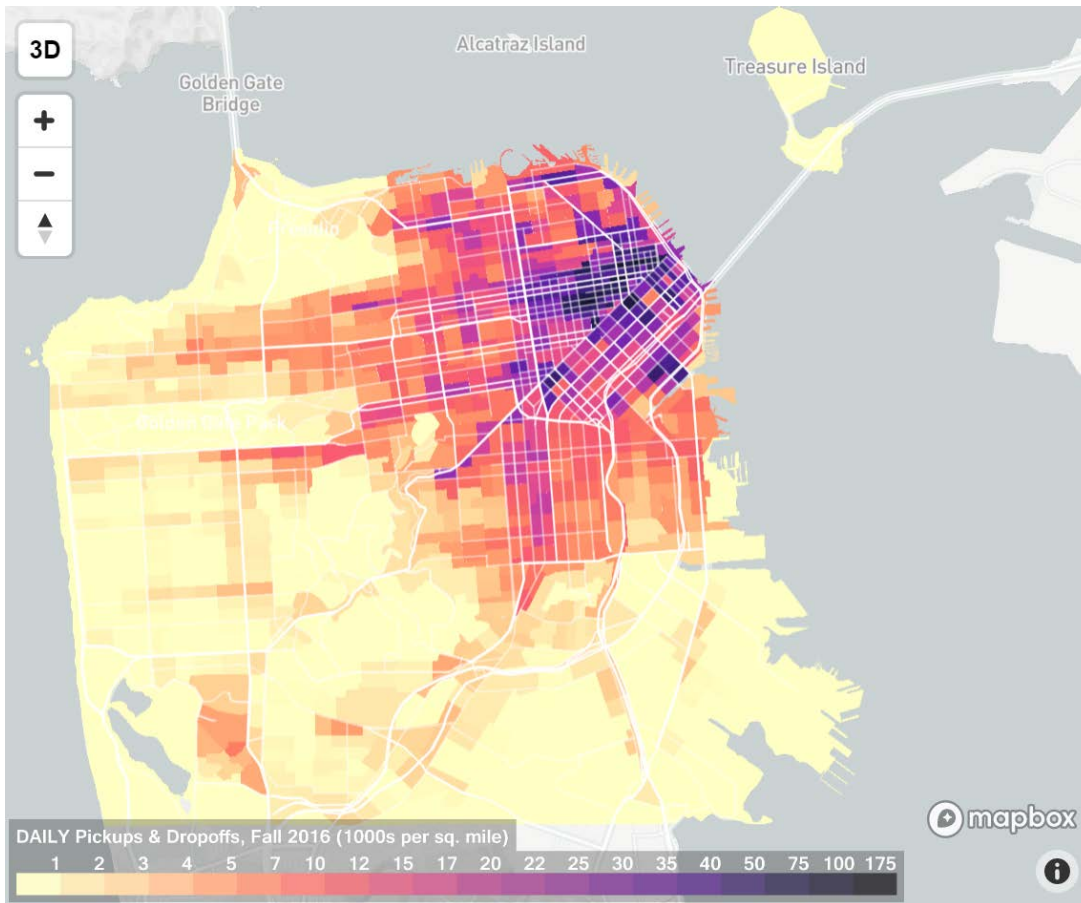


Historic Streetcar

San Francisco: A Comprehensive Approach to Managing Transportation



San Francisco: Home of the TNC

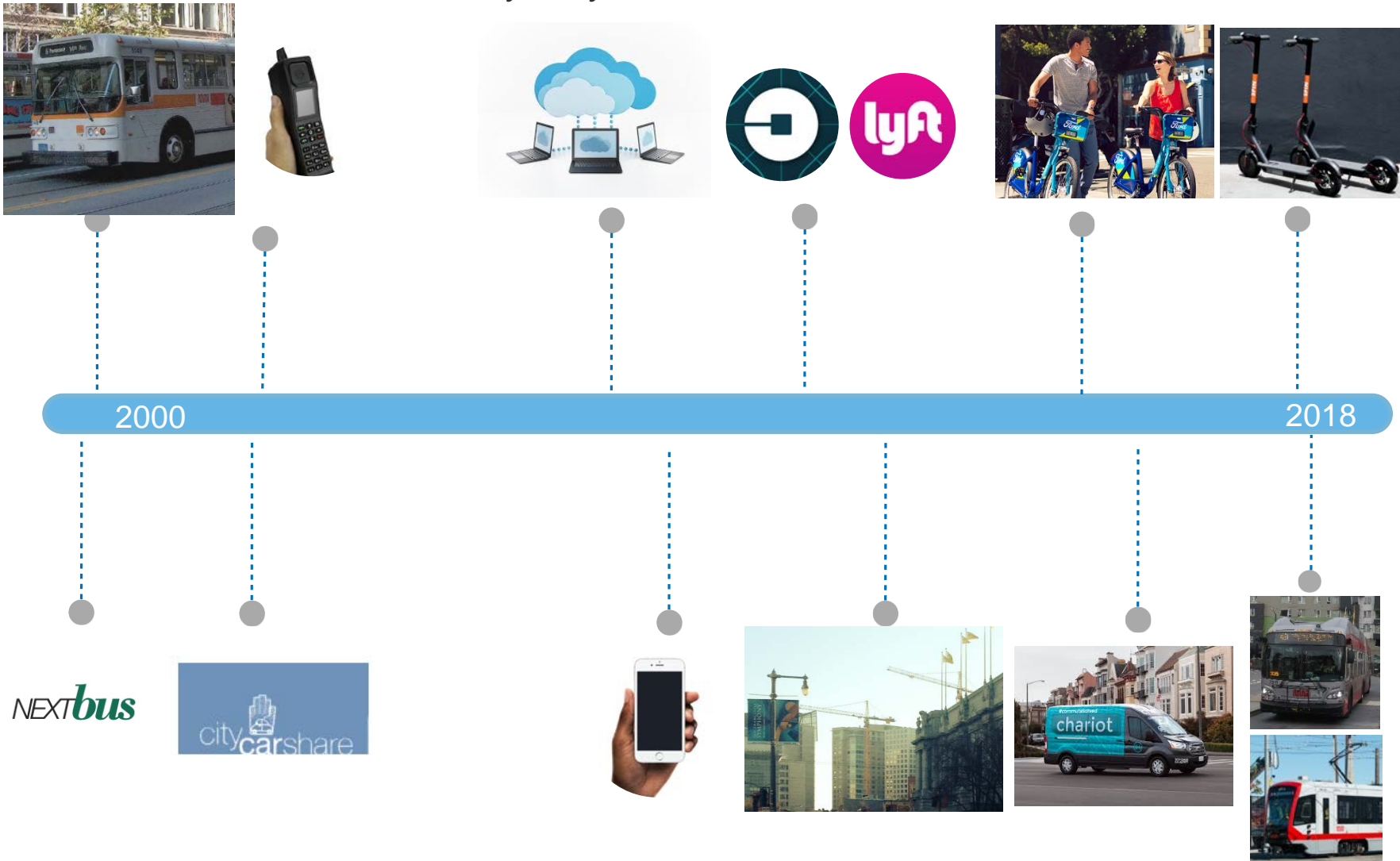


- 170,000 TNC vehicle trips per day, typically with only 1 to 2 passengers
- 20-26% of peak period traffic in Downtown/SOMA, which delays Muni
- Concentrated in areas with extensive Muni service

Source: *TNCs Today: A Profile of San Francisco Transportation Network Company Activity* (San Francisco County Transportation Authority)

Why Real-Time Information? Why Now?

- In 1999, San Francisco piloted the first U.S. real-time information system
- Since then, technology has rapidly altered the transportation landscape
- For the first time in nearly 20 years, we have a chance to do a refresh



Why Real-Time Information? Why Now?

Can the **next generation of real-time transit information** alter the psychology of mode choice and attract ridership?

Public Outreach

Quantitative

Comprehensive Survey

(Available in English, Chinese and Spanish; online and paper upon request)
5,856 complete responses; ±1.3% margin of error at a 95% confidence level

+

Qualitative

(including outreach to underrepresented groups)

Concept Testing

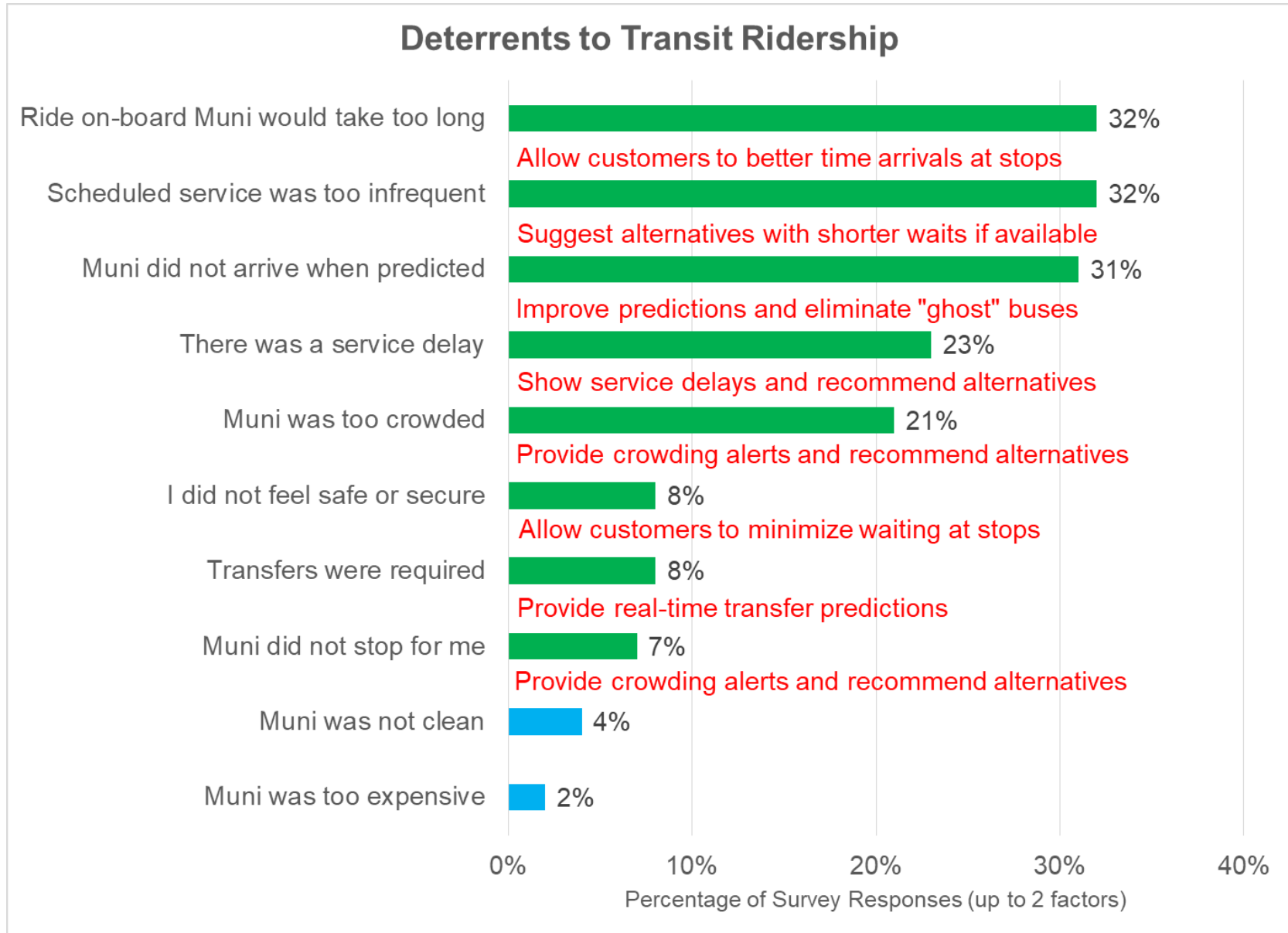
Stakeholder Interviews

Ride-alongs

External Stakeholder Examples

311	SF Board of Supervisors
BART	SF Travel
Chamber of Commerce	SFMTA Citizens' Advisory Council (CAC)
Chinatown Community Development Center (CCDC)	SFMTA Multimodal Accessibility Advisory Committee (MAAC)
Chinatown Tenants Association	SFMTA Policy and Governance
Hotel Council	SFUSD-Access
Independent Living Resource Center	Senior Action and Disability Network
Lighthouse for the Blind	SF Transit Riders
Mercy Housing	Youth Commission
Rebuild Potrero	The Village
Save Muni	Transbay Joint Powers Authority

How the New System Will Address Deterrents to Ridership

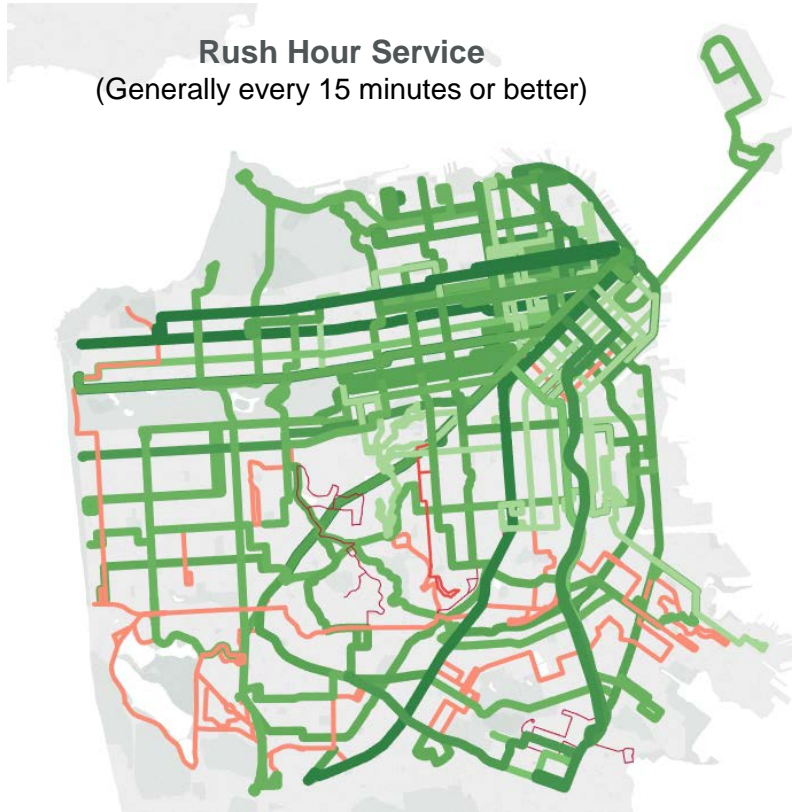


Willingness To Wait For Transit

Waiting Time Until Next Muni Vehicle	During the Day	During the Evening or At Night	When Transferring
5 min	97%	94%	93%
10 min	73%	67%	59%
15 min	35%	34%	22%
20 min	14%	15%	8%
30 min	5%	5%	3%

- Without any real-time information, customers are generally willing to wait 10 – 15 minutes
- Wait tolerance declines during the evening or at night, and when transferring

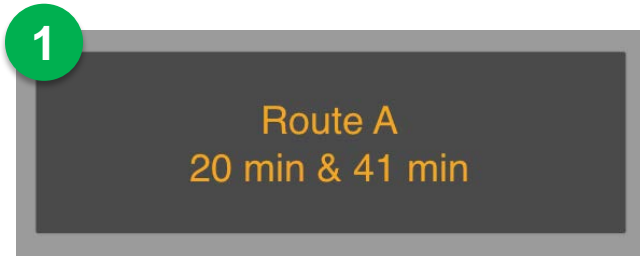
Muni Service Frequency



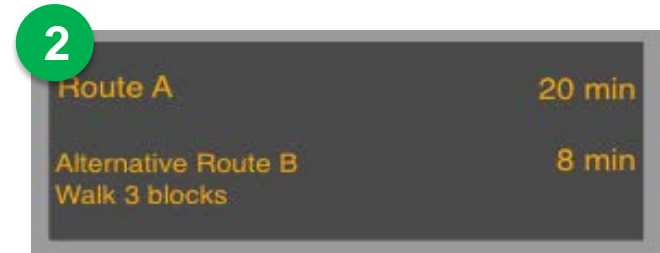
Service frequency often meets customer expectations during the day, but not during the evening and other off-peak times

A 20-minute Wait: Four Test Scenarios

- Survey presented customers with a hypothetical 20-minute Muni wait
- Respondents answered four situational questions testing how different types of information could influence mode choice



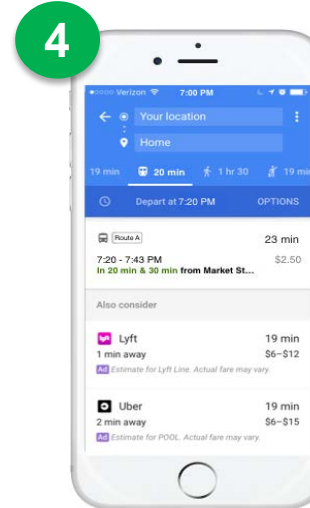
Customer arrives at shelter sign predicts a 20-minute wait



Countdown sign displays an earlier-arriving alternative

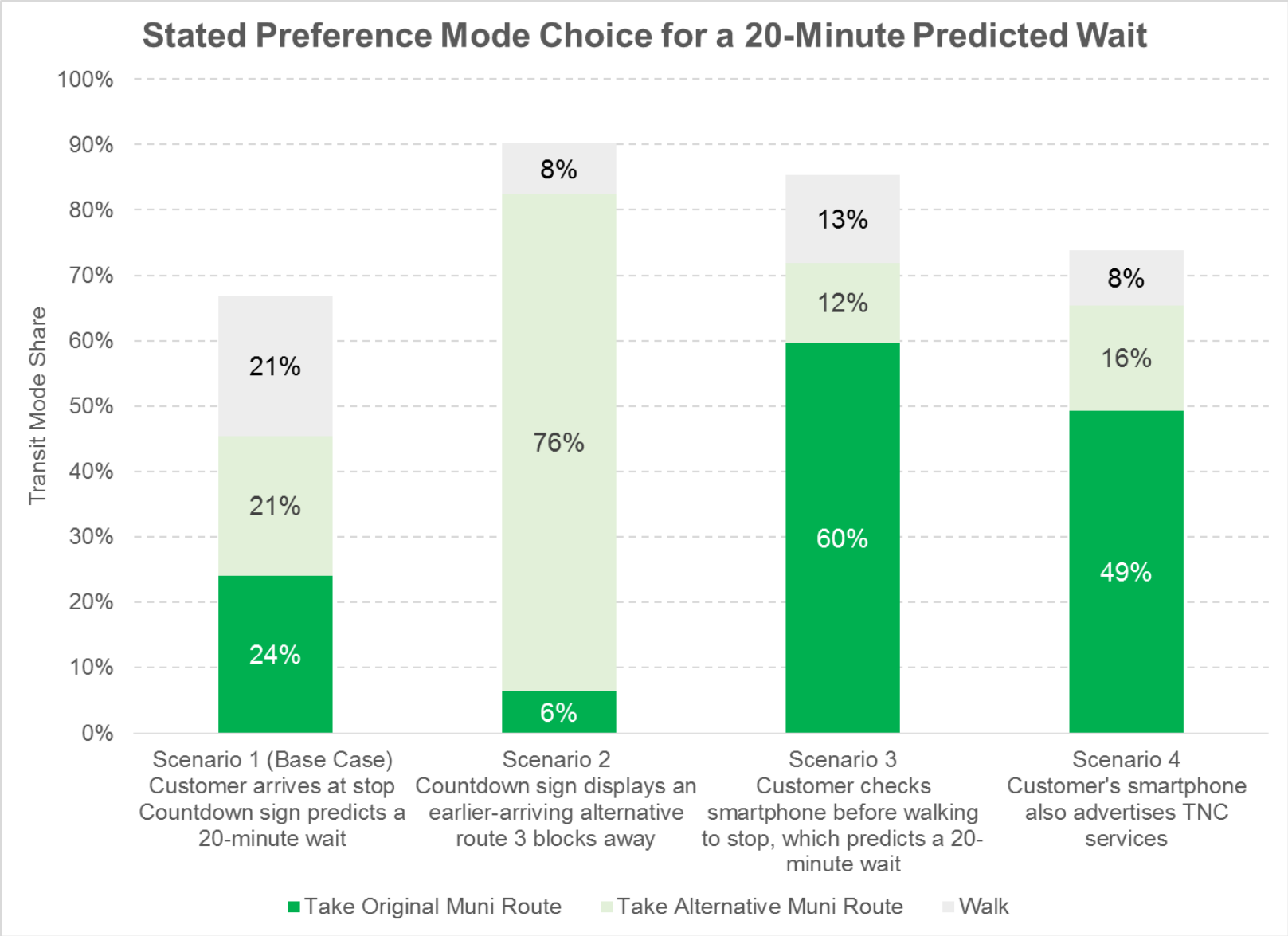


Checks smartphone before walking to stop, showing a 20-minute wait



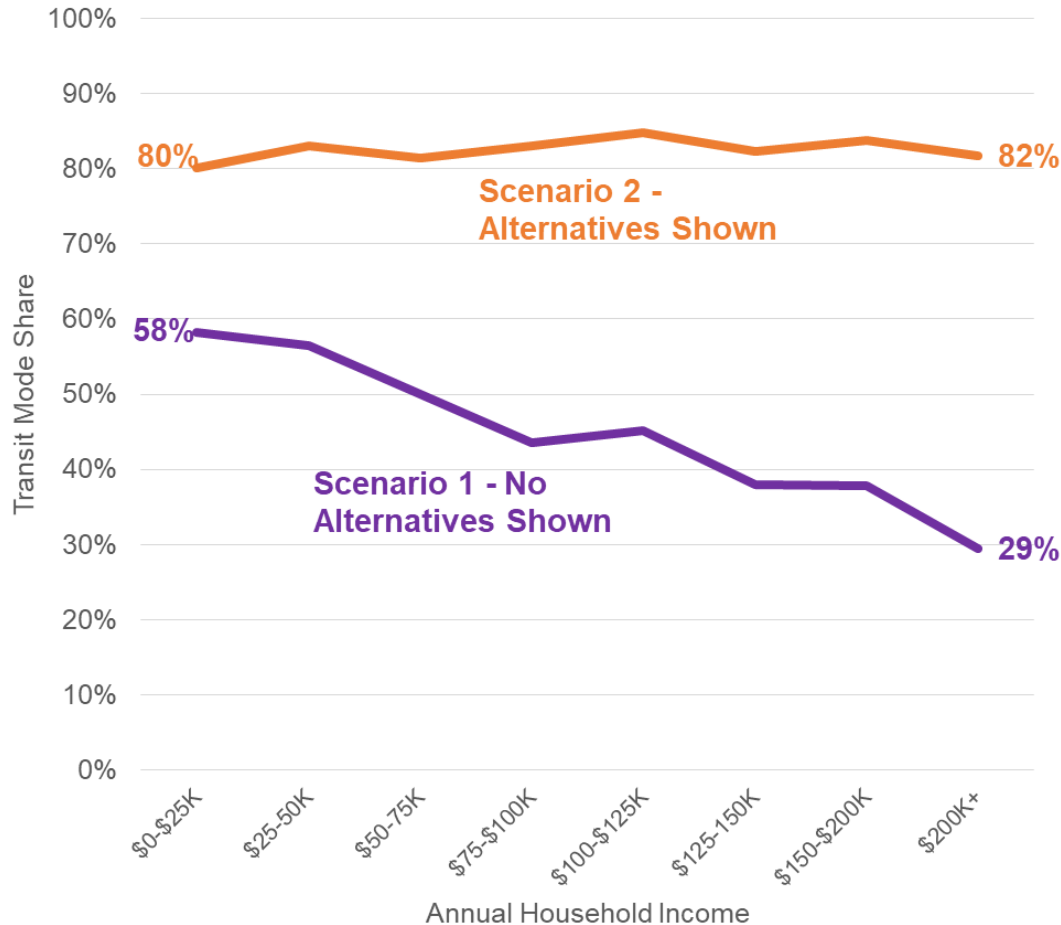
Customer's smartphone app also advertises Uber and Lyft

A 20-minute Wait: Top Level Results



Better Transit Information Reduces Income Disparities

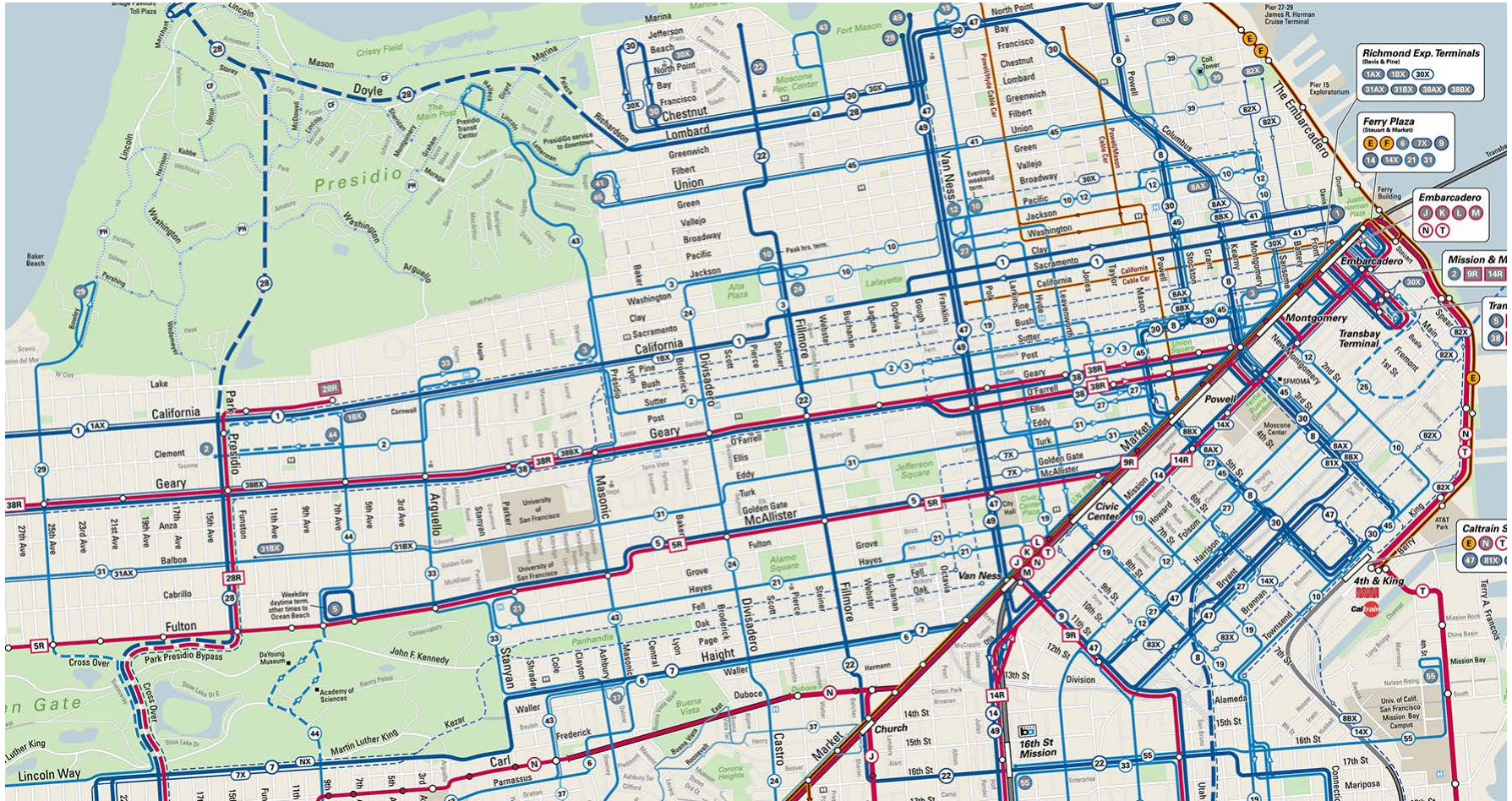
Impact of Showing Transit Alternatives on Signs
by Income (Scenario 1 vs 2)
Countdown Sign Predicts a 20-Minute Wait



- Survey confirms disparities in median household income by gender, ethnicity and other demographic variables
- As income rises people are less willing to wait for Muni
- The status quo can further a two-tiered transportation system based on income
- With better real-time information, respondents are more likely to ride Muni across all income brackets

Median Household Income: Female \$75-100K, Male \$100-125K
People of Color: \$50-75K, White: \$100-125K

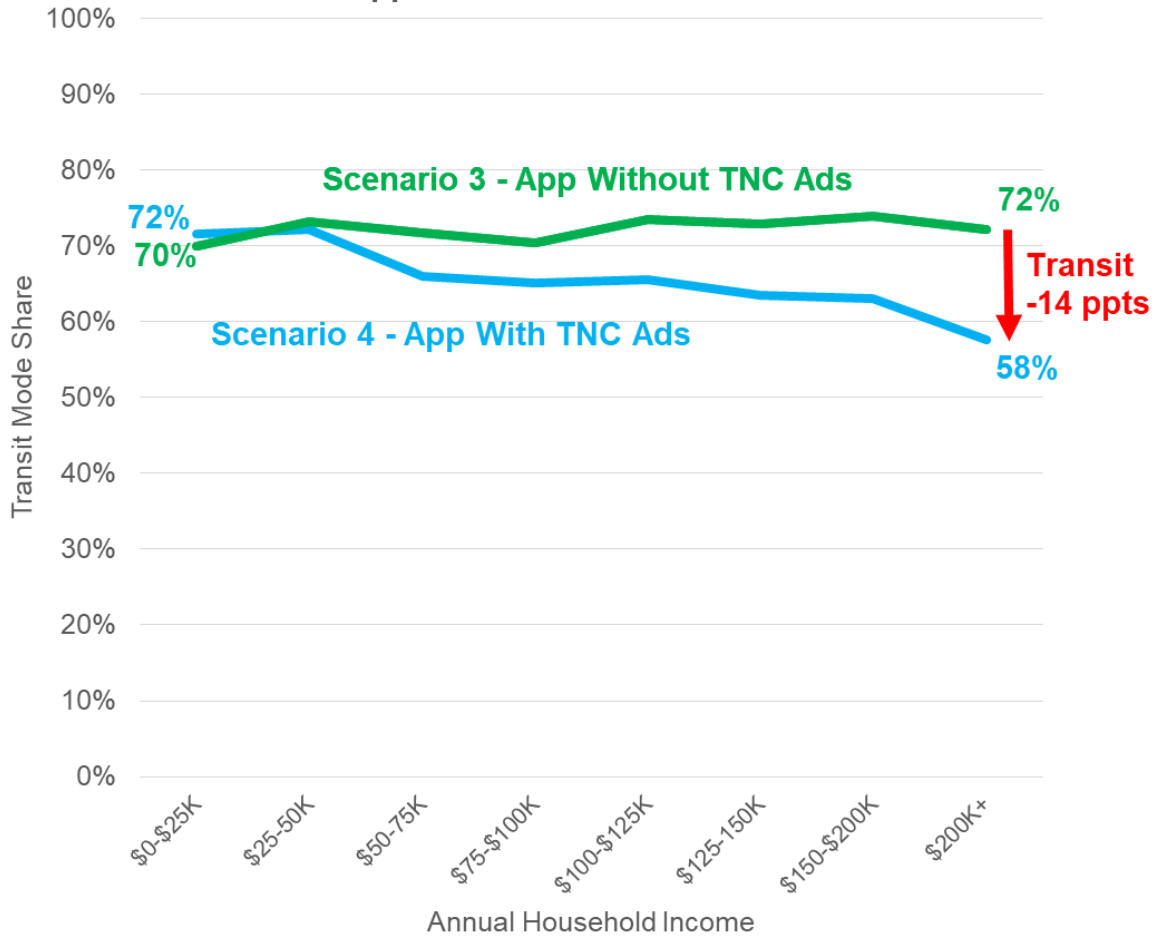
San Francisco Has Many Transit Alternatives



With many parallel lines, taking an alternative Muni route is viable throughout much of San Francisco

Impacts Of TNC Ads On Mobile Apps

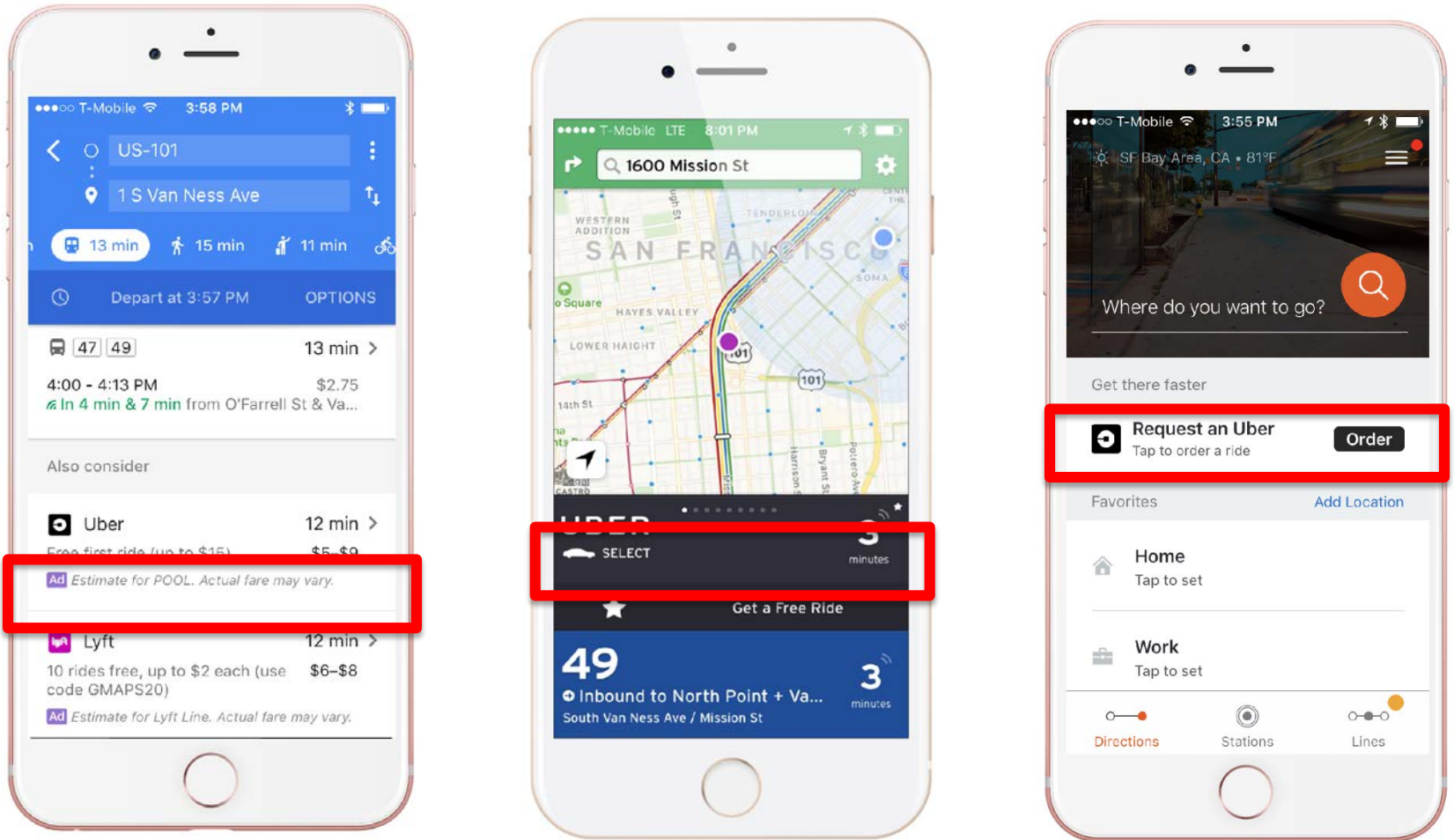
Impact of Showing TNC Ads on Transit Apps
by Income (Scenario 3 vs 4)
App Predicts a 20-Minute Wait



On transit apps, the income gap reappears when TNC ads are shown

Median Household Income: Female \$75-100K, Male \$100-125K
People of Color: \$50-75K, White: \$100-125K

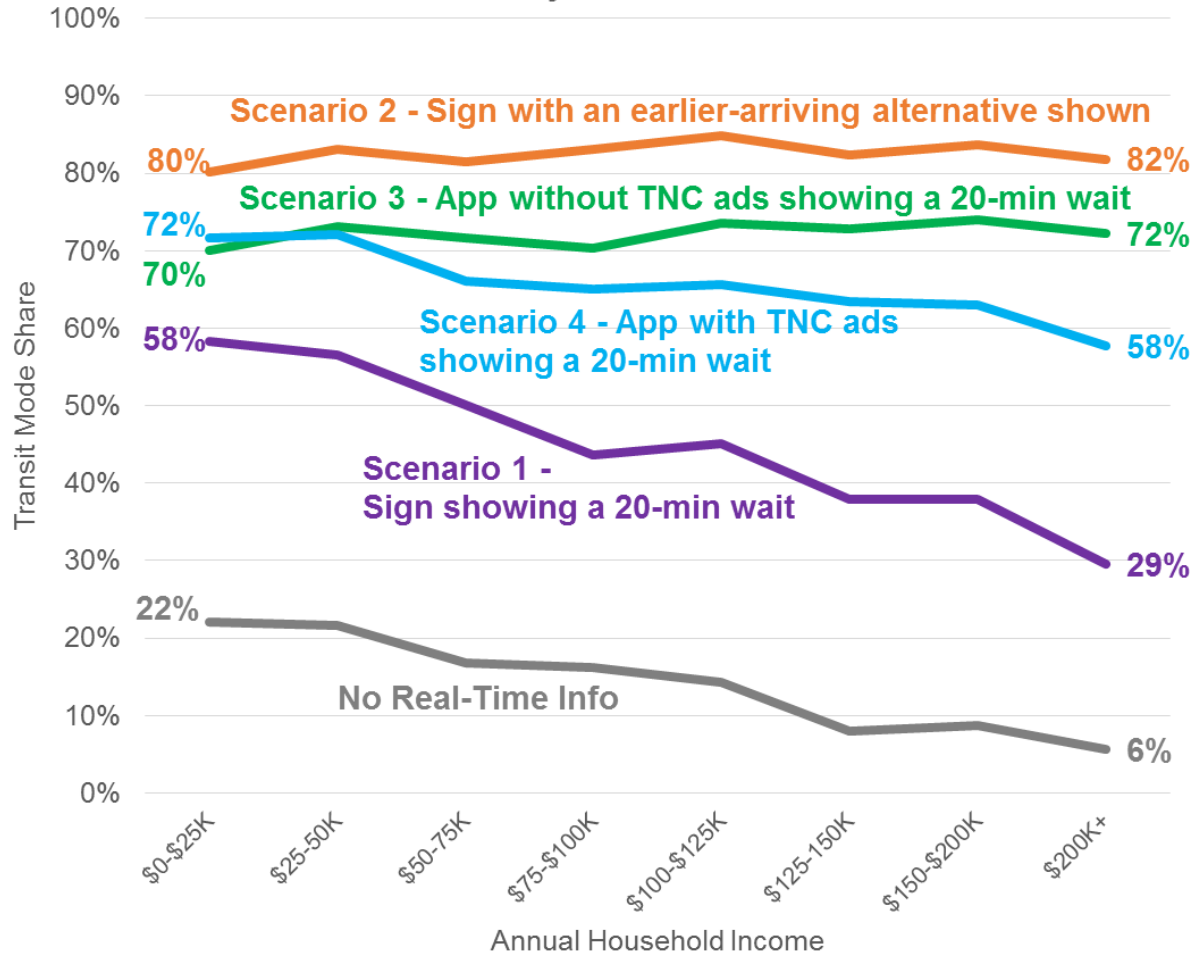
Many Apps Prioritize TNC Ads Over Transit Info



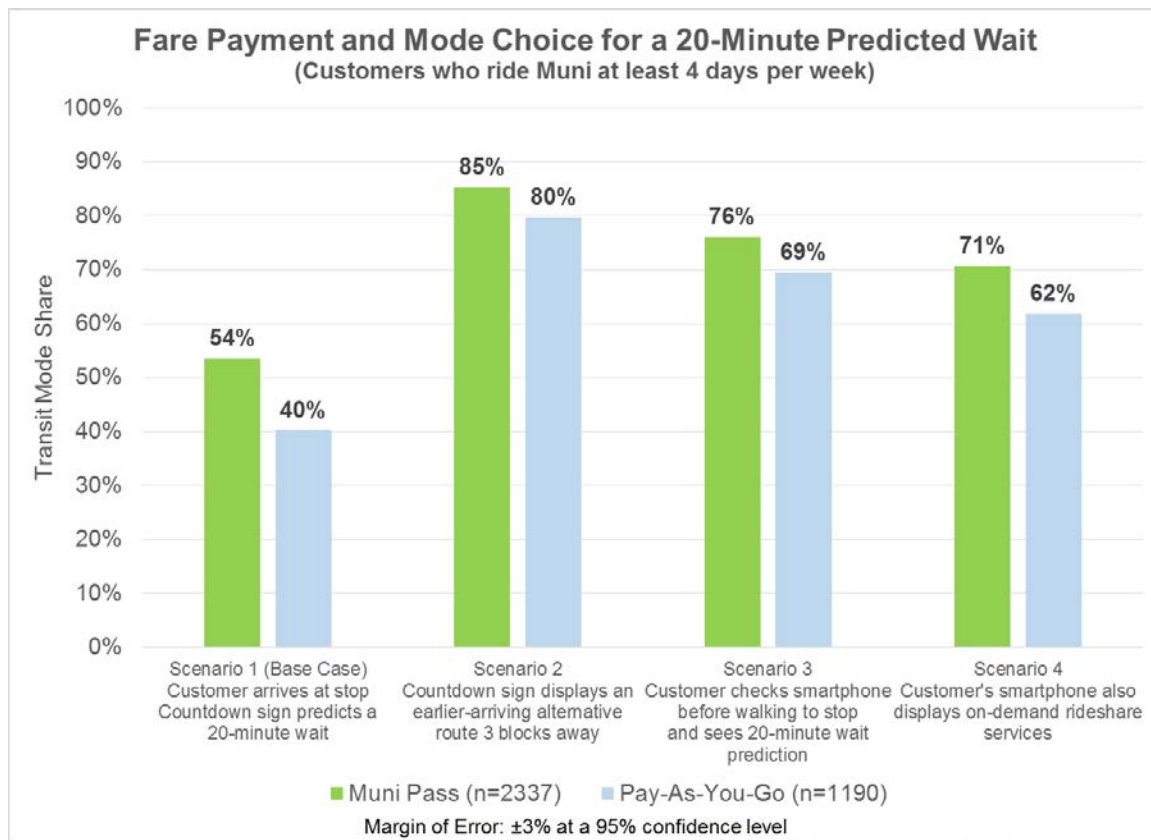
Many third-party apps prominently advertise TNCs when displaying transit predictions obtained through open data

Real-time Information's Influence On Mode Choice

Impact of Real-Time Information Presentation and Content on Transit Mode Share for a 20-Minute Wait by Income Bracket

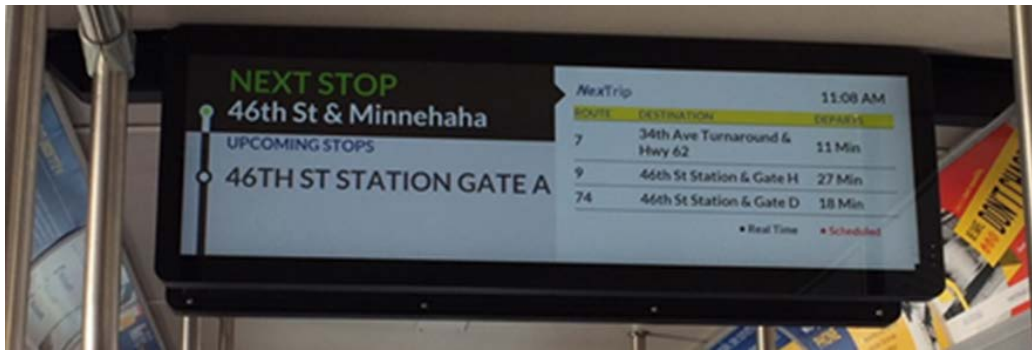


Transit Passes Encourage Ridership



- 34% of frequent riders (4+ days/week) pay for individual rides
- Compared to pass users, pay-as-you-go customers are more likely to choose other modes
- Passes currently break even at 30 single rides (on Clipper/MuniMobile) compared to 27.5 in 2009
- In September 2018, the SFMTA will offer:
 - ✓ A new day pass on its MuniMobile app
 - ✓ Lower visitor pass prices on Clipper/MuniMobile
 - ✓ Capped rate increases for the combined BART/Muni monthly pass

Customers Want A Better Enroute Info Experience



On-Board Digital Signage



Solar-Powered Signage

"Have signs that work at every stop, update outages and line delays, and provide visual information on board vehicles to show transfers available at each stop...bring this very dated system into the 21st century. We live in a city of innovation...utilize it!"

"Announce expected arrival times of intersecting routes at each stop."

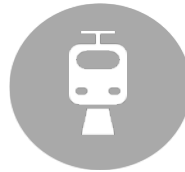
"I do not own a smartphone. Please do not make the system so dependent on owning one"

"On board screens that show arrival times of connecting bus, MuniMetro, BART and Caltrain lines would be helpful. Sometimes it's not always convenient to check times on a phone when standing on a crowded bus or holding bags/handrails/kids, etc. "

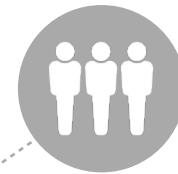
System Elements



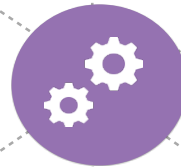
Surface Vehicle Locations
Gathers vehicle locations from CAD/AVL System



Underground Locations
Gathers vehicle locations from Automatic Train Control System



Automatic Passenger Counters
Gathers real-time ridership loads



System Software
Generates real-time vehicle predictions, monitors system status through a System Administration Tool, and displays information on customer interfaces through a Content Management System



Analytics Platform
Processes data from the System Software and Mobile Platform & Website to assist in operational and usage analysis



Stationary Digital Signage
Displays real-time arrivals, alternatives and other valuable info at rail stations, transit shelters and selected transit stops without power



On-Board Digital Signage
Provides back-end capability to display service updates, transfer connection times and other information on separately-procured on-board vehicle signs



Mobile Platform & Website
Delivers travel information in mobile and online formats; Mobile App features an enhanced Trip Planner and collects customer behavior insights to inform planning decisions

System Features

System Features	Current	Future
System Software		
Predictions	✓	✓ (improved)
Crowding Level Alerts	x	✓
Alternative Route Suggestions	x	✓
Real-Time Temporary Service Changes	✓ (limited)	✓
Connections with other systems	x	✓
Stationary Digital Signage		
Powered Shelters	✓	✓
Unpowered Shelters & Stops	x	✓
On-Board Digital Signage (back-end)		
Stop Announcements	✓	✓
Connection Times	x	✓
Service Delay & Reroute Alerts	x	✓
Mobile Platform & Website		
Mobile App	✓ (primarily mobile ticketing)	✓ (enhanced capabilities)
Accessible Itineraries	x	✓
Analytics Platform		
Usage Trends & Analytics	✓ (limited)	✓ (enhanced capabilities)

Data Analytics

Performance Management

- On-Time Performance
- Travel Time Variation
- Predictions Accuracy
- Interval Reliability
- Stop-to-stop travel times

Customer Engagement

- Usage
- Satisfaction
- A/B Testing
- Focus Groups

Service and Operational Planning

- Service Interventions Effectiveness
- Customer Travel Time Reliability
- Transfer Reliability
- Network Connectivity
- Stop Removal Impacts

Customer Responsiveness to Service Quality and Reliability

- Mode Choice and Abandonment
- Wait Tolerance
- Latent Demand
- Crowding
- Origin/Destination Patterns
- Ridership Forecasting
- Internal and External Transfers
- Fare Elasticity

Conclusions

Technology and Transportation

- Technology has radically altered the transportation landscape
- Our system is adapting to the “sharing economy”

Challenges and Opportunities

- The status quo could intensify inequities by creating income-based transportation systems
- The next generation of real-time information has the potential to:
 - ✓ Alter the psychology of mode choice and attract ridership
 - ✓ Promote a more equitable and sustainable transportation system
 - ✓ Improve our understanding of how people make travel choices