Learning from Automated Driving on San Francisco's Hard Miles

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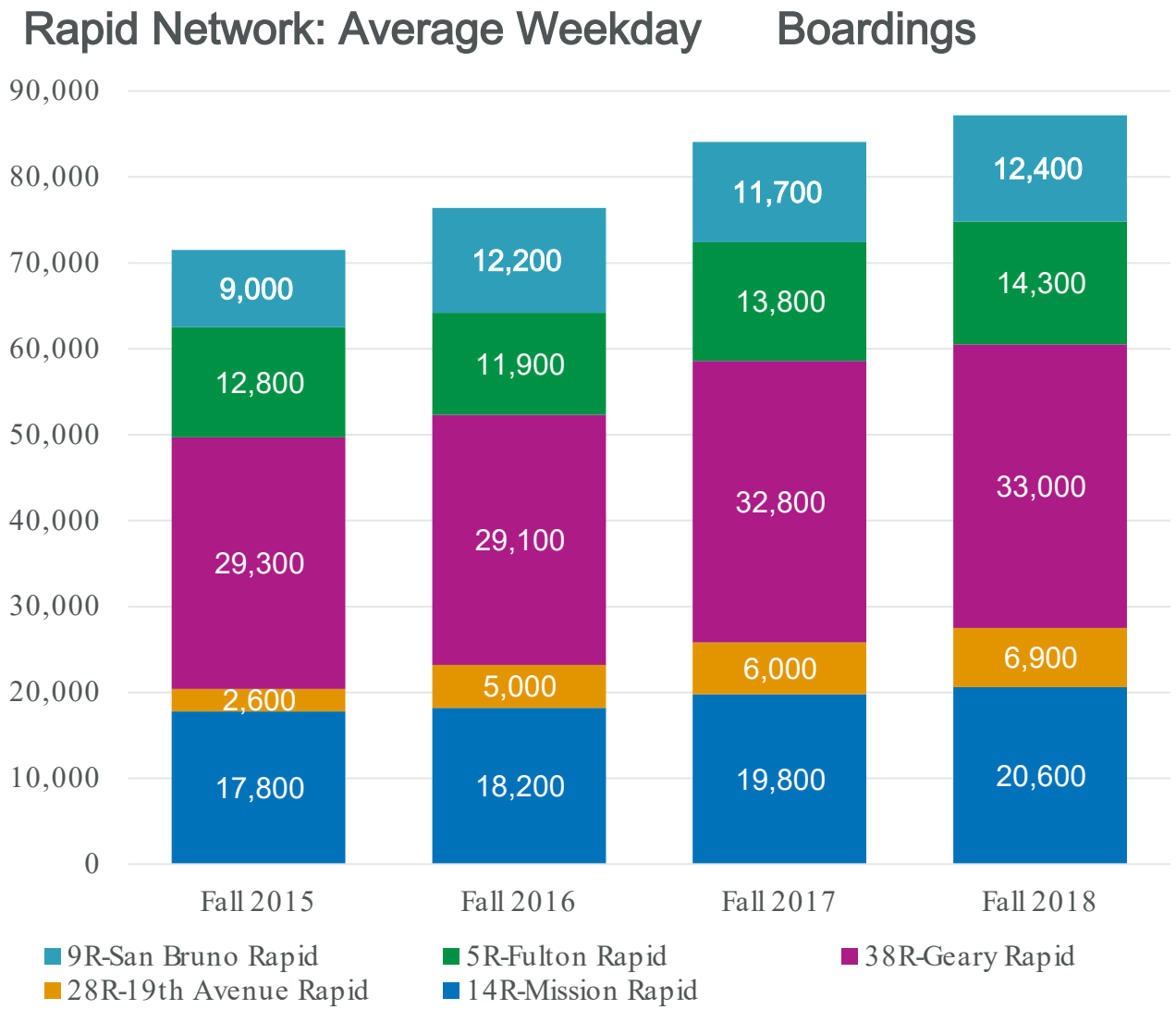
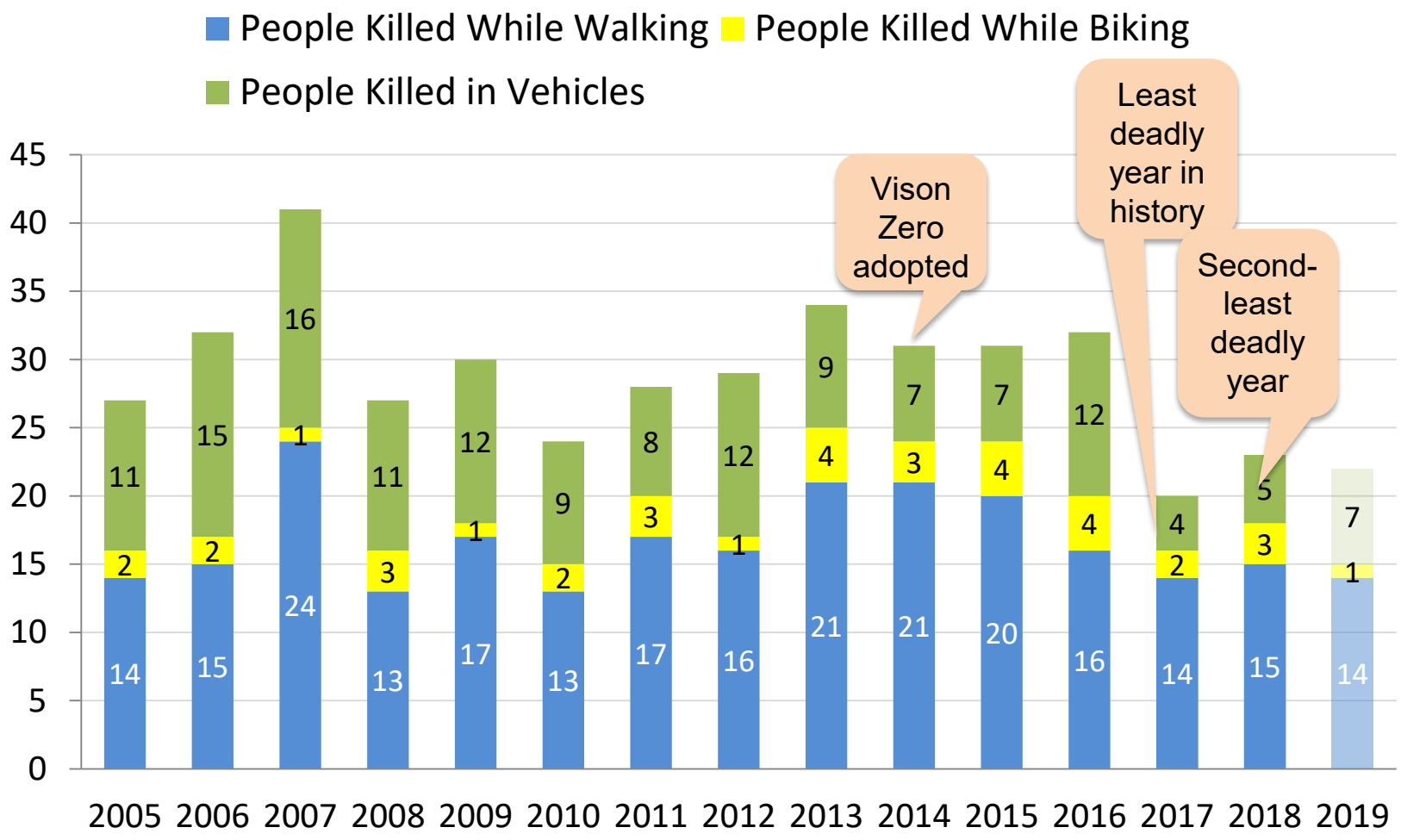
Transit First: Ridership Grows Where We Invest



- Added capacity & increased frequencies on Rapid routes
- Improvements attracted new riders, but also shifted demand from local to Rapid service
- Since 2015, Rapid Network ridership has increased **by 22 percent**

Safety: Vision Zero



Congestion: Change in Vehicle Hours of Delay by Factor between 2010 - 2016

FIGURE 4. % CHANGE IN VEHICLE HOURS OF DELAY

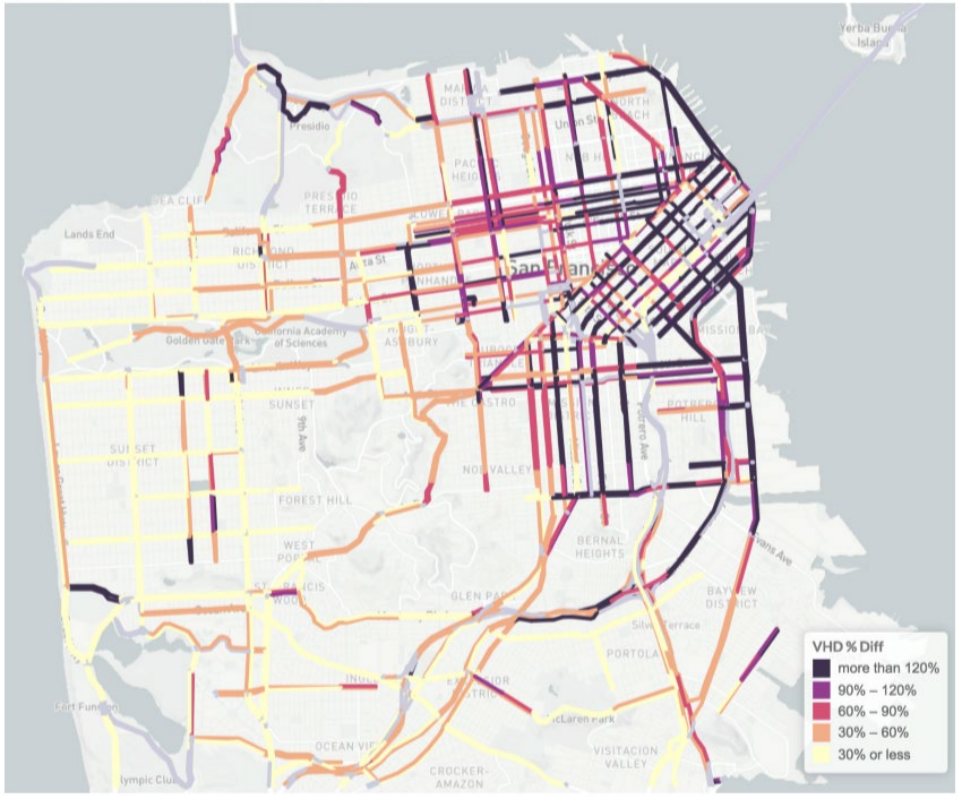
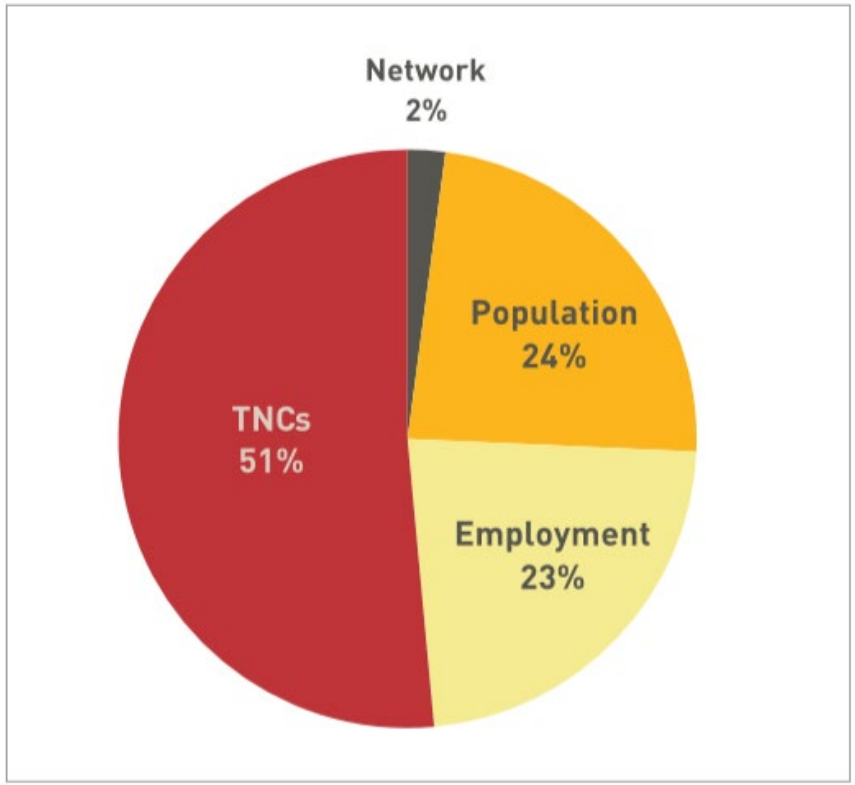


FIGURE 13. SHARE OF CHANGE IN DELAY BY FACTOR



Vehicle hours of delay in San Francisco's downtown area increased more than 120% .

CA Automated Driving Testing

- 63 permits to test ADS passenger vehicles with safety drivers
- 1 permit to test ADS w/o safety drivers in a suburban operational design domain (ODD)
- > 2 million miles of automated driving on CA roads in 2018
- We believe that 4 companies are testing ADS on SF roads

San Francisco Miles are “Hard Miles”

- Vehicles driving in San Francisco ‘predict an average of 32 times as many *possible interactions* as those in Phoenix.’

Maneuver / Scenario	San Francisco	Phoenix Suburbs	Ratio
Left turn	1462	919	1.6:1
Lane change	772	143	5.4:1
Construction blocking lane	184	10	19.1:1
Pass using opposing lane	422	17	24.3:1
Construction navigation	152	4	39.4:1
Emergency vehicle	270	6	46.6:1

Per 1,000 miles of autonomous driving

Developing Guardrails

California has set standards for:

- Safety driver qualifications and training
- Insurance / financial security
- Cooperation with law enforcement

There are no CA or federal standards for:

- **Accuracy in perceiving** vulnerable road users
- **Accuracy in predicting** actions of other road users
- **Safety of planned responses** to other road users
- **Execution** of maneuvers to prevent collisions

Policy Questions to Consider NOW

- What will it take to ensure that AVs actually comply with:
  - Stopping & standing limits?
  - Speed limits?
- Do we need new enforcement tools?

SFMTA

THANK YOU

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Living Our Values: Guiding Principles

Safety

Transit

Equitable Access

Disabled Access

Congestion

Sustainability

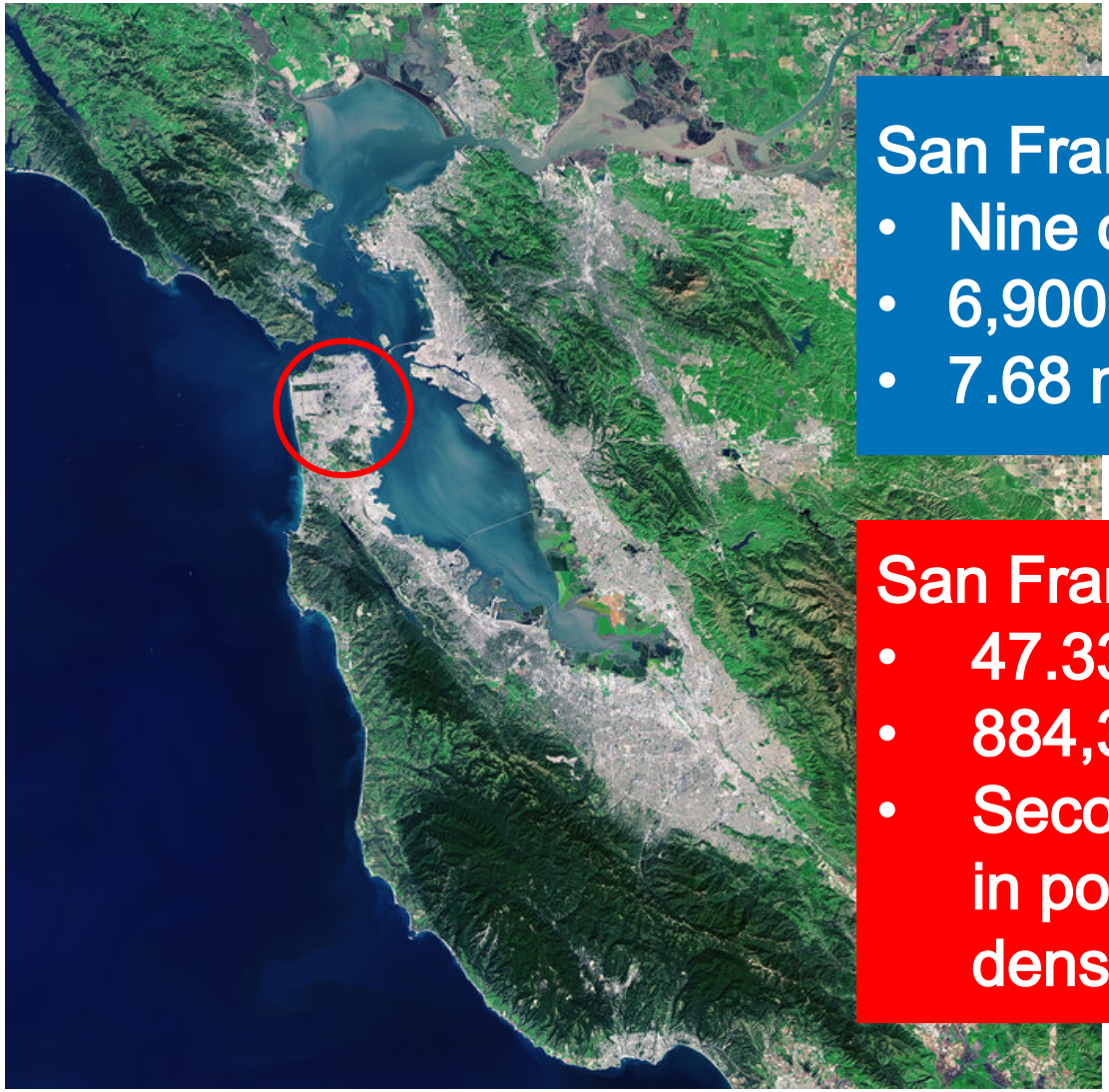
Financial Impact

Accountability

Labor

Collaboration

A Little Perspective



San Francisco Bay Area:
- Nine counties
- 6,900 square miles
- 7.68 million residents

San Francisco:
- 47.33 sq. miles
- 884,363 residents
- Second only to NYC in population density

Transit First: Using Street Space Wisely