New Mobility Street Design
A Case Study of Autonomous Vehicles in San Francisco

July 2017
Autonomous vehicles bring uncertain opportunities.

**AUTO-ORIENTED STREETS**
- Our primary objective used to be: faster, more streamlined driving
- Architecture for cars
- Decline in walking, biking, and riding transit

**MULTIMODAL RETROFIT**
- Walkability movement
- 2014 transit ridership since 1950s
- 300 miles of protected bikeways built

**NEW MOBILITY**
- Autonomous vehicles could introduce:
  - Ubiquitous shared mobility
  - Walkable, bikeable streets
  - Abundant capacity to redesign

- AVs raise many questions:
  - Will they catalyze sprawl?
  - Will transit ridership fall?
  - How will we manage streets?
How can we design more multimodal streets with AVs?

Autonomous vehicles have the potential to introduce transformative change to city streets.

Using real data, real plans, and real projections for a street in San Francisco, we use a quantitative approach to visualize future street designs.
Study Method: Data, Scenarios, Calculations, Designs

1. Gather data on existing and future development type and density, traffic volumes, parking demand, and curb demand.

2. Develop reasonable future mode share scenarios.

3. Apply scenarios to traffic, parking, and curb data to calculate traffic lanes and curb programming needs.

4. Create a walkable, bikeable, green street design.
Baseline: Driving, walking, and transit

Key Elements

- **Low vehicle ownership**, compared to US, but still driving is dominant.
- **Transit** is common.
- **Biking**, however, is uncommon.

![Pie chart showing mobility options:}

- Active Mobility: 32%
- Legacy Auto: 48%
- Legacy Bus: 11%
- Rail: 9%
Evolutionary: More driving, less sharing

Key Elements

- **Incremental automation** makes driving more appealing.
- **Human-operated transit** remains the norm.
- **Legacy vehicles** are still prevalent.
- **Shared mobility** services draw from transit.
Revolutionary: Sharing mobility and biking renaissance

Key Elements

- **Autonomous services** make vehicle ownership unappealing.
- **Major bus routes** are automated, allowing agencies to increase frequencies.
- **First/last mile services** flourish.
- **Public-private partnerships** make on-demand autonomous shuttles common.
- With **few legacy vehicles** on the streets, biking booms.
Scenarios compared

**BASELINE**
- Active Mobility: 32%
- Legacy Auto: 48%
- Legacy Bus: 9%
- Rail: 11%

**EVOLUTIONARY**
- Active Mobility: 30%
- Automated Bus: 5%
- Legacy Auto: 2%
- SAV Rideshare: 9%
- SAV: 5%
- Rail: 2%
- Owned AV: 15%

**REVOLUTIONARY**
- Active Mobility: 40%
- Automated Bus: 15%
- Owned AV: 8%
- SAV: 15%
- SAV Rideshare: 8%
- Rail: 15%
Traffic: Ample capacity with ped scramble, 2 lanes less
Parking: Parking demand fades with legacy vehicles.

- Baseline: 344 Parking Spaces
- Evolutionary: 911 Parking Spaces
- Revolutionary: 137 Parking Spaces

Demands: 1,114

Supply: Off-Street + On-Street: 313
Supply: Off-Street: 31
Curb: Demand for curb service will skyrocket.

We assumed 30 vehicles per hour per space with an average dwell time of one minute.
Design Parameters for Revolutionary Scenario

- Two-way bicycle facility
- Wide sidewalks
- Passenger loading zones
- Greenery and space for people
Street Design – Existing Plan View

4th Street Today: An auto-oriented arterial
Street Design – Existing Cross Section
Street Design – Future Cross Section
Street Design – Future Plan View

4th Street Tomorrow: A multimodal public space
New Mobility Street Design: Results

- Ped scrambles
- Wide sidewalks
- Bike parking
- 2-way cycle track
- Parklets
- Bioswales
- Passenger loading
- 65 feet of roadway reclaimed for people
Thank you!