

# TRANSPORTATION MODELING FORUM

December 11, 2019



# Forum Agenda

- Welcome, Introductions and Announcements
- Model Roadmap
  - Development
  - Application
  - Surveys
  - Sketch Planning
- How to model the 5 Big Moves

# Model Roadmap

Wu Sun

Cherry Liu

Rick Curry

Mike Calandra

Cedric Goddevrind (Deloitte)

# Model Roadmap

- Model Development
- Model Application
- Surveys in 2019
- Sketch Planning

# Model Development

- Roadmap for the 2025 Regional Plan
  - 4-year development cycle
  - Multiple tools for a wide spectrum of transportation analysis
  - Fast, reliable, reproducible, easy to maintain, user friendly, and reflective of changing environment
- Contingent on budget, time, & staffing

# Spectrum of Modeling Tools

- Sketch planning tools for strategic analysis
- Travel demand model for long range regional planning
- Customized travel demand model for sub-regional planning
- Project evaluation tools for operational level analysis

# Sketch Planning Tools

## FutureScape

- Highway and transit network investment impact
- Visualization

## Other possible tools (e.g. VisionEval)

- Land use
- Emerging transportation technologies/modes

## Integrated sketch planning

- An integrated platform for quick evaluation of network, land use, emerging transportation policy and technology changes

## Risk analysis/Range-based forecasting

- Expand FHWA/SANDAG TMIP-EMAT project
- Link with the sketch planning tool to produce range-based forecasting

# Long Range Regional Planning-Core Model

## ABM3 (10/2020-06/2023)

- New software platform-ActivitySim
- Complete demand side modeling update
  - Estimation, implementation, calibration, validation, & sensitivity tests
- Possible new model components, including but not limited to:
  - Transit pass model
  - University student model
  - Military travel model
- Supply side modeling update
  - Faster network building, skimming & assignments to achieve significantly reduced model runtime
- Data model/structure
  - Input and output management
  - Monitoring and reporting
- Cloud-based?



# Long Range Regional Planning-Special Market Models

## Special Market Model Highlights

- Cross-border model update (02/2020-07/2021)
  - First project to transition from Java-based CTRAMP to Python-based ActivitySim
- Commercial vehicle model (07/2021-06/2023)
  - Fully integrated with ABM3 core model with explicit E-commerce/online shopping modeling

## Other Special Market Model Update

- External models
- Airport model
- Visitor model
- Heavy truck model

# Others

- Automated, integrated, and streamlined reporting & monitoring system
- Integrated transportation and land use modeling platform
- Survey/Big data informed behavioral data fusion system
- Optimized observed data/traffic count management system
  - Highway counts
  - Arterial counts (MS2)
  - Transit ridership counts
  - ACS/Census

# Model Application

- Board policy
  - May 2017 Executive Committee decision (covered during the June 2017 Model Forum)
    - Support the current and previous model only
    - Expiration date tied to Board adoption of Regional Plans (RP)
  - Regional plans
    - 2015 Regional Plan and Sustainable Community Strategy (SCS)
    - 2019 Federal Regional Transportation Plan (RTP)
    - 2021 Regional (Vision) Plan and SCS
  - Cycle interruption
    - The 2019 Regional Plan was deferred to the 2021 Vision Plan
    - The 2019 Federal Regional *Transportation* Plan adopted November 2019 to satisfy FHWA and FTA for funding purposes
    - The 2021 Regional (Vision) Plan

# Model Application

- Cycle interruption significance
  - Update of the Series 14 Growth Forecast
  - Accelerated model development of ABM 2+
  - Project status uncertainty
- Back to the Executive Committee



# Model Application

- Board policy
  - February 2020 Executive Committee
    - Staff options for coping with the cycle interruption
      - Follow the existing policy and deny new land use scenarios
      - Follow the existing policy and deny new land use scenarios after a grace period
      - Exception to allow new requests to start with ABM1 until the Vision plan is adopted



# Model Application

- Recommended option implication
  - New land use model scenarios can begin with ABM 1 / Series 13
  - Limited use of the 2019 Federal RTP
    - Regional model data extraction
      - Select zone assignments
      - CAP, mode choice and SB743 VMT analysis
    - Custom network scenarios
    - No custom land use scenarios



# Model Application

- Cycle update
  - Move ABM 2+ from development to application
  - Request for proposals (RFP) for subarea ABM 2+ enhancements
    - Employment density update
    - Reinstitute splitting of TAZs
    - Revamp the land use override procedure
      - Automate shadow pricing
      - Addition of new unit types
      - Pre-model run Person and Vehicle trip/tour reports
    - Popsyn update
    - Migration of existing subarea script reporting
    - Automation of QA/QC procedures
    - Reduce model run times
    - Trip data report and threshold definitions
    - Application tests

# Model Application

## Priority Projects for 2020

### Airport Ground Access

- Update to airport model component
- Site land use
- Ground access

### SR 11 Otay Mesa East Port of Entry

- Cross border travel survey
- Updated Traffic and Revenue model
- Investment grade study

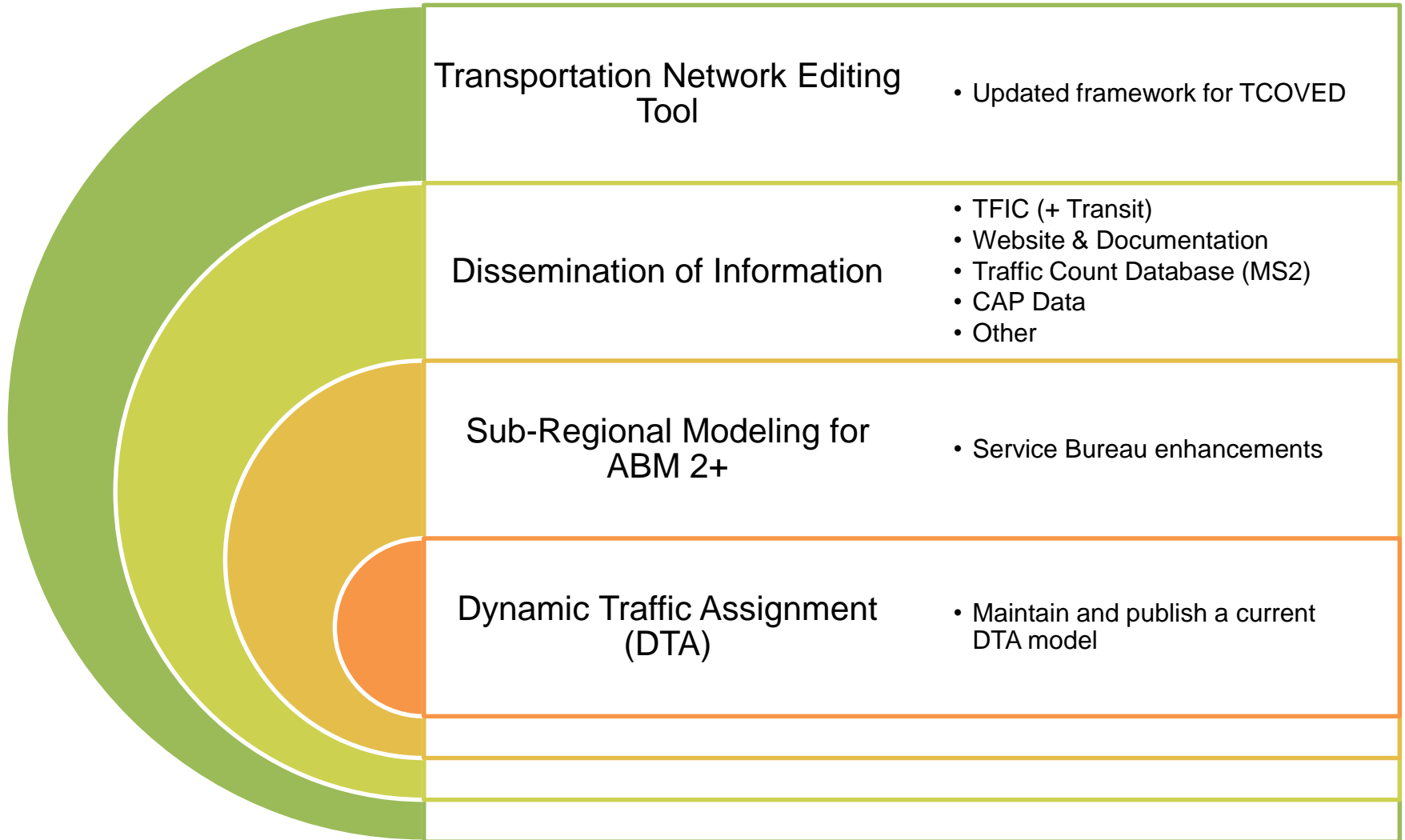
### 2021 Regional Plan / Sustainable Communities Strategy (SCS)

- 5 Big Moves
- EIR
- SCS GHG targets



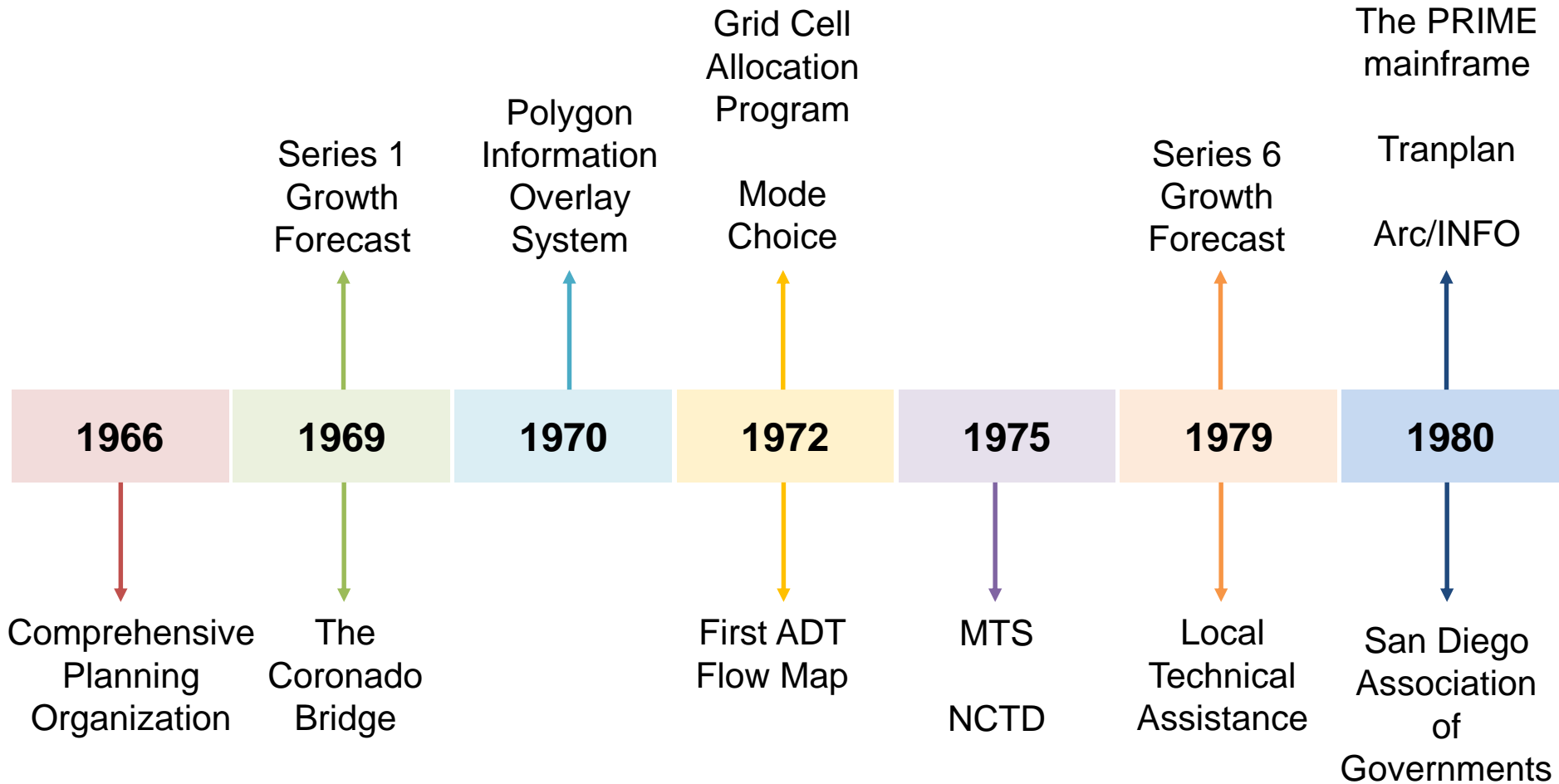
# Model Application

## 2020 Focus Areas



# Model Timeline

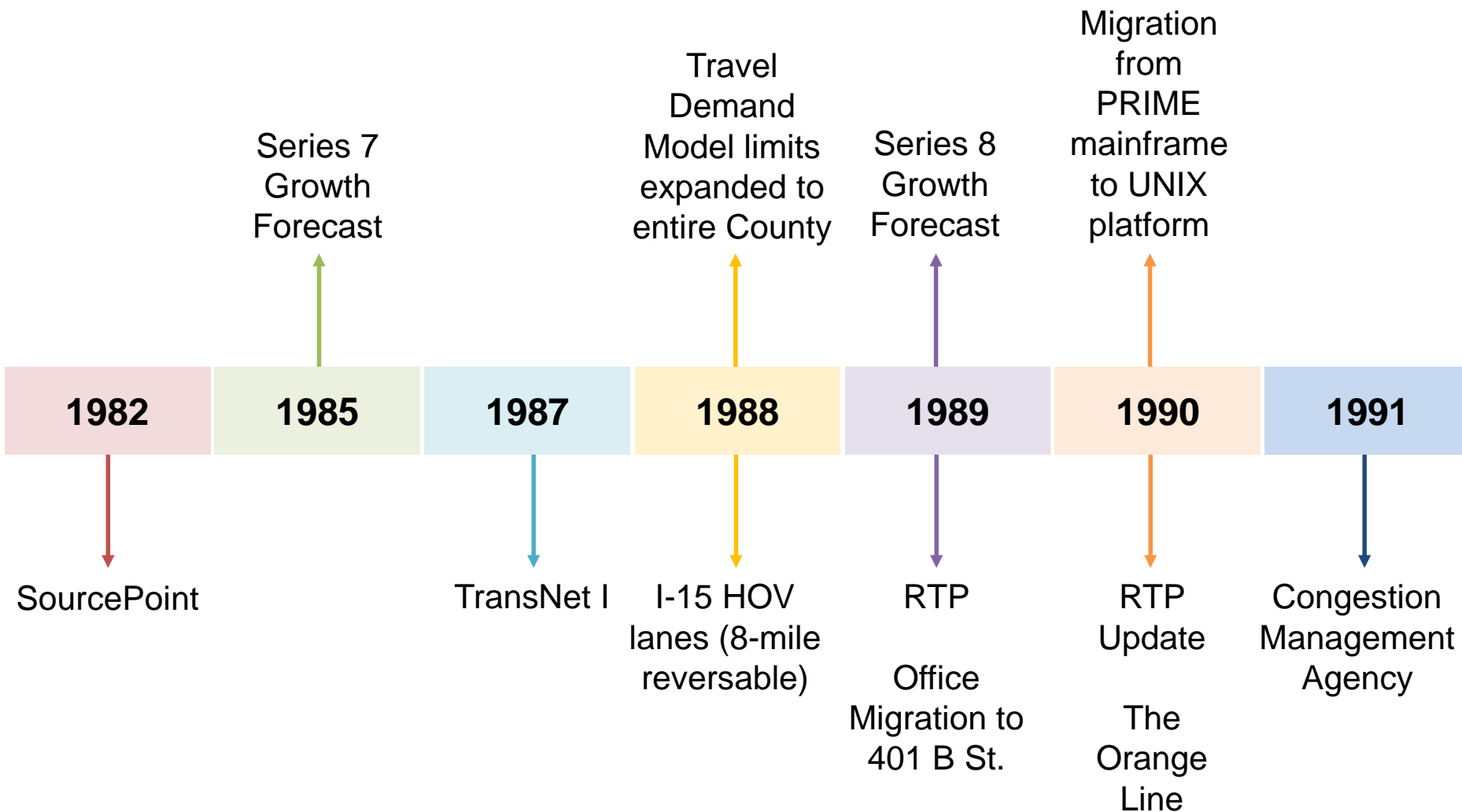
## Data & Model Development



## Policy & Model Application

# Model Timeline

## Data & Model Development



## Policy & Model Application

# Model Timeline

## Data & Model Development

Development of a GIS application for network editing (TCOVED)

1992

Bridge Toll Authority

1993

Freeway Service Patrol

1994

RTP

1995

The Coaster

1996

Travel Behavior Survey

RTP Update

Series 9 Growth Forecast

1997

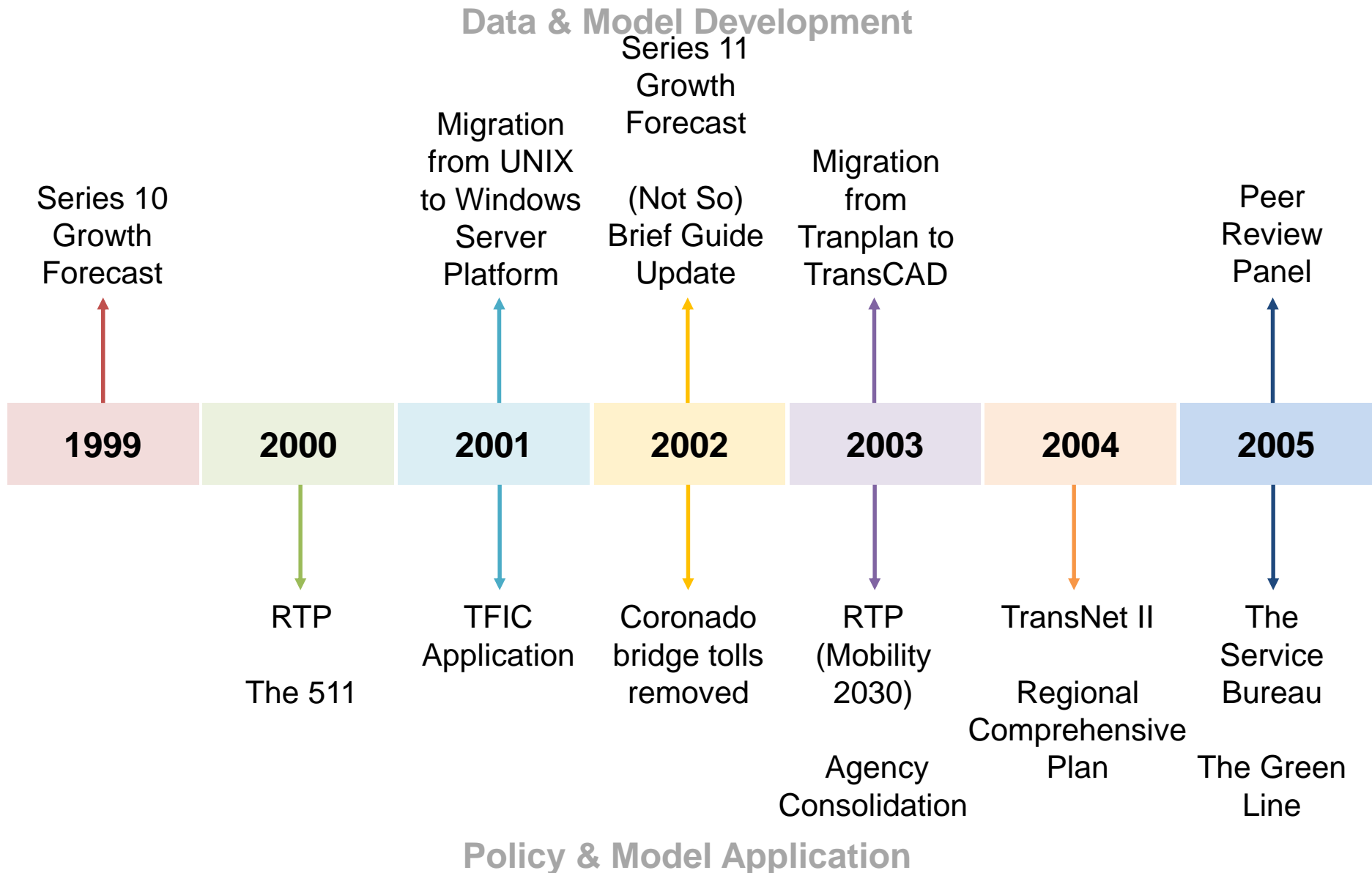
(Not So) Brief Guide

1998

I-15 HOV lanes converted to HOT lanes

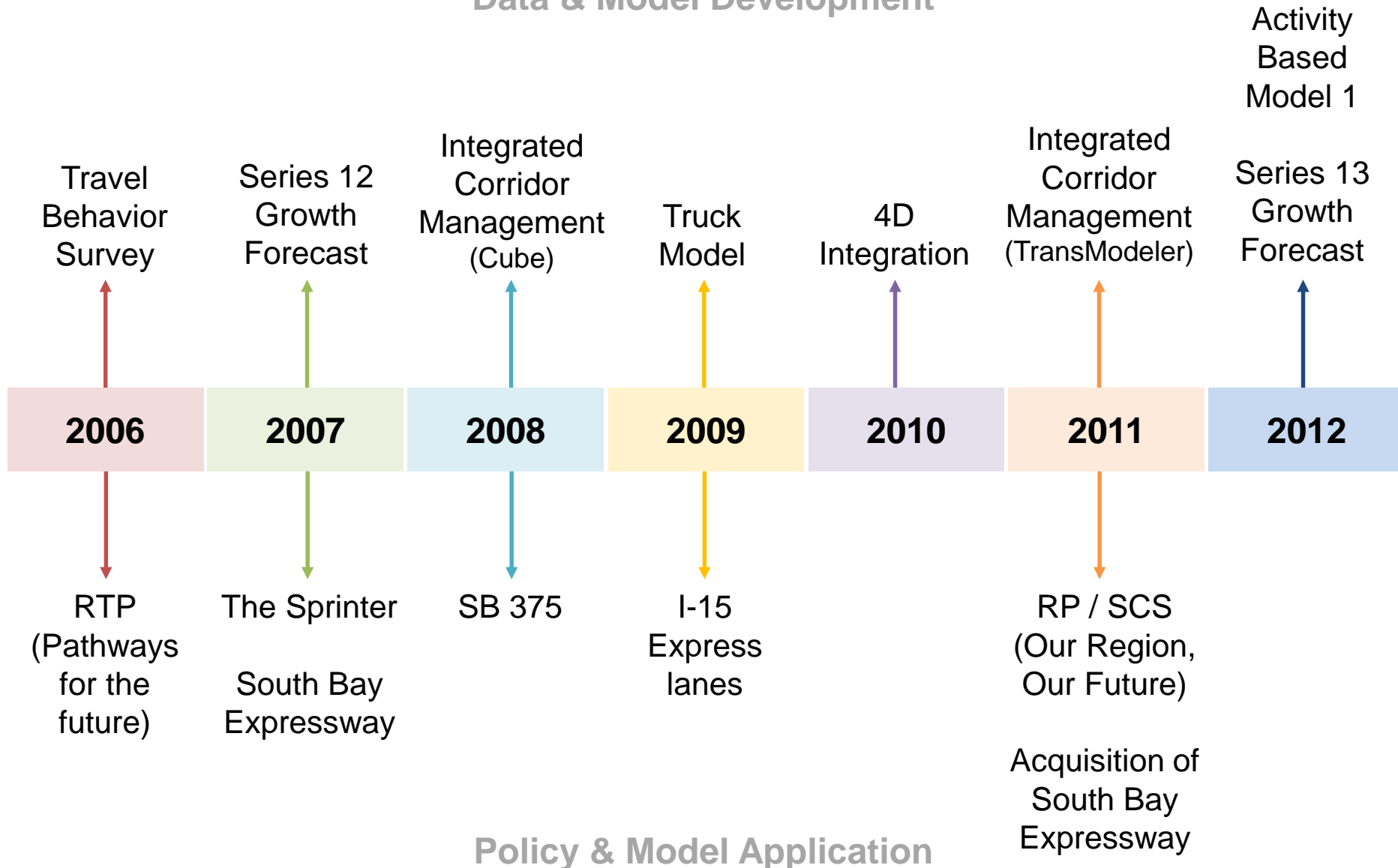
## Policy & Model Application

# Model Timeline

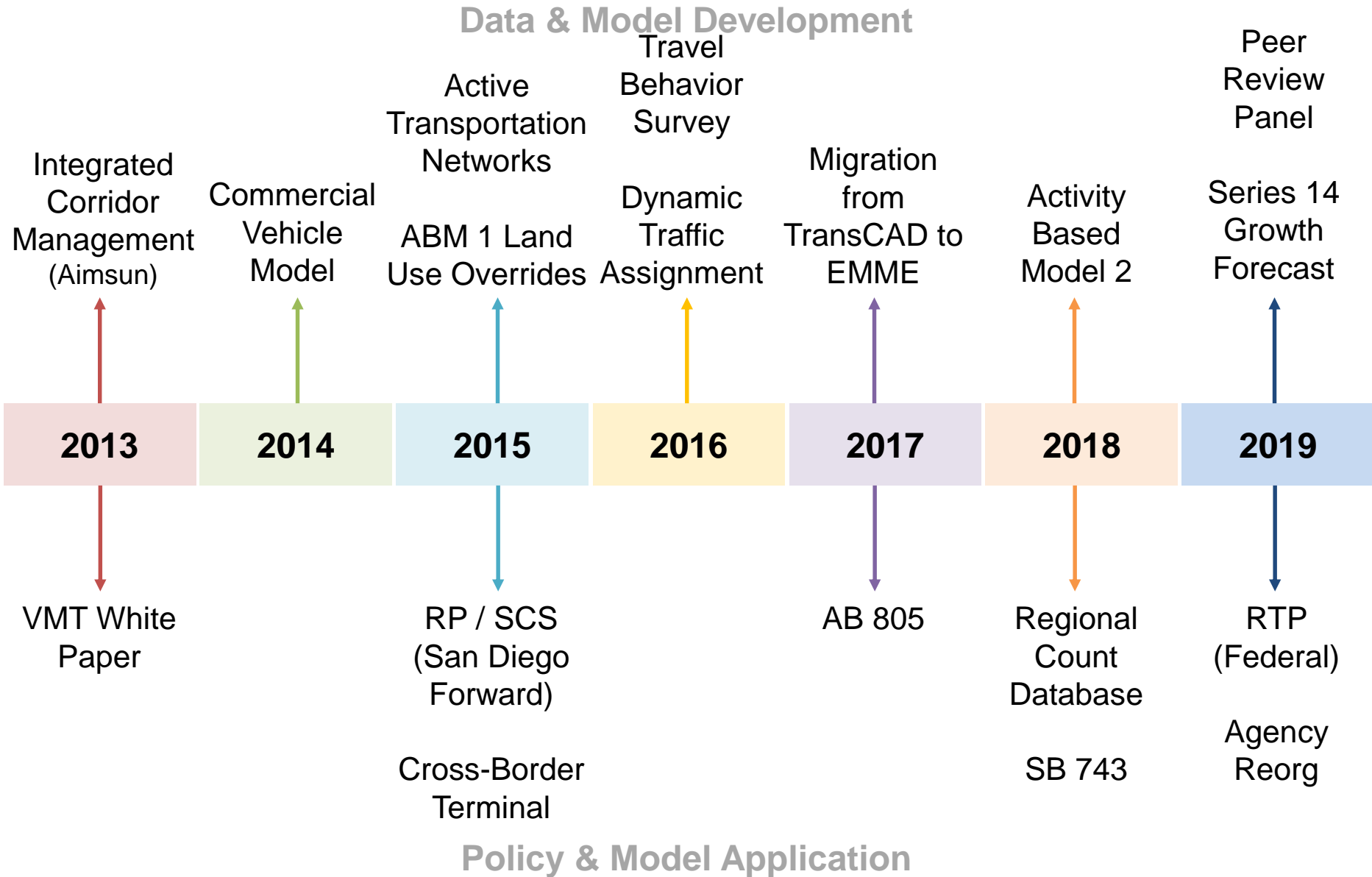


# Model Timeline

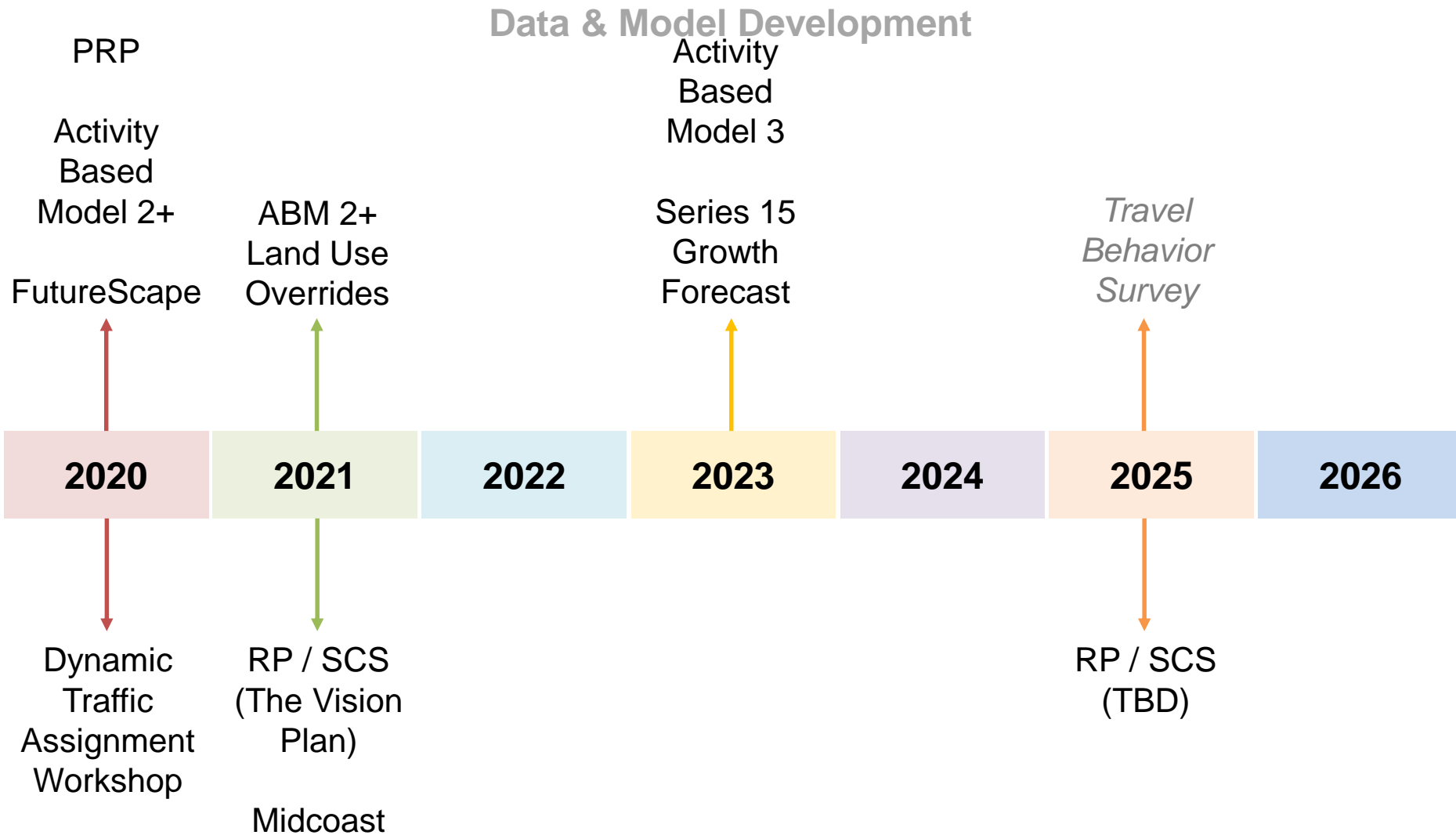
## Data & Model Development



# Model Timeline



# Model Timeline





# Dynamic Traffic Assignment (DTA)

- Introduction to the San Diego DTA Webinar
  - What is DTA
  - Coverage: Area & Time
  - Devices
  - Demand
  - Usage of the model
    - Micro-level use case
    - Meso-level use case
  - Things to know
- Hands on Training Workshop
  - How to use the model
  - How to update the model
  - Modeling exercises



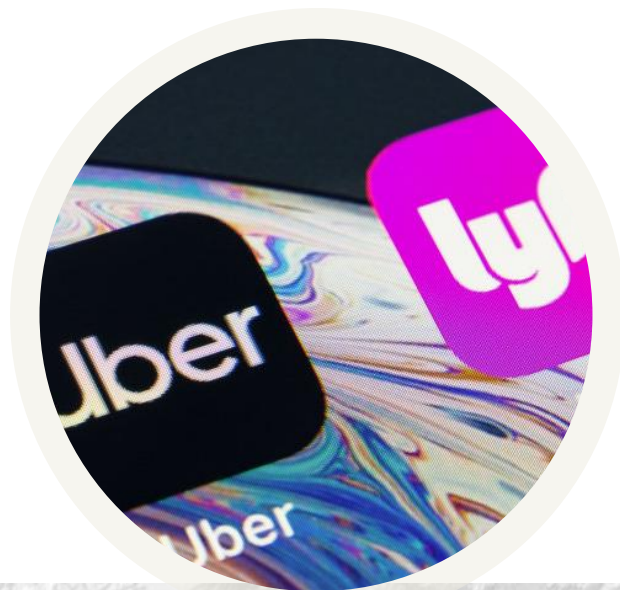
# Surveys in 2019

- Statewide Ride-hailing survey (SB1 TNC Survey)
  - Grant-funded project from Caltrans
  - “The Future of Mobility: Analyzing the impact of ride-hailing on California communities”
- 2019 Cross-Border Survey
  - Funded by SANDAG
  - Continuous study of traffic conditions at the US-Mexican Border

# Statewide Ride-Hailing Survey

- Study Overview

- Objective: Inform long-range transportation and land use planning, investment decisions and policies
- Sample Target: 12,500 or more complete travel days and 1,350 TNC samples
- rMove smartphone app: ask *who, why, how, when and where*
- Validated technology and project methodology

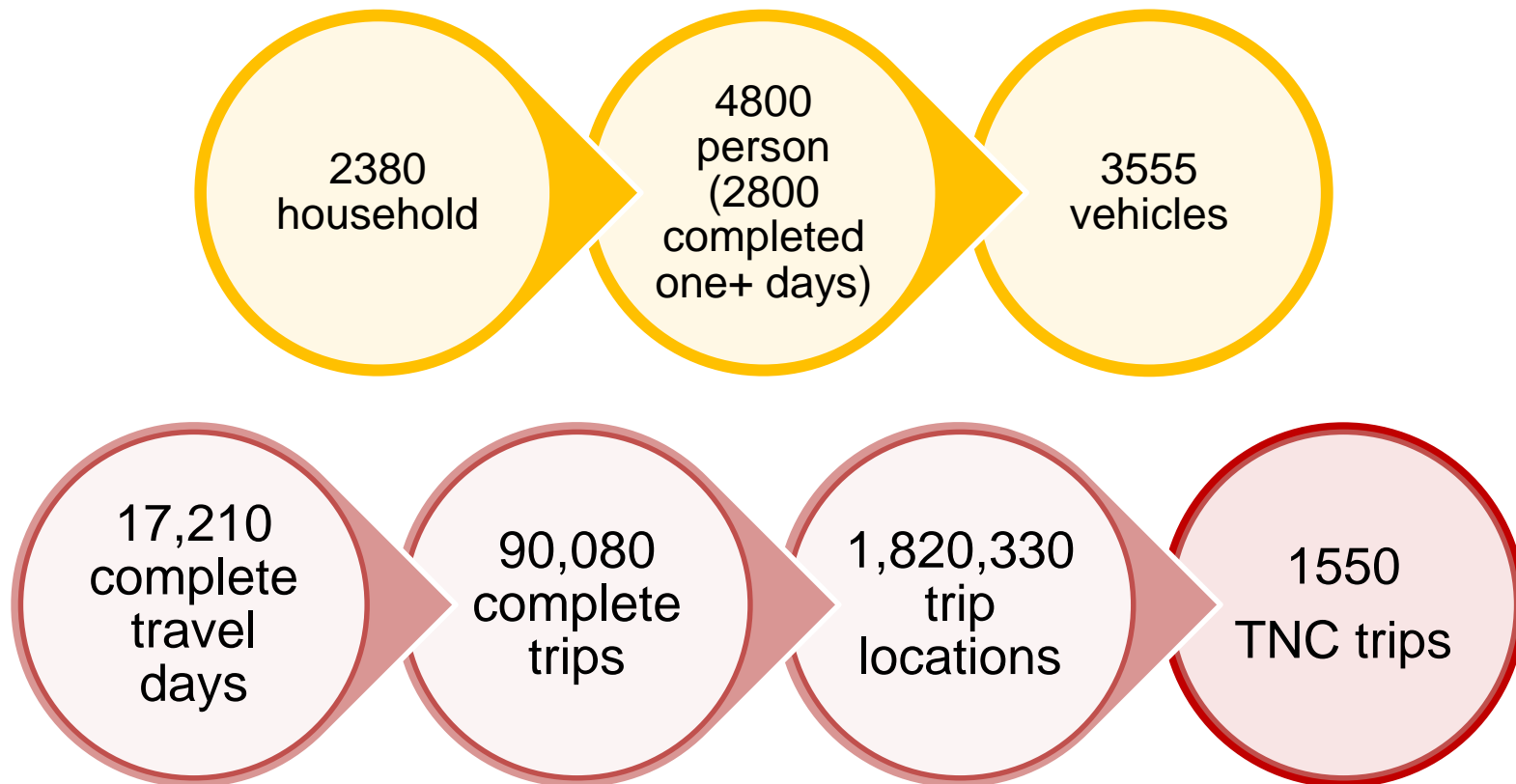


# Statewide Ride-Hailing Survey

- Survey Methodology
  - Travel data for a one-week period
  - Contents
    - “Signup Survey” – household composition, demographics and vehicles
    - Trip surveys after each trip
    - Daily surveys after each travel day
  - “Complete” participants
    - Demographic sufficient
    - Complete surveys for one or more days

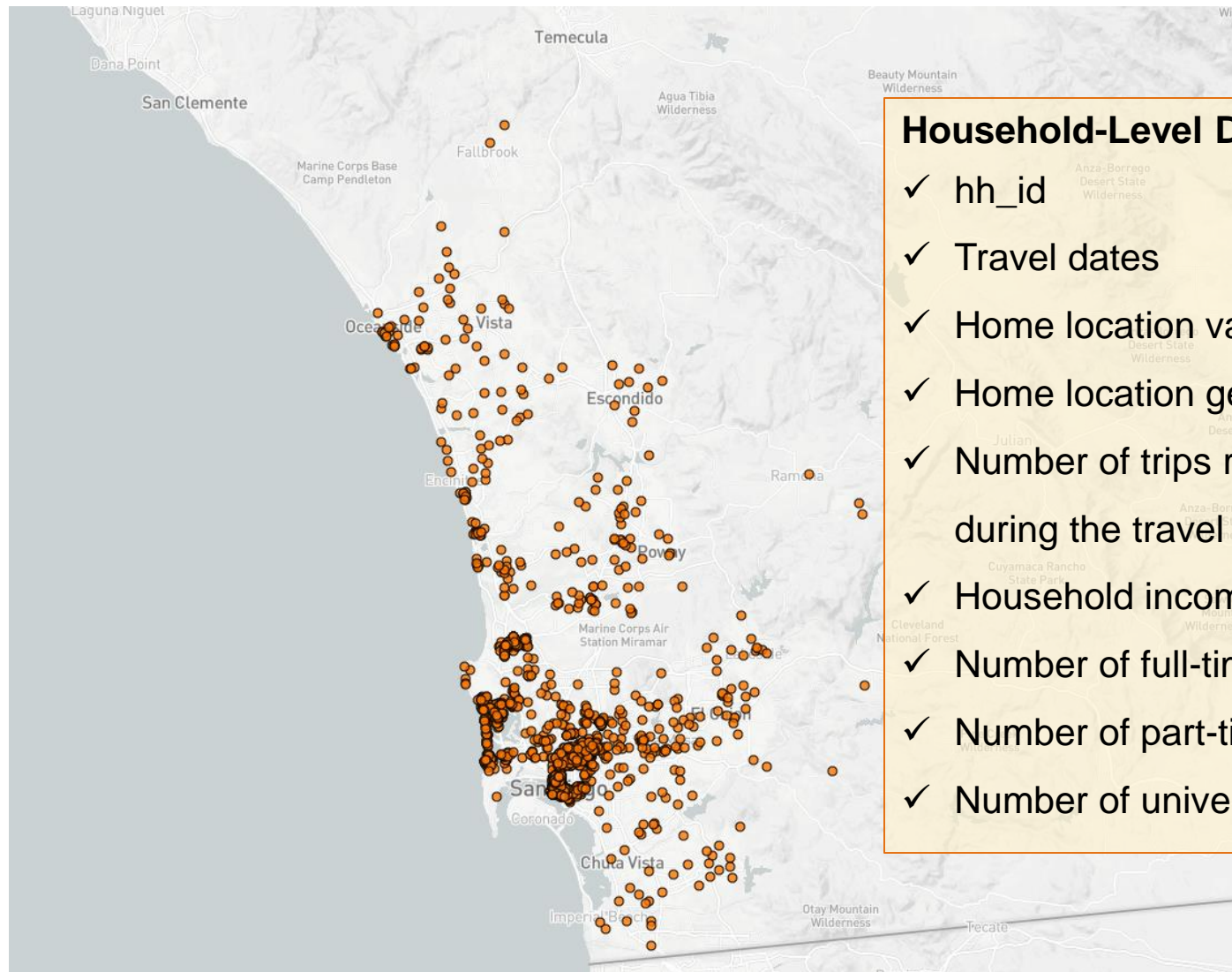
# Statewide Ride-Hailing Survey

- Data Collection – San Diego County



# Statewide Ride-Hailing Survey

## Statewide Ride-hailing Survey (SB1 TNC Survey) – Household



### Household-Level Data Table Description

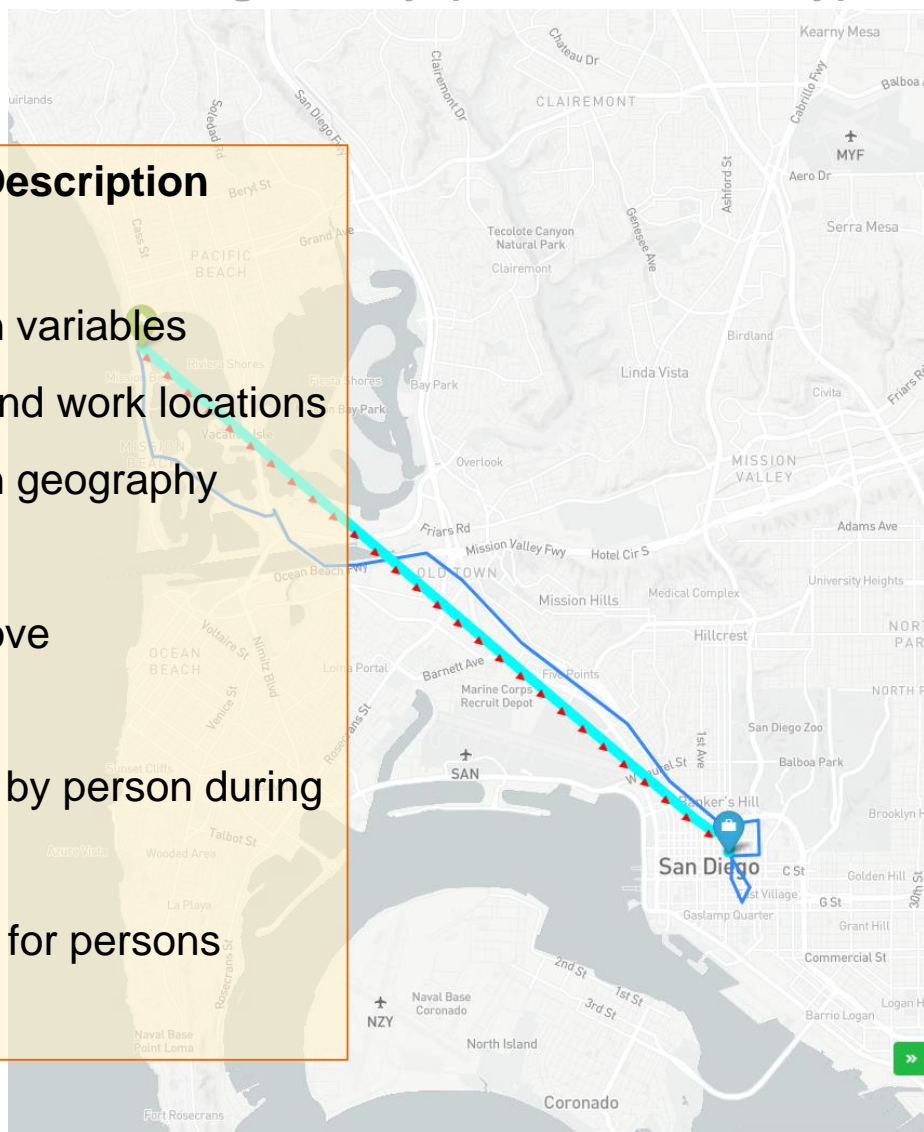
- ✓ hh\_id
- ✓ Travel dates
- ✓ Home location variables
- ✓ Home location geography variables
- ✓ Number of trips reported by household during the travel periods
- ✓ Household income variables
- ✓ Number of full-time workers
- ✓ Number of part-time workers
- ✓ Number of university students

# Statewide Ride-Hailing Survey

## Statewide Ride-hailing Survey (SB1 TNC Survey) – Person

### Person-Level Data Table Description

- ✓ person\_id
- ✓ School and work location variables
- ✓ Missing derived school and work locations
- ✓ School and work location geography variables
- ✓ Date and time active rMove
- ✓ Shared mobility use
- ✓ Number of trips reported by person during the travel period
- ✓ Number of complete day for persons during the travel period



**TNC Survey 2019**

[What is this?](#) [Learn More](#)

**CHOOSE HOUSEHOLD ID:**  
195000093

**CHOOSE PERSON:**  
1  
2  
3

**CHOOSE TRAVEL DAY(S):**  
2019-06-04  
2019-06-05  
2019-06-06  
2019-06-07

**CHOOSE TRIP(S):**  
 SHOW ONLY COMPLETE TRIPS  
TRIPNUM, OPURP, DPURP, MODE, DEPTM, ARRTM  
1, Home, Work, Car, 07:05:50, 07:22:43  
2, Work, Meal, Walk, 17:56:01, 17:59:03  
3, Meal, SocRec, Walk, 18:37:43, 18:40:49  
4, SocRec, Home, Car, 21:30:01, 21:52:17

**SANDAG**

# Statewide Ride-Hailing Survey

## Statewide Ride-hailing Survey (SB1 TNC Survey) – Vehicle

vehicle_id	sample_segment	sample_stratum	make	model	year	vehicle_name	home_park_pass	home_park_cost	home_park_amour
195000057101	3	12	BMW	3 series	2007.0	2007 BMW 3 series	2	995	
195000057102	3	12	Ford	Focus	2010.0	2010 Ford Focus	995	995	
195000093101	3	11	Honda	Accord	2009.0	2009 Honda Accord	2	995	
195000093102	3	11	Toyota	Camry	2010.0	2010 Toyota Camry	2	995	
195000109101	3	14	Toyota	Camry	2009.0	2009 Toyota Camry	2	995	

### Vehicle-Level Data Table Description

- ✓ Vehicle\_id
- ✓ Vehicle year, make, and model
- ✓ Other vehicle information (primary vehicle)
  - Home park time and cost
  - Toll transponder availability
  - Fuel



# Statewide Ride-Hailing Survey

## Statewide Ride-hailing Survey (SB1 TNC Survey) – Day

**TNC Survey 2019**

What is this? Learn More

**CHOOSE HOUSEHOLD ID:**  
195000093

**CHOOSE PERSON:**  
1  
2  
3

**CHOOSE TRAVEL DAY(S):**  
2019-06-04  
2019-06-05  
2019-06-06  
2019-06-07

**CHOOSE TRIP(S):**  
 SHOW ONLY COMPLETE TRIPS  
TRIPNUM, OPURP, DPURP, MODE, DEPTM, ARRTM  
1, Home, Work, Car, 07:05:50, 07:22:43  
2, Work, Meal, Walk, 17:56:01, 17:59:03  
3, Meal, SocRec, Walk, 18:37:43, 18:40:49  
4, SocRec, Home, Car, 21:30:01, 21:52:17

**TNC Survey 2019**

What is this? Learn More

**CHOOSE HOUSEHOLD ID:**  
195000093

**CHOOSE PERSON:**  
1  
2  
3

**CHOOSE TRAVEL DAY(S):**  
2019-06-07  
2019-06-08  
2019-06-09  
2019-06-10

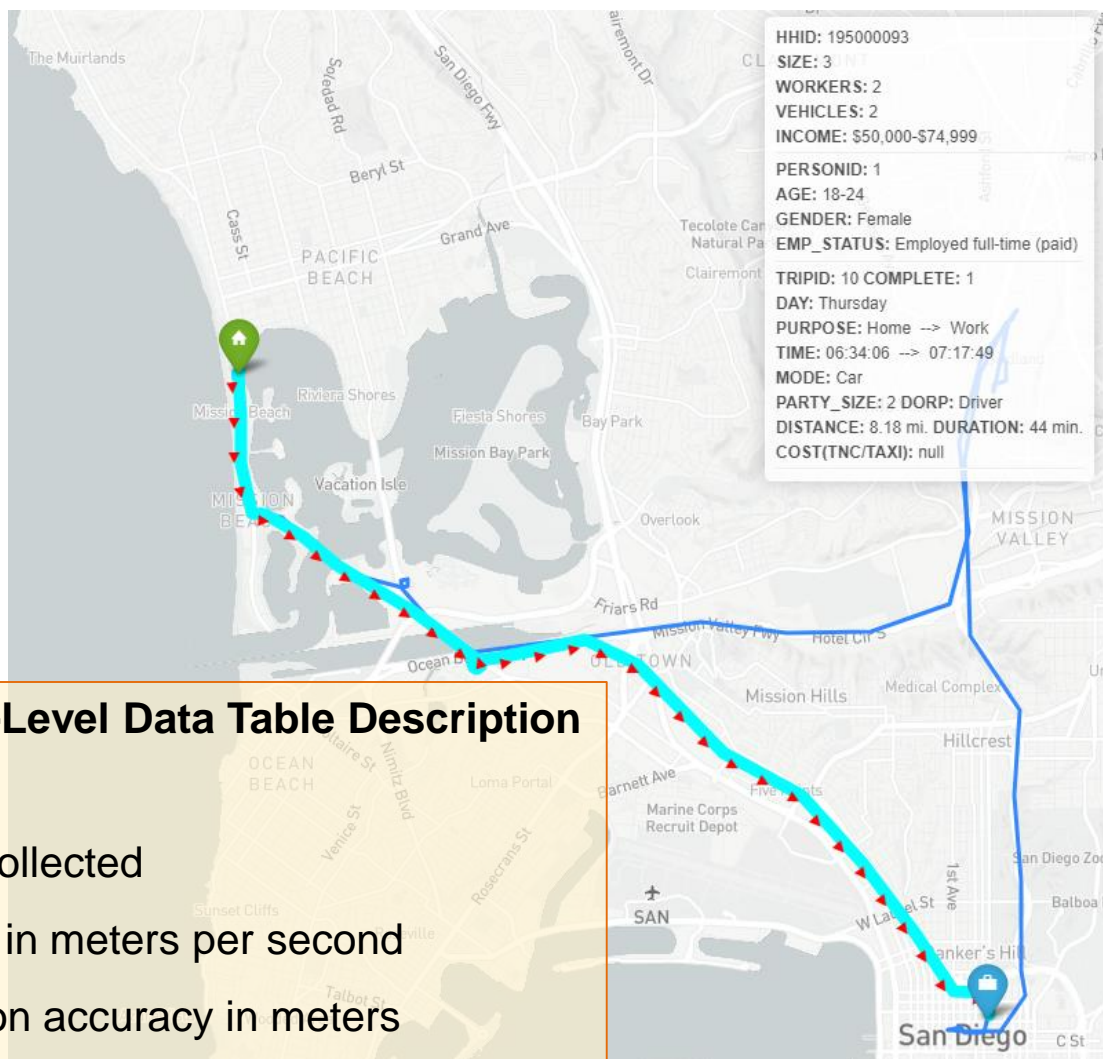
**CHOOSE TRIP(S):**  
 SHOW ONLY COMPLETE TRIPS  
TRIPNUM, OPURP, DPURP, MODE, DEPTM, ARRTM  
40, Home, Work, Car, 07:09:16, 07:30:52  
41, Work, Meal, Walk, 11:44:47, 11:52:37  
42, Meal, Work, Walk, 11:56:38, 12:40:17  
43, Work, Home, Car, 17:41:24, 18:07:21

### Day-Level Data Table Description

- ✓ Person\_id + Day\_num
- ✓ Number of total trips
- ✓ Reason didn't travel on travel date
- ✓ Day is complete
- ✓ Number of trips reported by person on travel date

# Statewide Ride-Hailing Survey

## Statewide Ride-hailing Survey (SB1 TNC Survey) – Location



### TNC Survey 2019

[What is this?](#) [Learn More](#)

CHOOSE HOUSEHOLD ID:  
195000093

CHOOSE PERSON:  
1  
2  
3

CHOOSE TRAVEL DAY(S):  
2019-06-04  
2019-06-05  
2019-06-06  
2019-06-07

CHOOSE TRIP(S):  
 SHOW ONLY COMPLETE TRIPS

TRIPNUM	OPURP	DPURP	MODE	DEPTM	ARRTM
10	Home	Work	Car	06:34:06	07:17:49
11	Work	Work-related	Walk	07:36:51	07:45:37
12	Work-related	Work-related	undefined	11:04:16	11:05:05
13	Work-related	Work	Walk	11:09:59	11:10:25
14	Work	SocRec	Car	17:29:17	17:40:50
15	SocRec	Meal	Car	19:24:36	19:29:10
16	Meal	Home	Car	20:01:47	20:19:29

### Location-Level Data Table Description

- ✓ Trip\_id
- ✓ Time collected
- ✓ Speed in meters per second
- ✓ Location accuracy in meters
- ✓ Heading in degrees

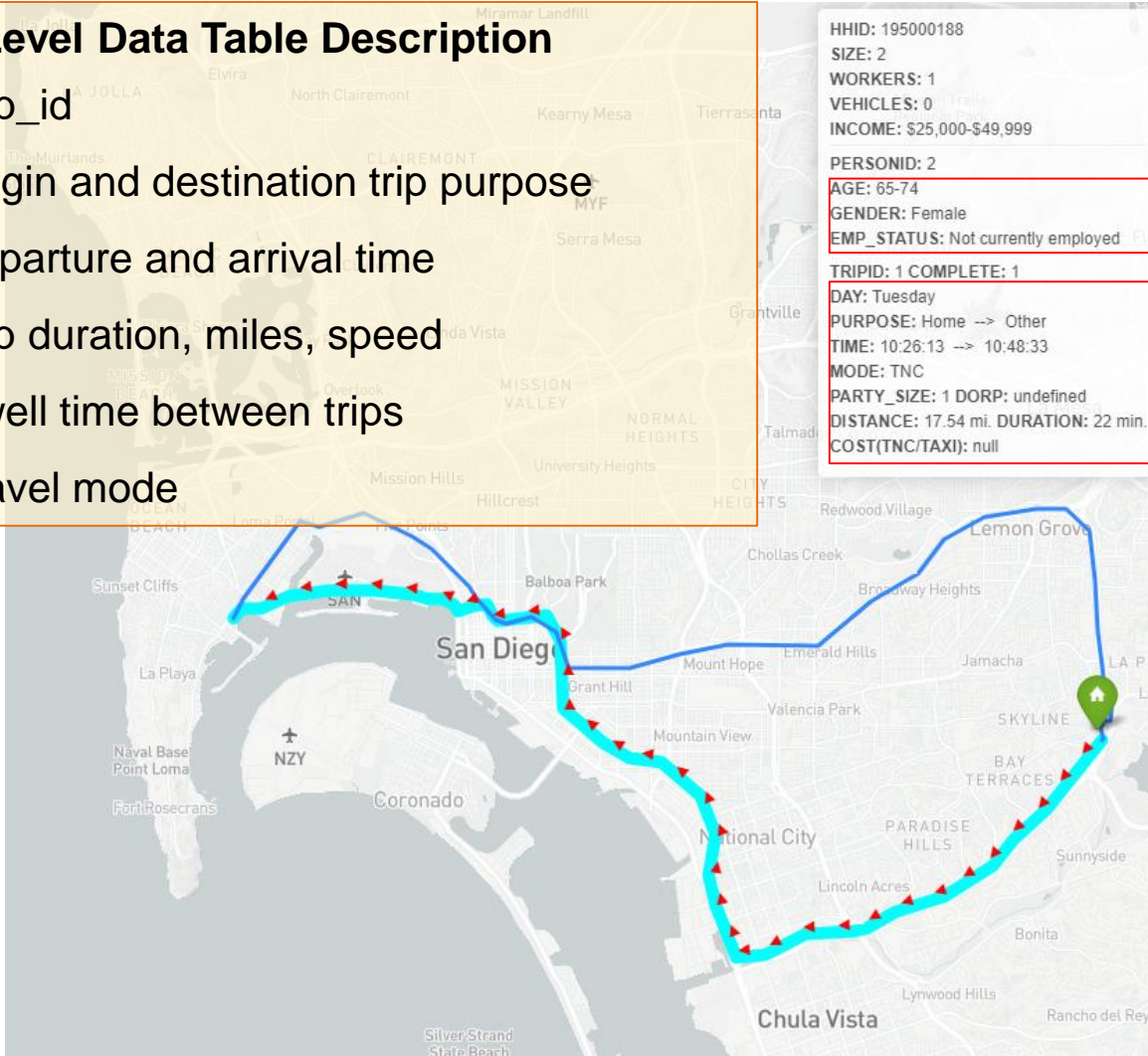
# Statewide Ride-Hailing Survey

## Statewide Ride-hailing Survey (SB1 TNC Survey) – Trip

### Trip-Level Data Table Description

- ✓ Trip\_id
- ✓ Origin and destination trip purpose
- ✓ Departure and arrival time
- ✓ Trip duration, miles, speed
- ✓ Dwell time between trips
- ✓ Travel mode

HHID: 195000188  
SIZE: 2  
WORKERS: 1  
VEHICLES: 0  
INCOME: \$25,000-\$49,999  
PERSONID: 2  
AGE: 65-74  
GENDER: Female  
EMP\_STATUS: Not currently employed  
TRIPID: 1 COMPLETE: 1  
DAY: Tuesday  
PURPOSE: Home --> Other  
TIME: 10:26:13 --> 10:48:33  
MODE: TNC  
PARTY\_SIZE: 1 DORP: undefined  
DISTANCE: 17.54 mi. DURATION: 22 min.  
COST(TNC/TAXI): null



### TNC Survey 2019

What is this?

Learn More

#### CHOOSE HOUSEHOLD ID:

195000188

#### CHOOSE PERSON:

1

2

#### CHOOSE TRAVEL DAY(S):

2019-06-04

2019-06-06

#### CHOOSE TRIP(S):

SHOW ONLY COMPLETE TRIPS

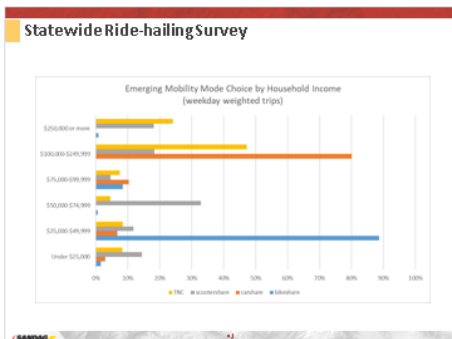
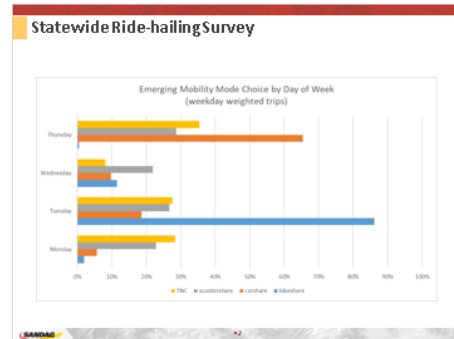
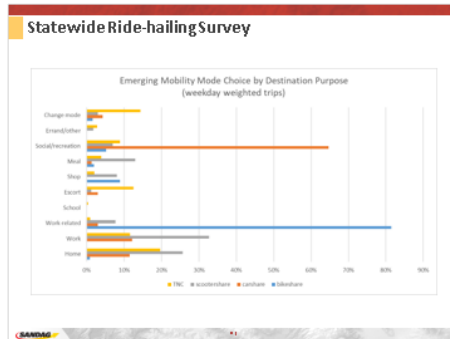
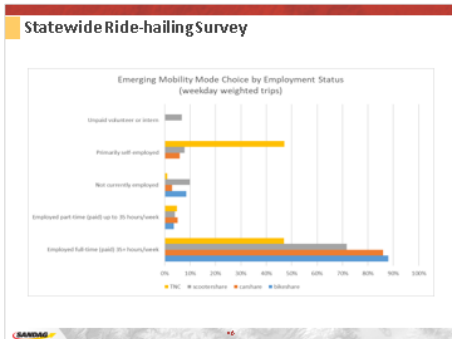
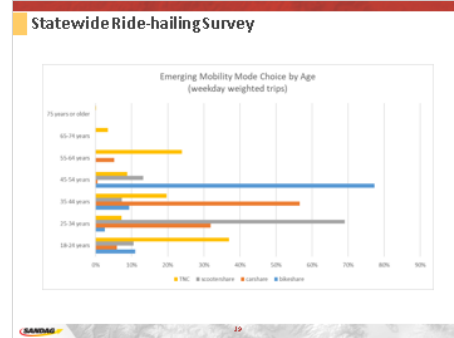
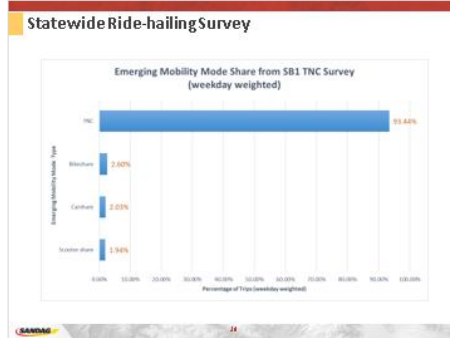
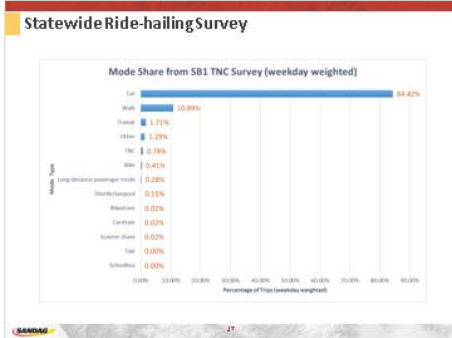
TRIPNUM, OPURP, DPURP, MODE, DEPTM, ARRTM

1, Home, Other, TNC, 10:26:13, 10:48:33

2, Other, Home, TNC, 11:55:36, 12:20:50

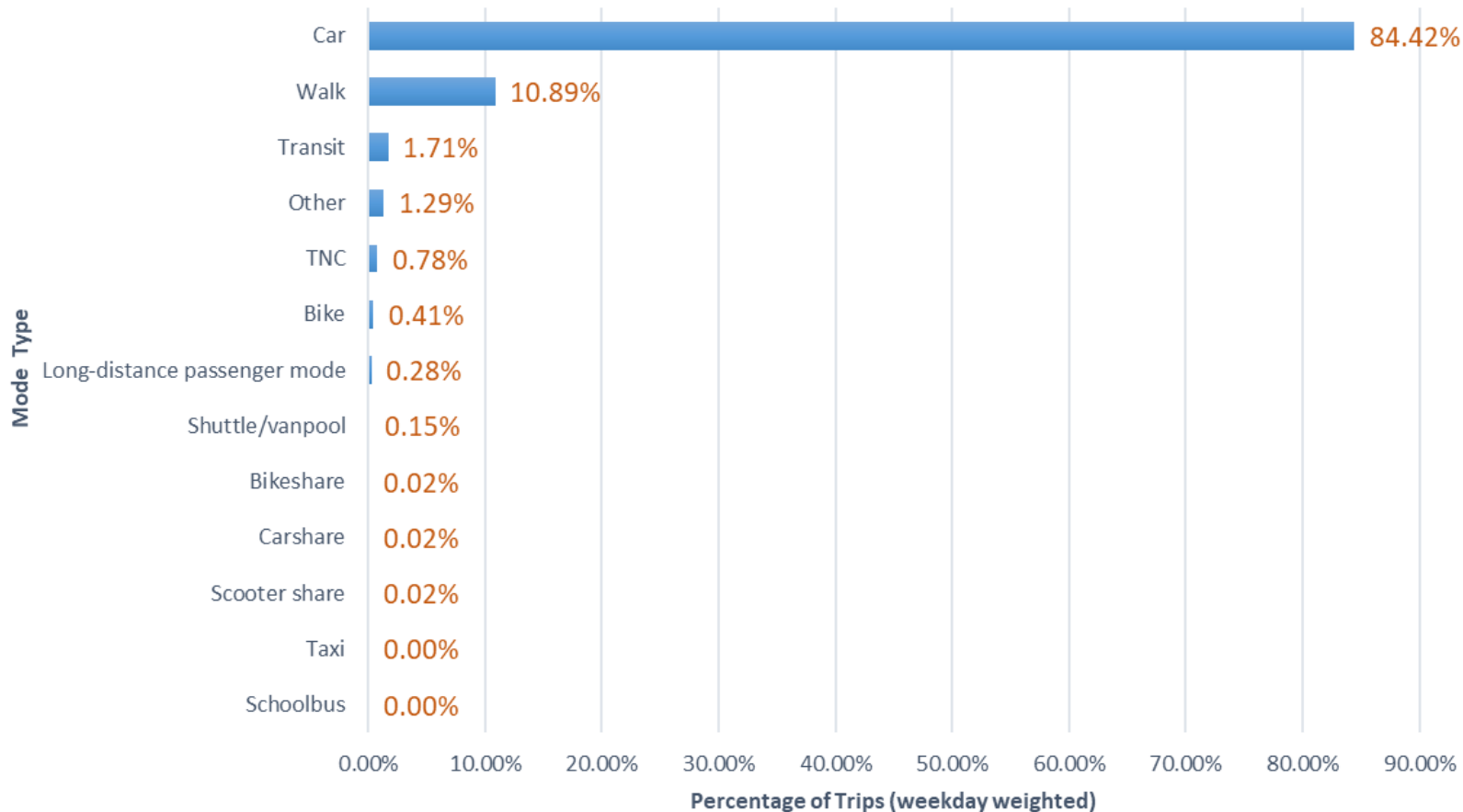
# Statewide Ride-hailing Survey

## Survey Data Statistical Summary – San Diego County

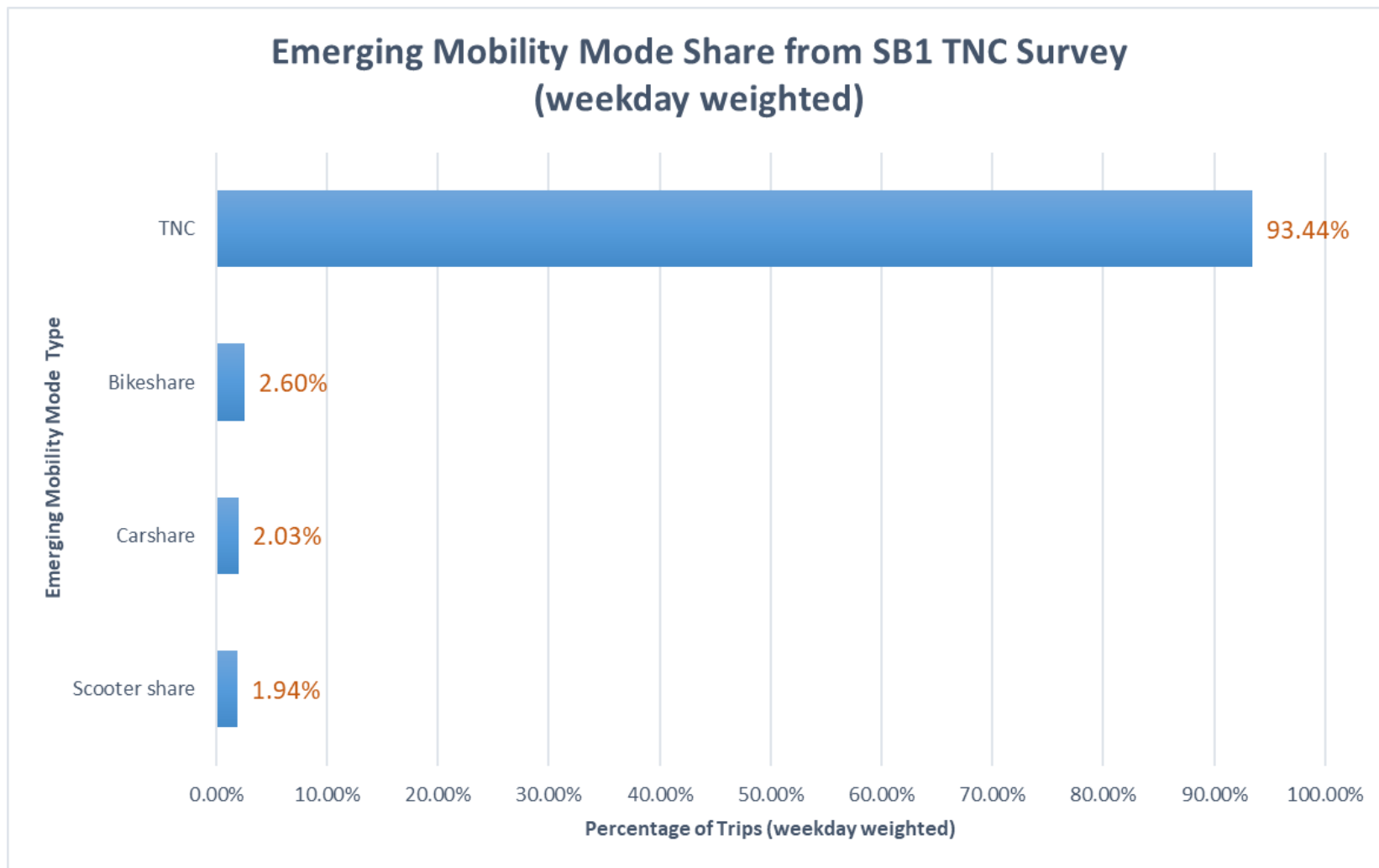


# Statewide Ride-hailing Survey

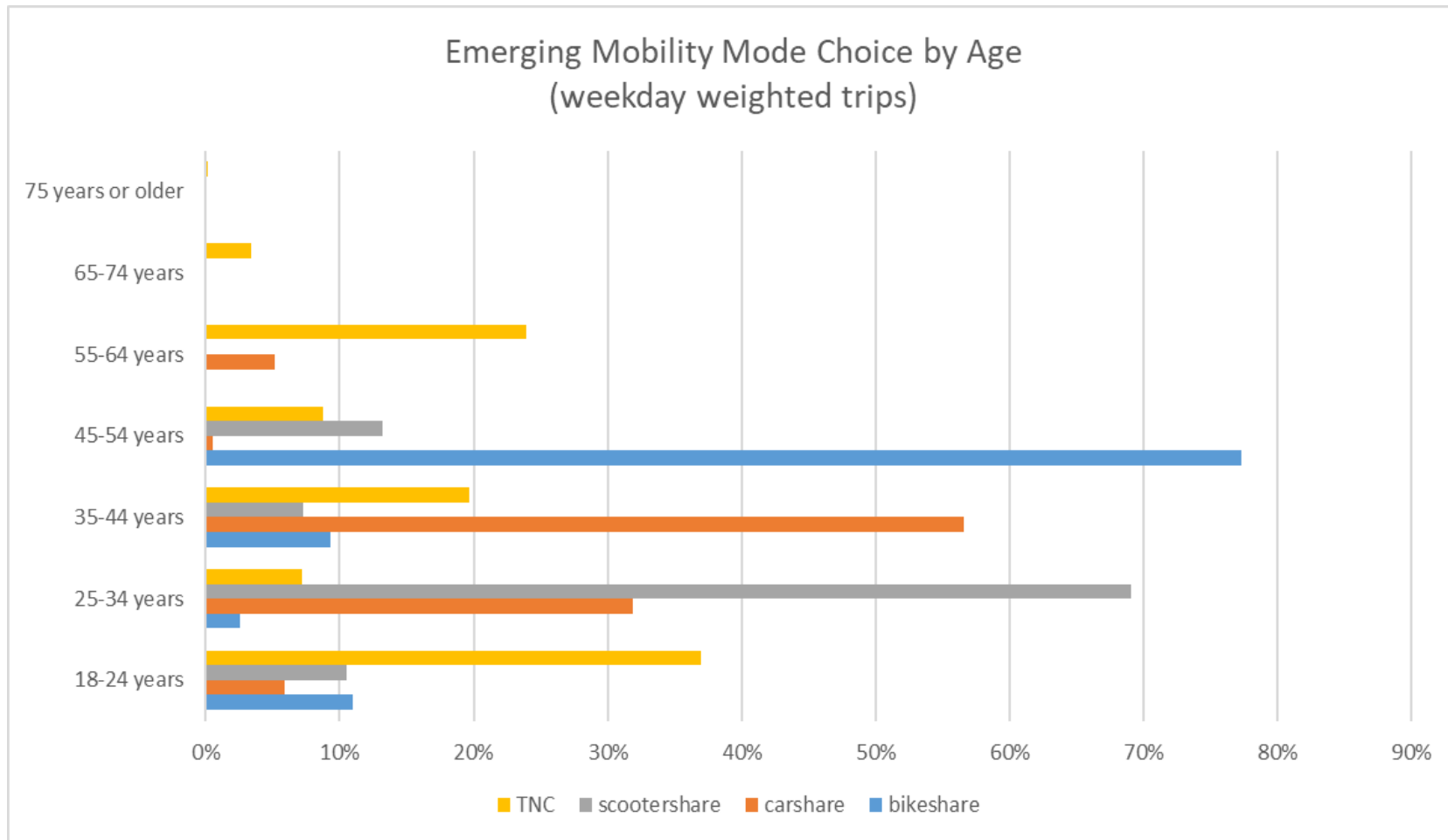
## Mode Share from SB1 TNC Survey (weekday weighted)



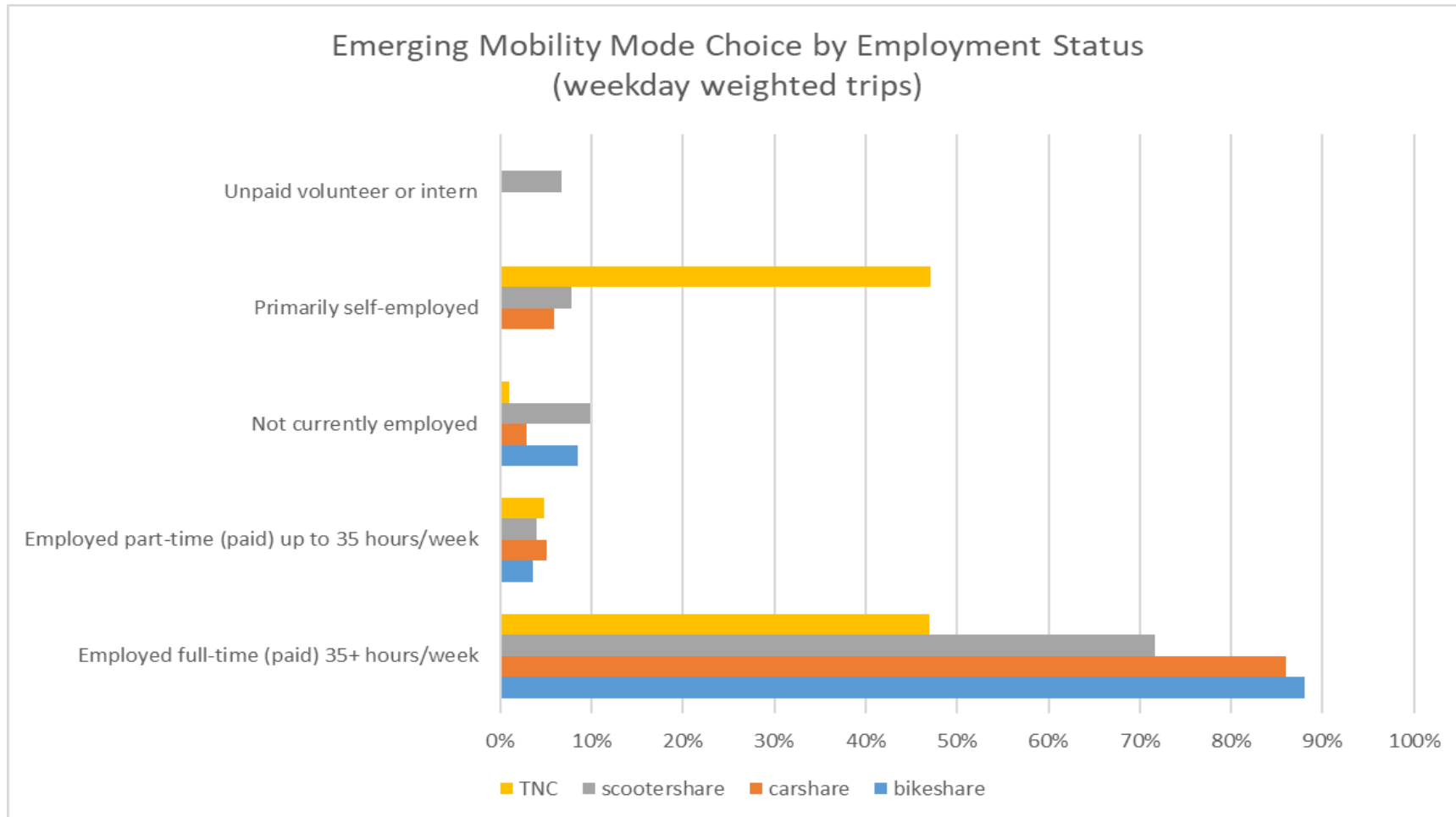
# Statewide Ride-hailing Survey



# Statewide Ride-hailing Survey

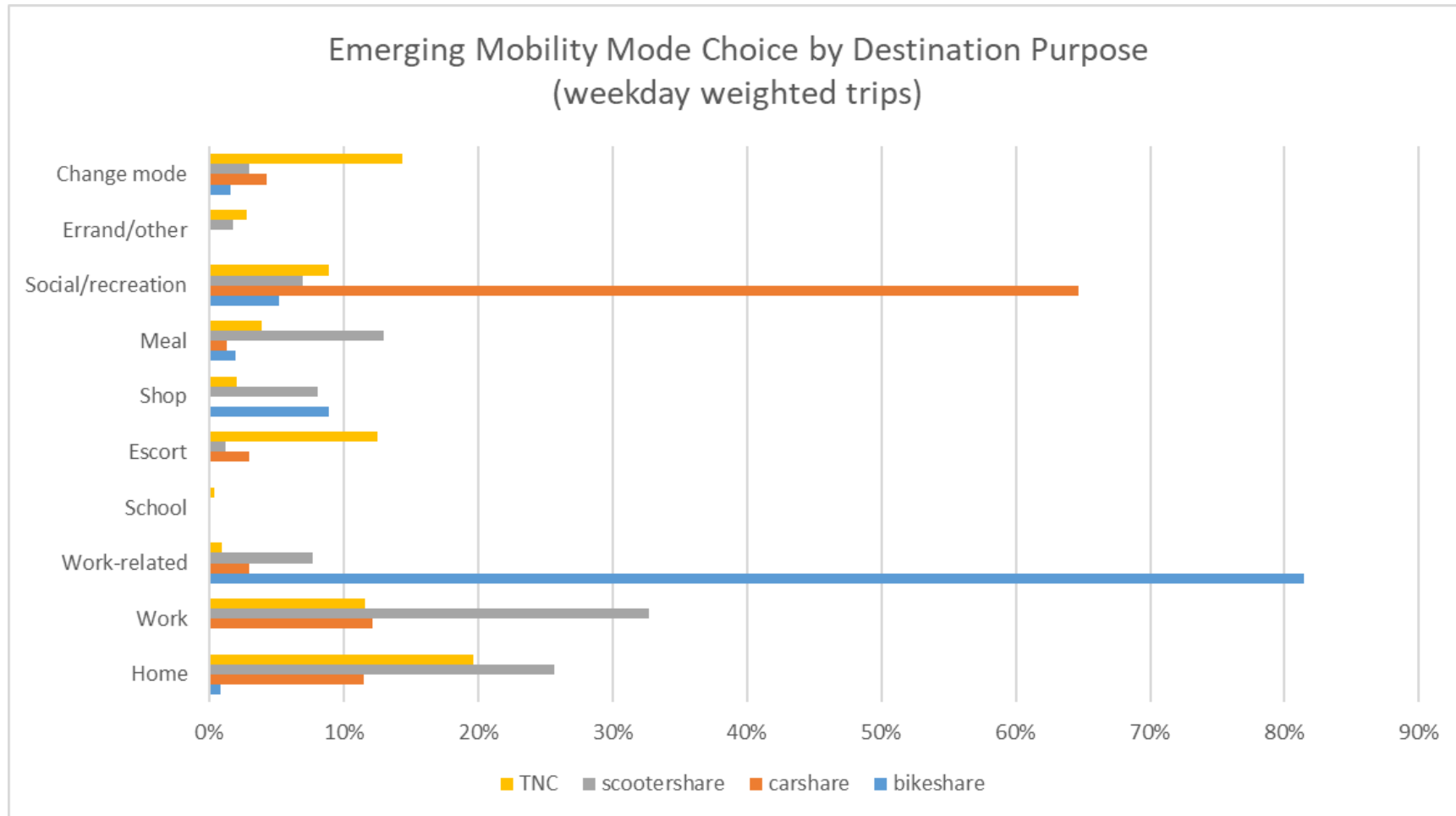


# Statewide Ride-hailing Survey

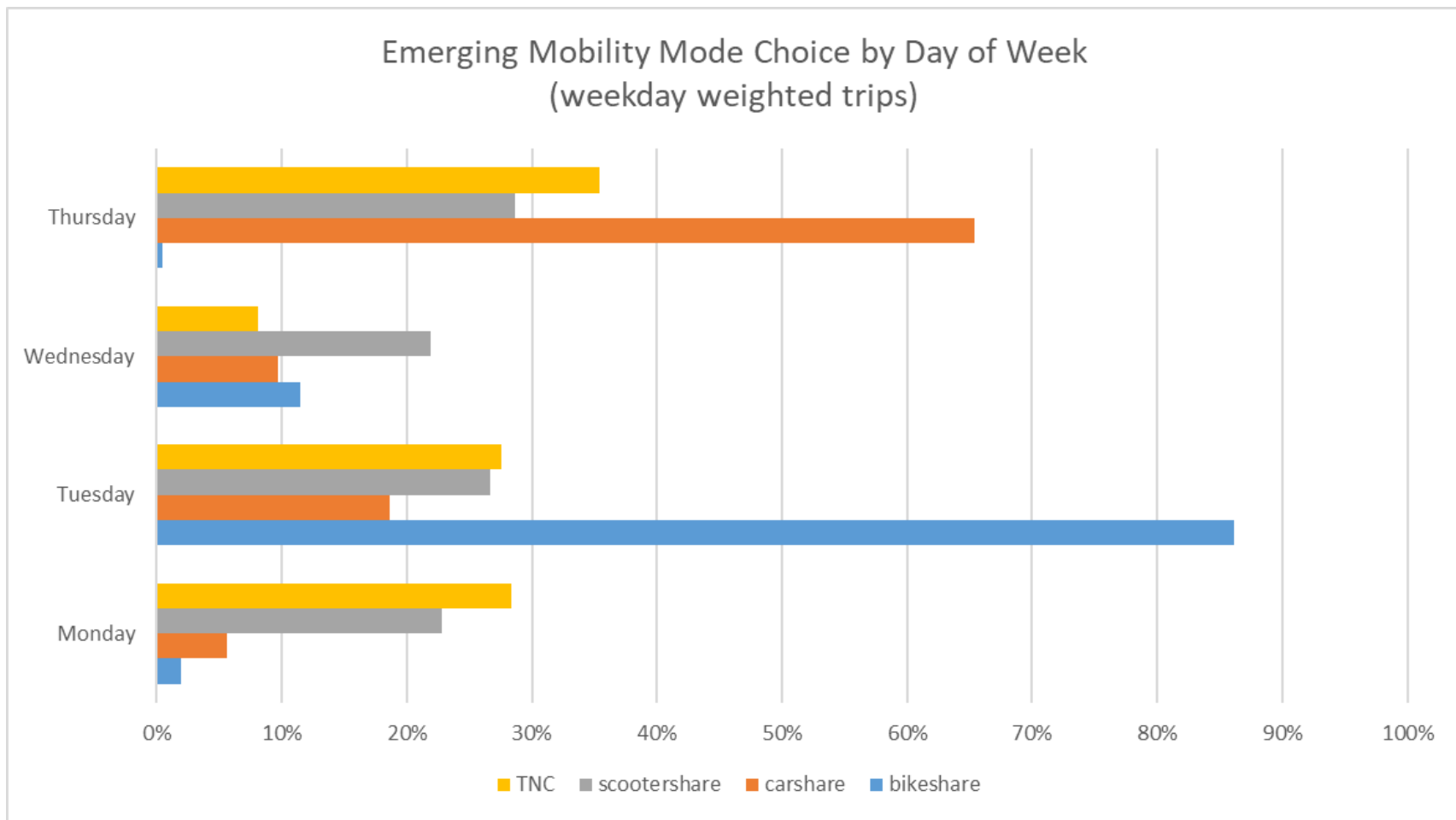




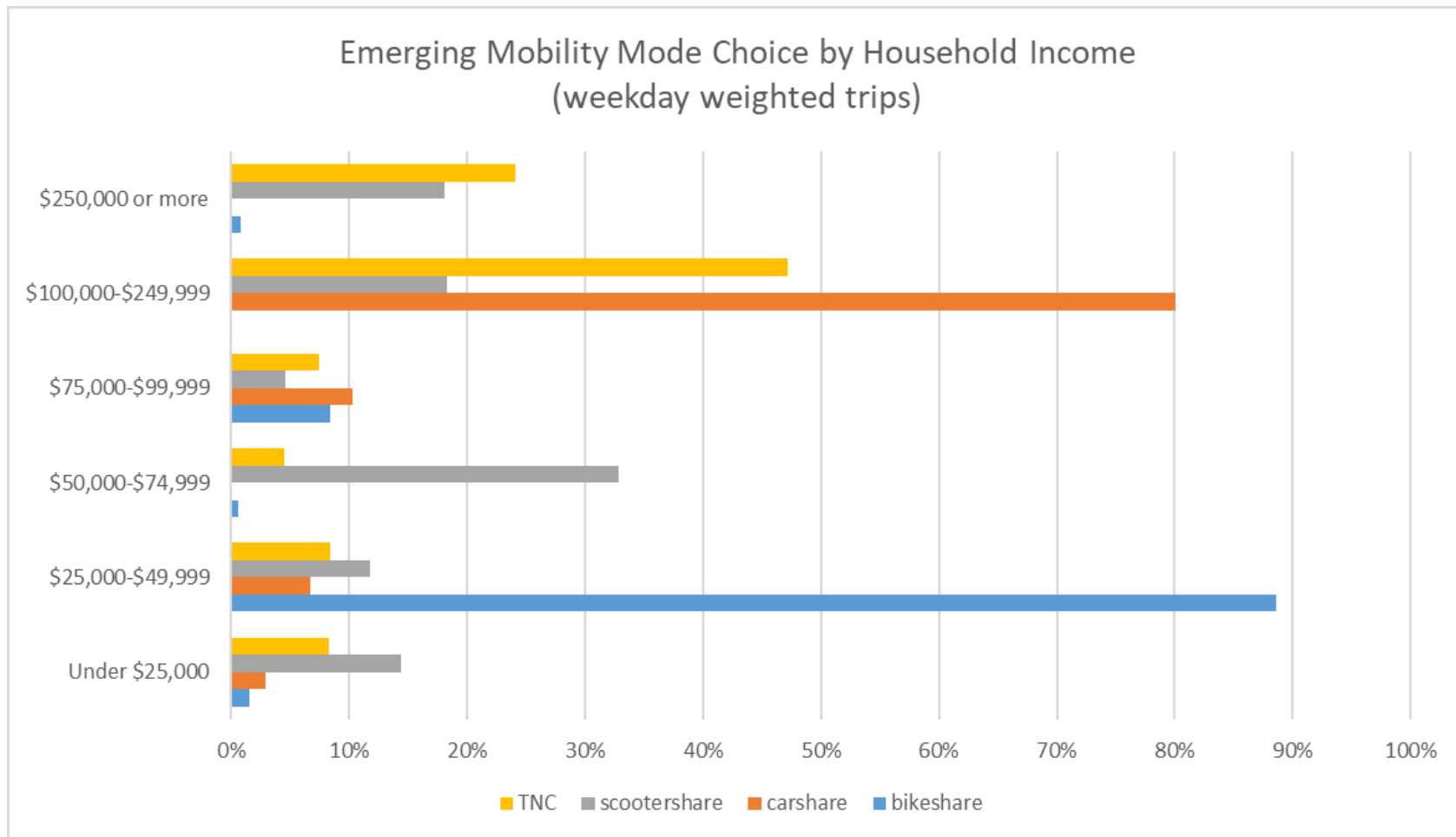
# Statewide Ride-hailing Survey



# Statewide Ride-hailing Survey



# Statewide Ride-hailing Survey



# 2019 Cross-Border Survey

- Project Overview
  - Update SANDAG's Activity Based Model
    - Northbound crossers
    - Trip purpose
  - Collect information on Value of Time for Otay Mesa East
  - Collect data at three POEs: San Ysidro, Otay Mesa and Tecate



# 2019 Cross-Border Survey

- Methodology and Sample Design
  - Cluster sampling
  - Distribution of crossings
  - Two-state collection design
  - Weekday vs. weekend interviewing



# 2019 Cross-Border Survey

## Pilot Survey Summary



- Attrition rate is slightly better than anticipated - 77% vs 80%
- Participation in the second interview (i.e., accepted a diary) was much lower than 2010 – 15% vs 19%

# 2019 Cross-Border Survey

- Adjustments made based on pre-test
  - Several individuals attempted to turn in their diary shortly after crossing the border
  - The laptops used by Flagship staff on the US side of the border for diary retrieval would not connect to the Internet
  - One individual attempted to turn in a fraudulent diary, claiming he had received it earlier in the week and was reporting for travel behavior from a prior day

# 2019 Cross-Border Survey

- 2019 Cross-Border Survey

## Timeline

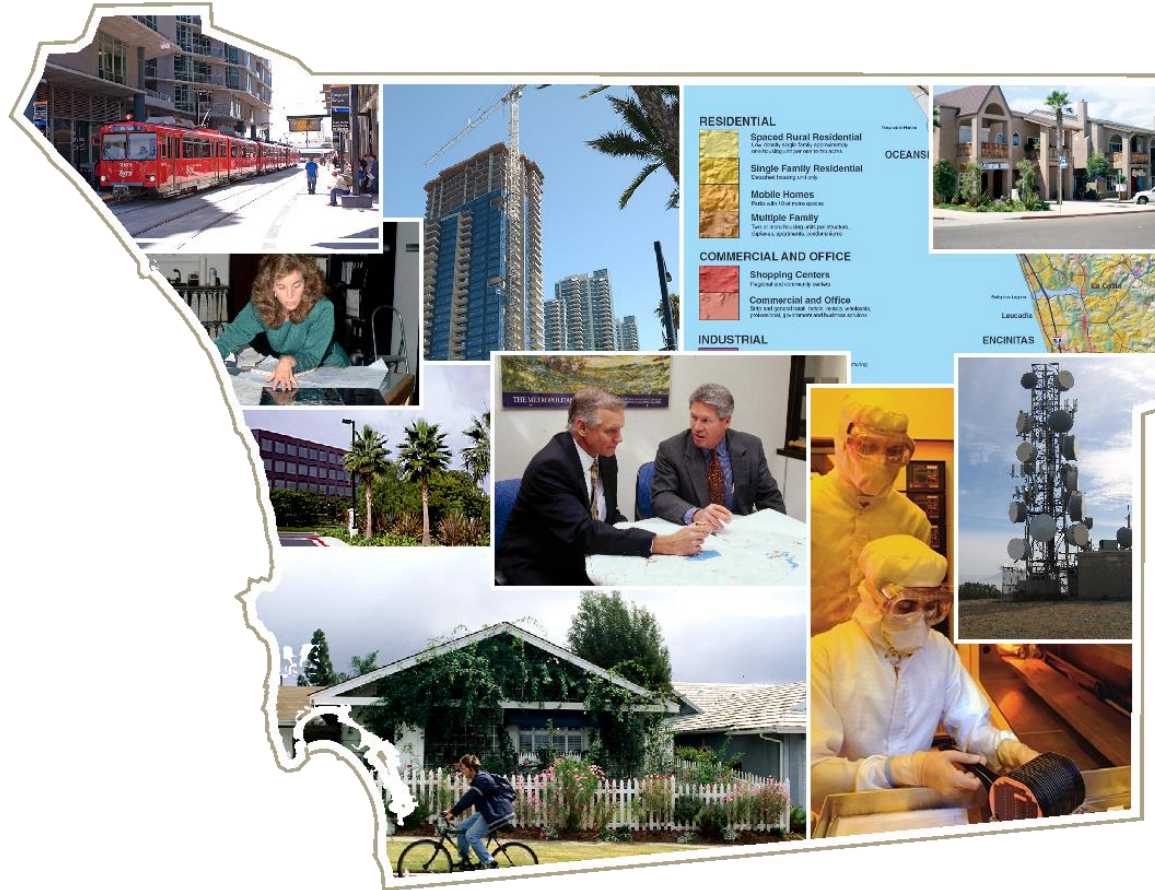
- September 2019: Kick-off meeting, finalize project management plan, sampling plan, survey instrument and travel diary
- October 2019 – January 2020: pilot test and survey at San Ysidro, Otay Mesa and Tecate
- Early spring 2020: clean and validate data
- Mid-spring: draft report
- Late-spring: final report





# Sketch Planning

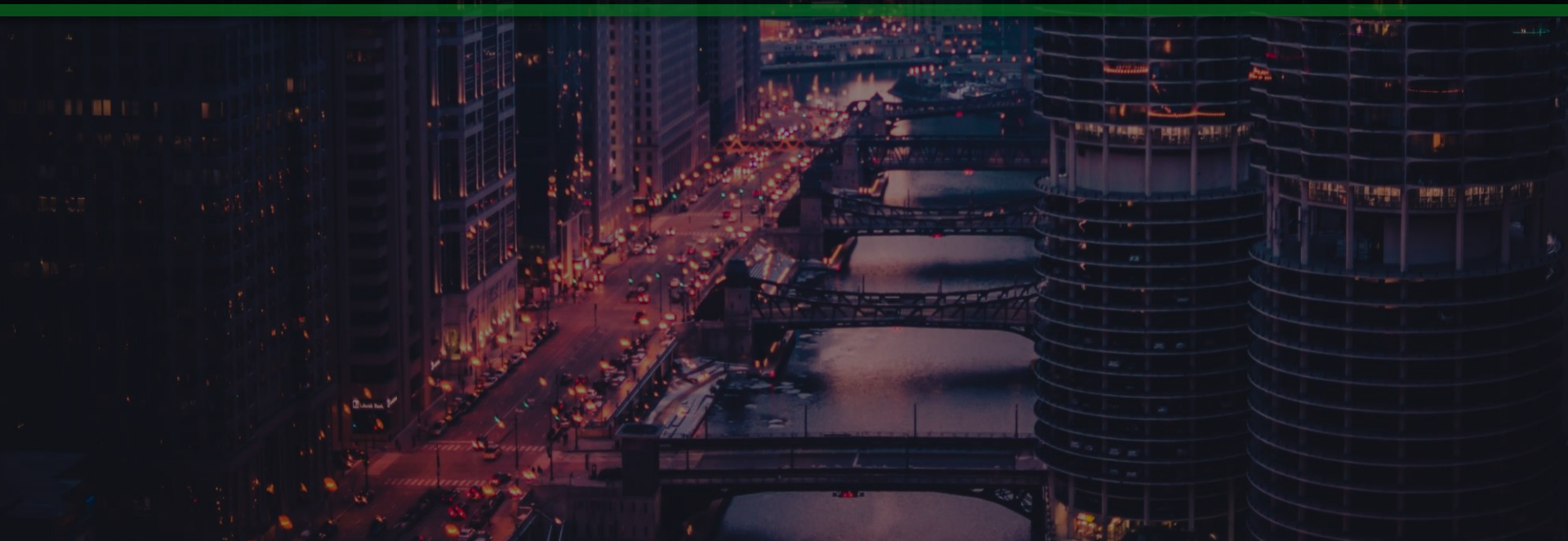
- FutureScape



Deloitte.

# FutureScape™

Experiment with the Future.



# FutureScape at SANDAG

## What is FutureScape?

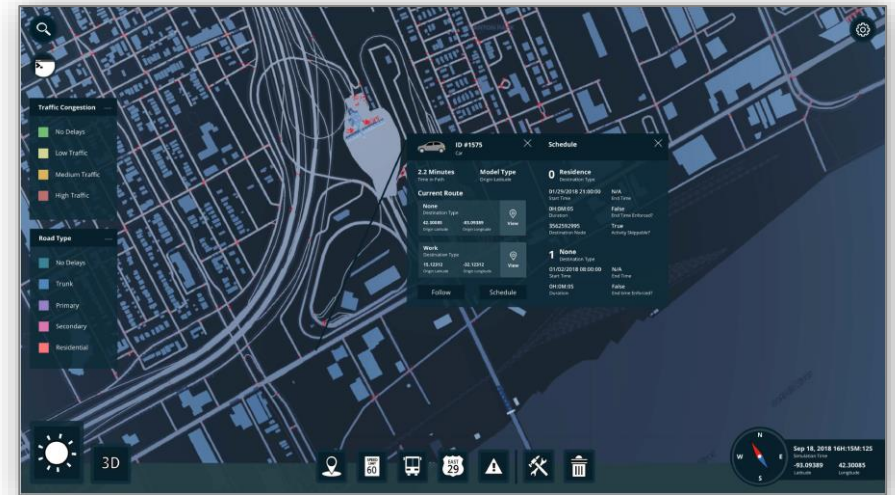
FutureScape™ is a **sketch planning and simulation platform** that creates digital replicas of large-scale systems such as entire cities or large industrial infrastructure to answer 'what if' questions about the future.

## How is it being used at ?

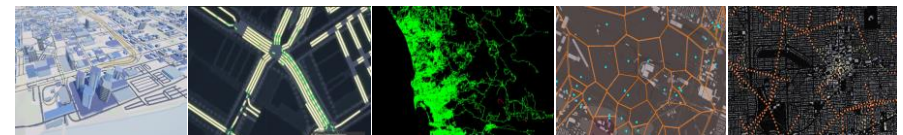
A digital twin was created for the San Diego region to **explore the impact of the Five Big Moves on VMT and Mode Choice** using logic from the SANDAG Activity Based Model (ABM).

This tool is intended to complement the ABM by providing (1) a more agile means to assess impact of the Moves within comparable/ reasonable bounds of the ABM, and (2) a visual and dynamic interface for SANDAG users.

## Transportation Network/User Interface

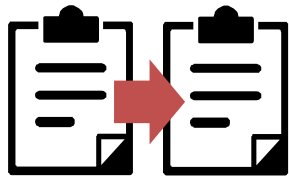


Buildings      Lanes      Roads      Nodes      Power Network

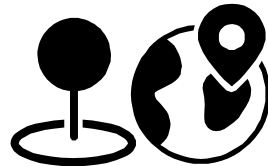


# Methodology – Data Ingestion

**Convert MGRA location field into latitude and longitude coordinate positions** via building centroid points within each MGRA. Home and work locations for each user are held consistent.



**Read in the ABM trip lists as provided,** merging the joint and individual lists together

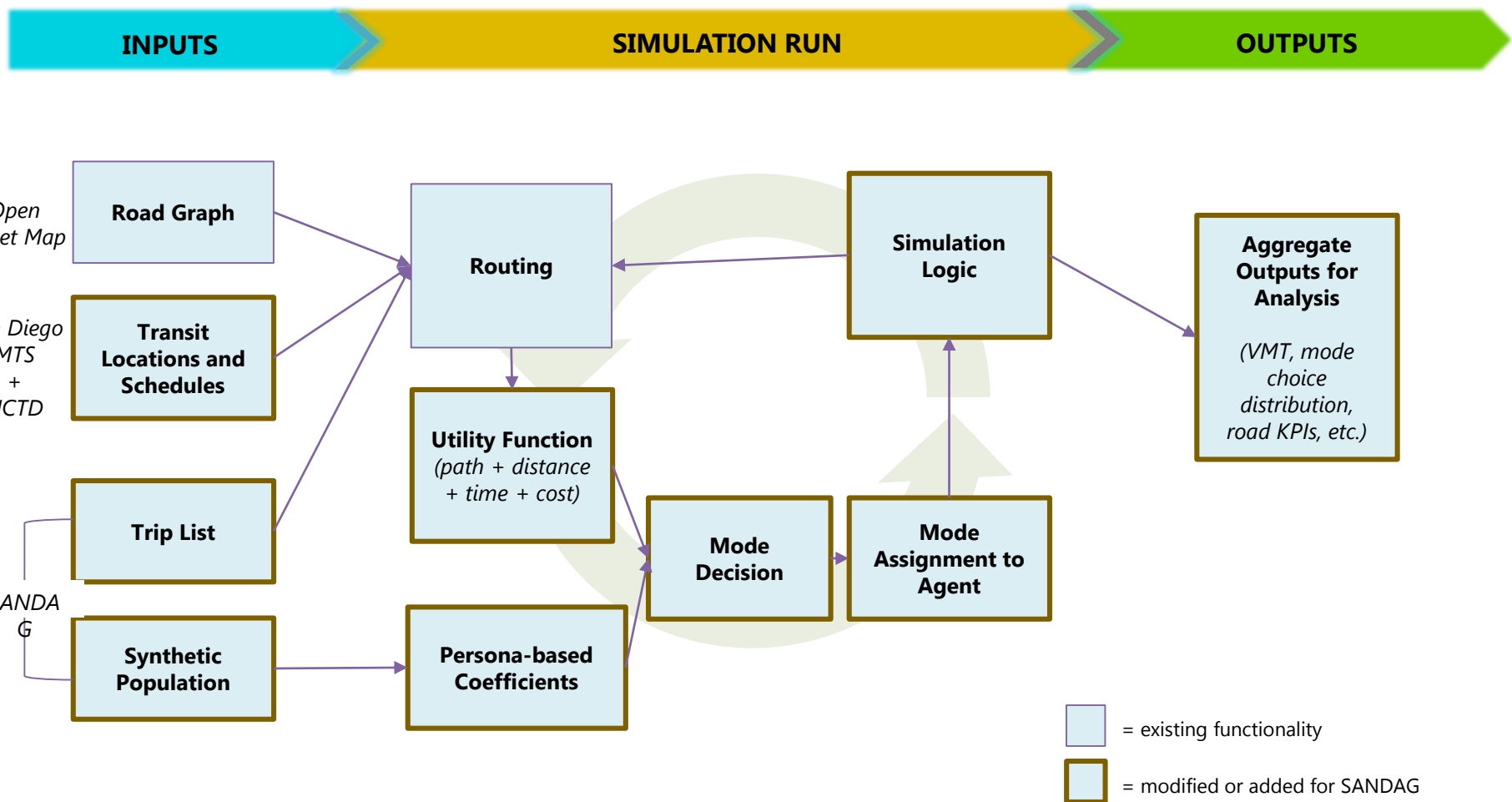


**Convert time bin field into real times** by sampling from a bounded uniform distribution. We ensure that activity chronology is maintained at the person level and that joint trips occur at the same time for co-travelers.

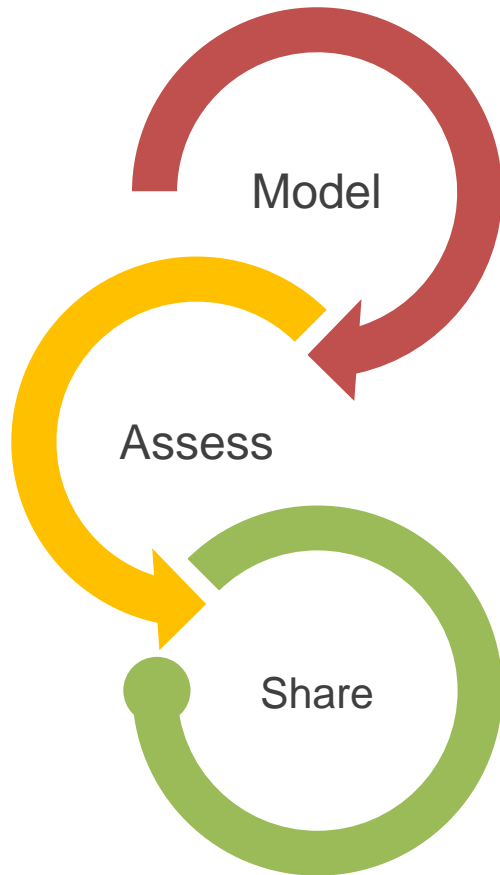


**Read processed schedules into the FutureScape simulation.** Agents will follow the trip list, which now has complete position and time data.

# Methodology – Process Flow



# Impact to Date



## **Strong Alignment and Calibration to SANDAG Standards**

Calibrated the model against SANDAG's activity based model and arrived at very strong alignment with less than 0.3% variance on key metrics tied to calculating miles traveled (VMT) as a result of travel / mode choice decisions made by agents in the simulation.

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## **Scenarios for the Five Big Moves**

Running scenarios for each of the Five Big Moves to understand the impact on Vehicle Miles Traveled (VMT) and Mode Choice. This involves assessing ridership on new transit lines, use of flexible/ shared fleets in certain shed areas, and volume of ride-alone trips by car with changes to the road network and pricing.

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## **Demonstrating Due Diligence and Use of Data**

Participated in public outreach and executive meetings to brief preliminary results and illustrate how SANDAG is using advanced analytics and making data a central part of their decision making process for the 2021 Regional Plan.

# FutureScape Demo

[FutureScape Sketch Planning for the San Diego Region](#)

**Questions?**



# How to Model the 5 Big Moves

Joel Freedman (RSG)



**RSG**

the science of insight

# SANDAG Model Users Group Meeting

SANDAG ABM2+ Enhancements

December 11, 2019

# Topics

- Treatment of TNCs, AVs
- Telecommute model
- New transit mode
- Micro-mobility
- Toll simplification
- Other enhancements

# Modeling Challenges

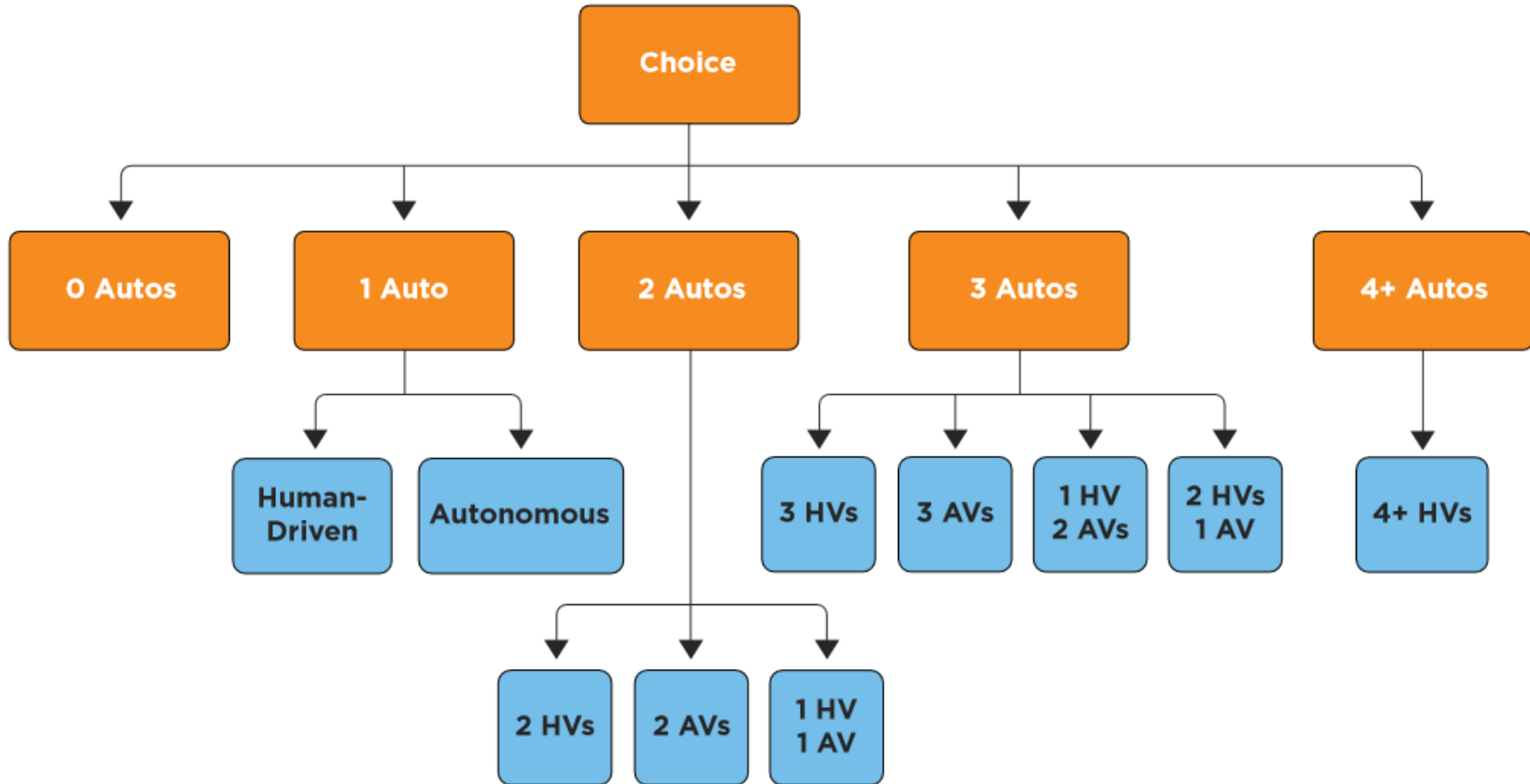
- Characteristics of new and emerging modes
  - Limited observed data
  - Limited opportunity for analogy
  - Potential for transformative changes in travel
- Traditional single-point forecasts ineffective for exploring potential outcomes
- Scenario testing preferred
  - Multiple runs with systematically varied parameters



# Treatment of AVs

- Extension of vehicle ownership model
  - Human-driven versus autonomous vehicles
- Vehicle type availability
  - For households with both HV and AV – is an AV available for the tour?
- AV-specific mode choice parameters (if AV available)
  - Lower minimum age for drive-alone
  - In-vehicle time sensitivity
  - AV-specific auto operating cost, parking cost, terminal time
  - Mode-specific constant
- Assignment
  - PCE-specific factors for AVs

# Vehicle Type Extension



# Explanatory variables for AV ownership

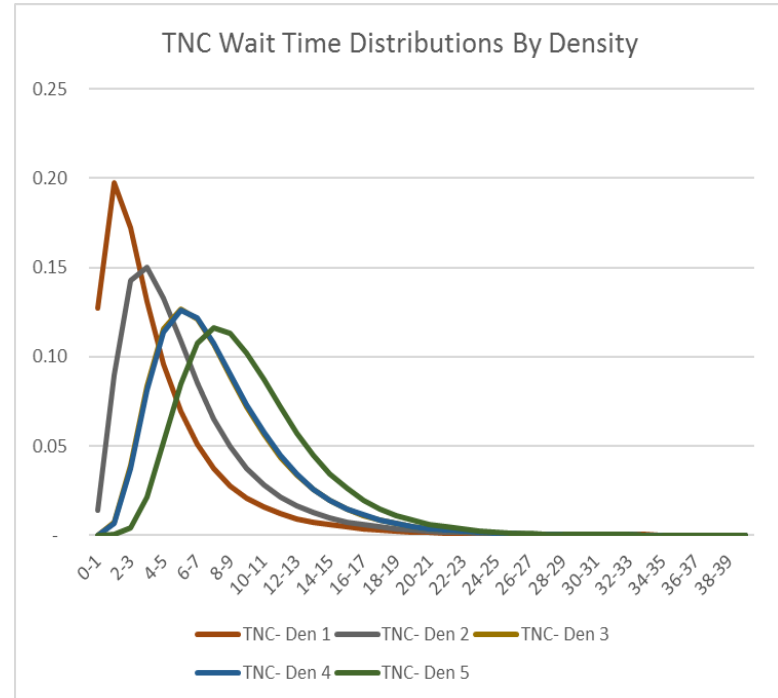
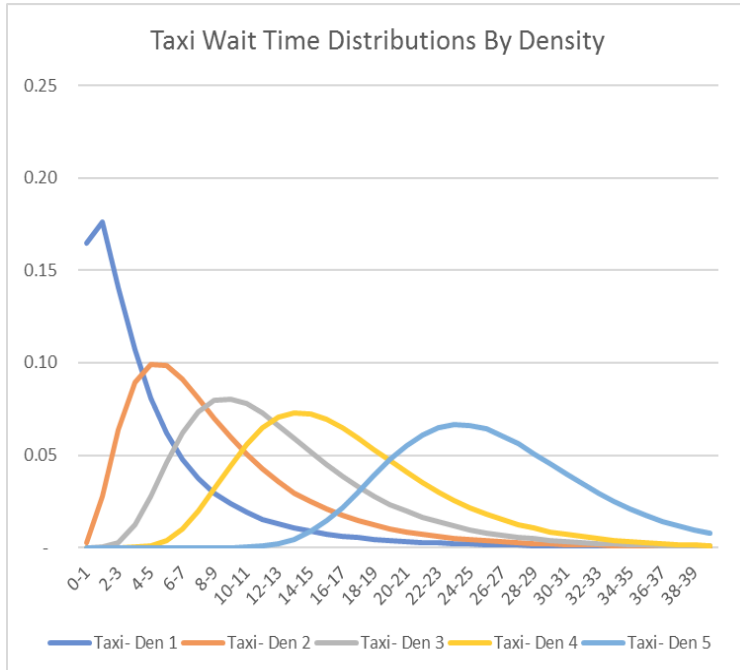
- Demographics
  - Age (-), income (+)
  - May not be temporally stable
- Work accessibility
- Alternative-specific constants
  - “Calibrated” to represent different assumed private AV fleet penetration rates (10%, 50%, 90%)
  - And auto ownership percentages based on assumed potential for increased car-sharing across household members (-10%, -25%, -50%?)

# Transportation Network Company Enhancements

- Effects of TNC availability on auto ownership
  - Via addition of TNC nest to transit accessibilities
- Extension of mode choice
  - TNC-transit utility similar to KNR-transit
  - Mobility-as-a-service nest
    - Taxi, TNC-single, TNC-shared (pool)
    - User-configurable wait time and cost functions
    - Time from skims derived from auto network
  - Alternative-specific constants to reflect non-included attributes
    - Calibrated to TNC survey
    - Provides another ‘lever’ for scenario testing



# Wait Time Distributions



Source: City of Portland, 2015

Density Range		Average Wait Time (min)	
High	Low	Taxi	TNC
10000000	15000	5.5	4.7
15000	5000	9.5	6.3
5000	2000	13.3	8.4
2000	500	17.3	8.5
500	0	26.5	10.3

- Density = (Pop + Emp)/Sq. Mi
- Samples from distribution based on origin MAZ density
- Shared TNC distribution asserted
- Wait times to be estimated from TNC survey
- Mean\SD could be informed by simulation

# Taxi and TNC Costs

Cost Component	Taxi	TNC-Single	TNC-Shared
Base Fare	\$2.20	\$2.20	\$1.00
Cost per mile	\$2.30	\$1.33	\$0.50
Cost per minute	\$0.10	\$0.24	\$0.24
Minimum cost per trip	0	\$7.20	\$1.00

- Base-year costs to be updated based upon results of TNC survey
- Future year cost assumptions can be tested
- Does not take into account surge pricing, except could be assumed for special event modeling

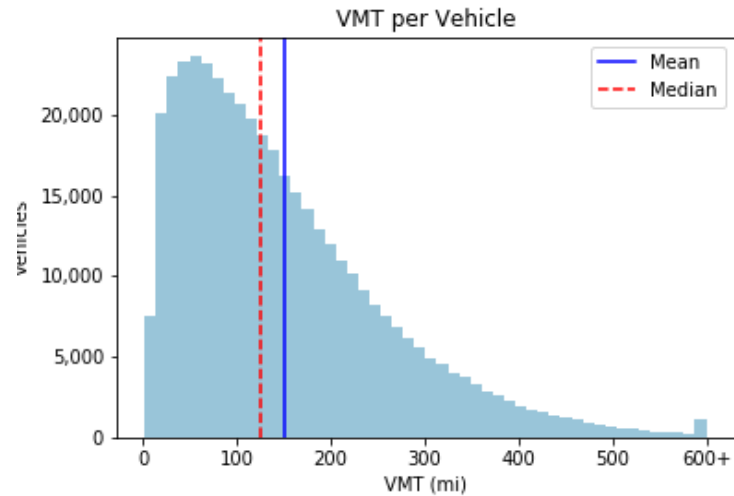
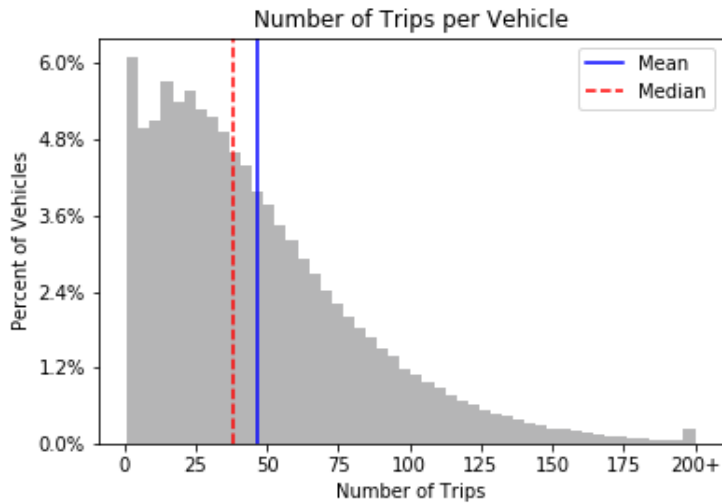
# Vehicle Routing Algorithm

- Initially developed to answer the question:
  - “How big would a shared TNC fleet have to be in order to serve all of the person trips in San Diego County?”
- A shared autonomous vehicle routing algorithm with the following features:
  - Reasonable approximation of real-world shared AV routing algorithms
  - Estimate vehicle fleet size
  - Takes trip list from SANDAG activity-based travel model as an input
  - Outputs a vehicle trip list that can be assigned to transport network to estimate impacts (congestion, VMT, etc.)
  - Generates empty vehicles
  - Rapid development, reasonable runtime

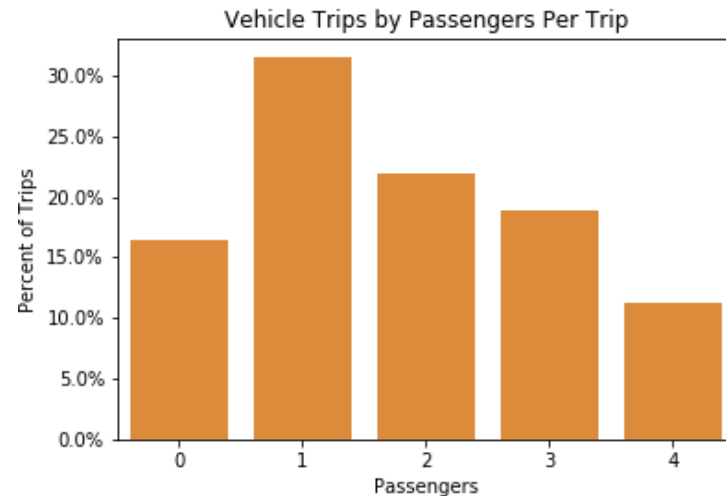
# Time-based Greedy Algorithm

- Vehicles are generated on-demand and filled them up with passengers according to their departure time and origin\destination
- Vehicles are filled subject to constraints (out-direction travel, occupancy)
- Empty vehicles are placed in idle queue and wait for passenger requests within a max distance
- Passenger-less trips generated by relocating vehicles
- Passengers are re-routed to “hotspots” for greater efficiency
- Vehicles refuel\recharge according to user-specified parameters

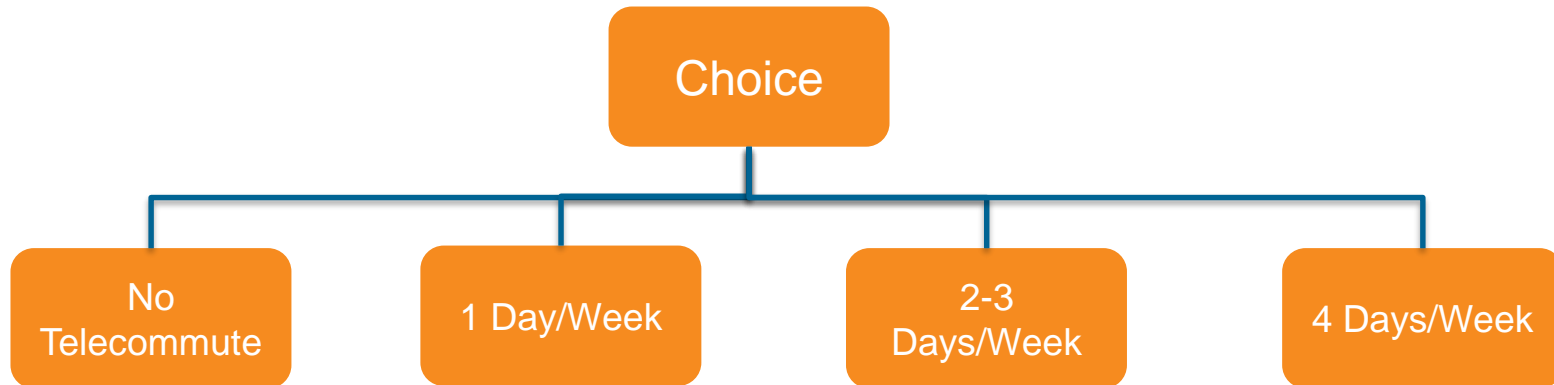
# Preliminary Results



- Approximately 420k vehicles to serve 11.5M person trips
- That is a ~5x decrease in fleet size
- Vehicles traveling ~150 miles on average
- +16% average occupancy over input trip list.



# Telecommute Model



- Based on telecommute question in 2016 HH Survey
- Explanatory variables include occupation, income, person type, number of autos, number of adults in HH, presence of children, distance to work, whether worker pays to park at work
- Outcome of model affects daily activity pattern model and non-mandatory tour frequency model

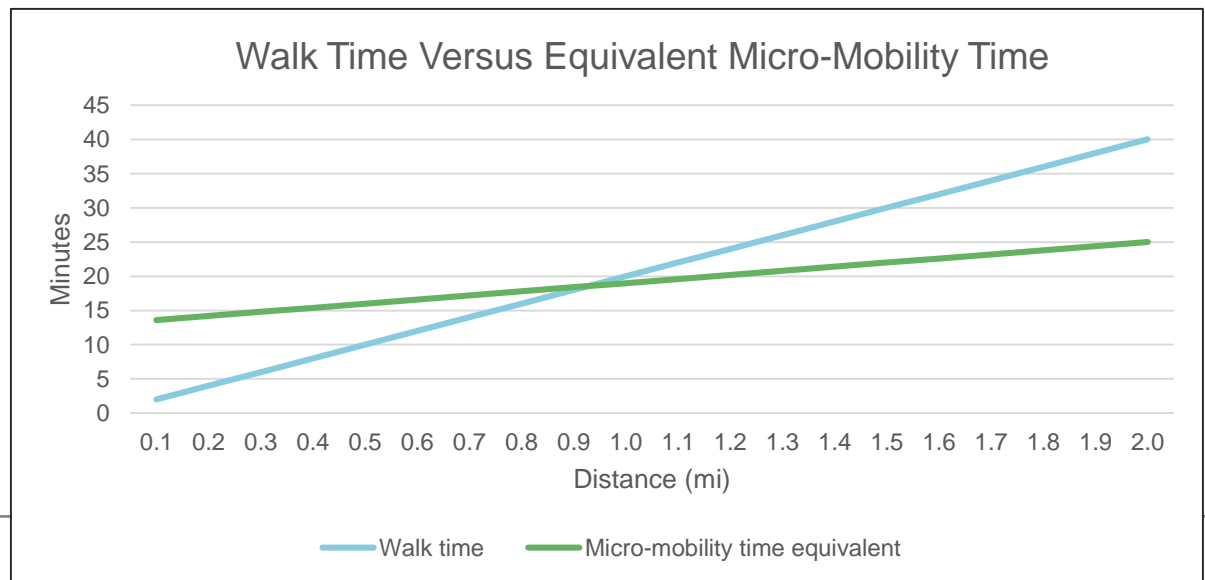
# Modeling approach

- Added new 'fast' transit mode to EMME
- Station-station times and headways coded explicitly (required for modeling)
  - Actual wait times may require iterating with demand depending on assumed vehicle capacities
- Allowed to compete in 'premium' and 'premium+local with transfer' mode alternatives
- Fast transit time & distance skimmed separately and can be used to apply transit-specific constants in mode\path choice
  - Suggest scenario testing between 15 minutes and 60 minutes of benefit
  - more benefit is more similar to commuter rail, would be applied based on duration of trip

# Micro-mobility

- E-bikes, e-scooters
- Modeled via walk mode and walk leg of transit trips
  - Walk times input to model are minimum of walk or micro-mobility generalized time
  - Trip mode choice model applied to walk trips to estimate micromobility demand
  - Calibrated to data from City of San Diego and trip length frequency distribution from Salt Lake City

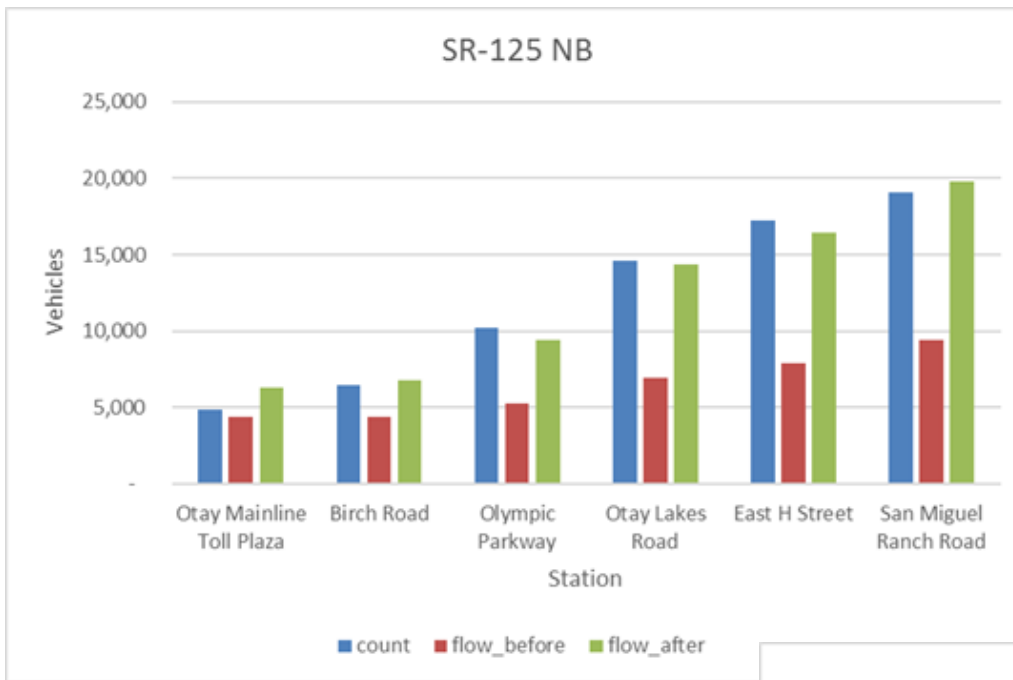
Attribute	Value	Units
Walk speed		3MPH
Micro speed		15MPH
Micro cost	\$0.50 per mile	
Micro wait time		3 minutes
Micro constant		10 minutes
Time Value of Money		4MPD



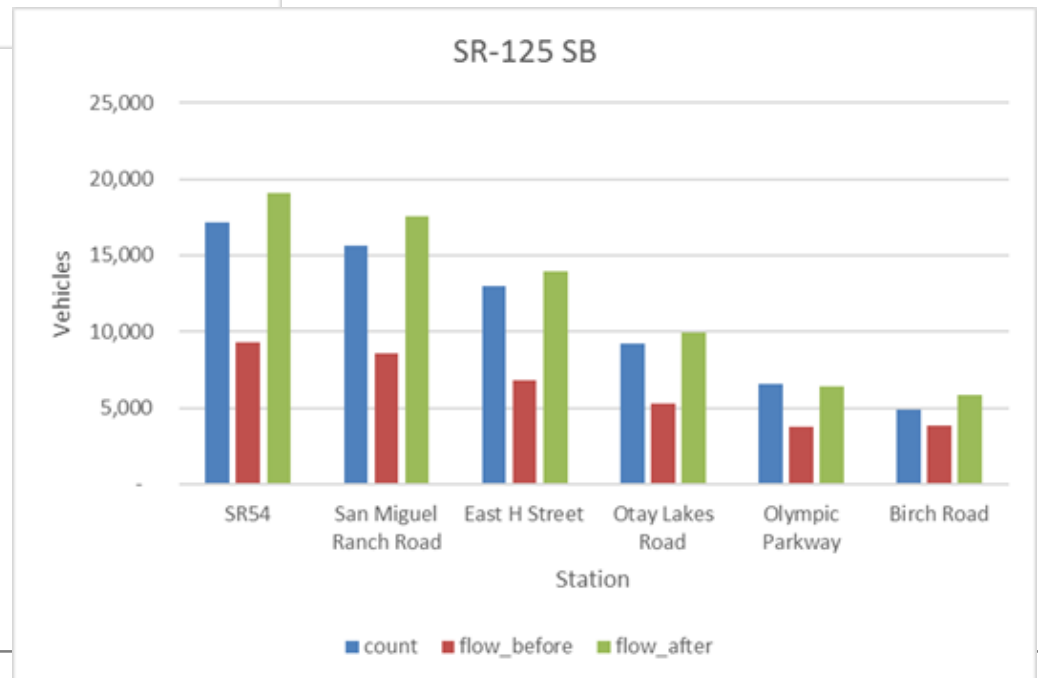


# Toll Choice Simplifications

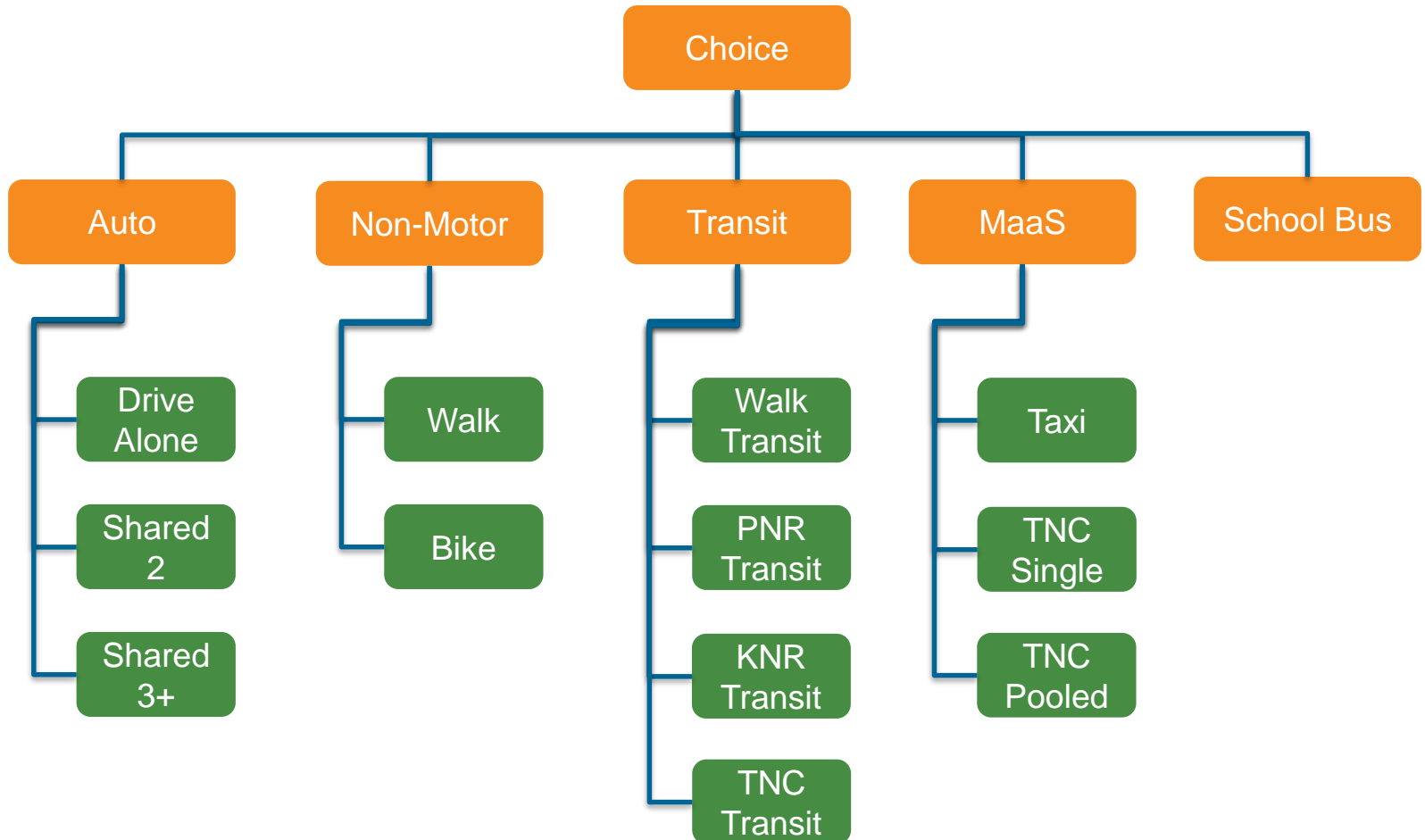
- Recent SHRP 2 C04 enhancements included segmenting assigned trip tables by three value-of-time bins
  - But, toll/non-toll choice left in model, resulting in 30 assignment classes
- RSG tested elimination of toll/non-toll choice in mode choice, compared results to volumes on I-15 and SR-125
  - Note: transponder ownership segmentation for SOVs (for I-15 use)
- Resulted in little change to I-15 but significant improvement in demand estimation for SR-125
- Also shorter runtime, less disk space required



Estimated SR-125 volumes after collapsing toll choice much closer to observed



# Revised mode choice model



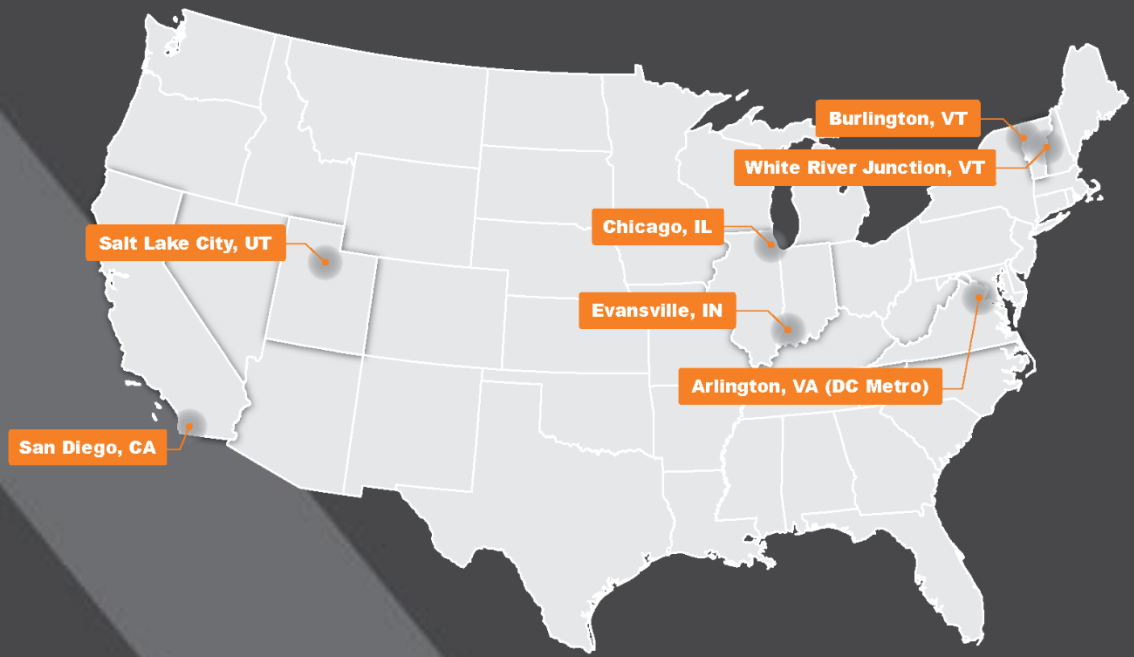
## Other Enhancements

- Simplification of mode choice logsum calculation for destination choice
- User enhancements around specification of toll costs and occupancy restrictions by time-of-day
- Automation of toll transponder model inputs
- Automation of '4d' input calculations



# Questions





## Contacts

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# Forum Agenda Recap

- Welcome, Introductions and Announcements
- Model Roadmap
  - Development
  - Application
  - Surveys
  - Sketch Planning
- How to model the 5 Big Moves

**Next  
Transportation  
Model Forum:**

**June 10, 2020**

# TRANSPORTATION MODELING FORUM

December 11, 2019

