SCAG ABM Model Improvement and Validation :
Sub-model Re-estimation, Calibration, and Validation

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SCAG Modeling Taskforce Meeting

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Outline

- Overview of the project

- Model refinements

- Calibration and validation updates

- Conclusion and next steps

Overview of the project

- Objective: get the SCAG ABM ready for the 2024 RTP/SCS

- Contract period: June 2021 to June 2024

- Major Tasks

  - Model improvements: Sub-model refinements & New sub-model development

  - Base year model calibration and validation

  - Peer review meeting

  - Modeling support for RTP/SCS 2024

Model refinements

- Sub-model estimation from local data

- New sub-model implementation

- Run time improvements

Model estimation

- Mandatory destination choice models

  - Work location

  - University location

  - School location

- Discretionary task frequency model

- Mode choice model

Model estimation
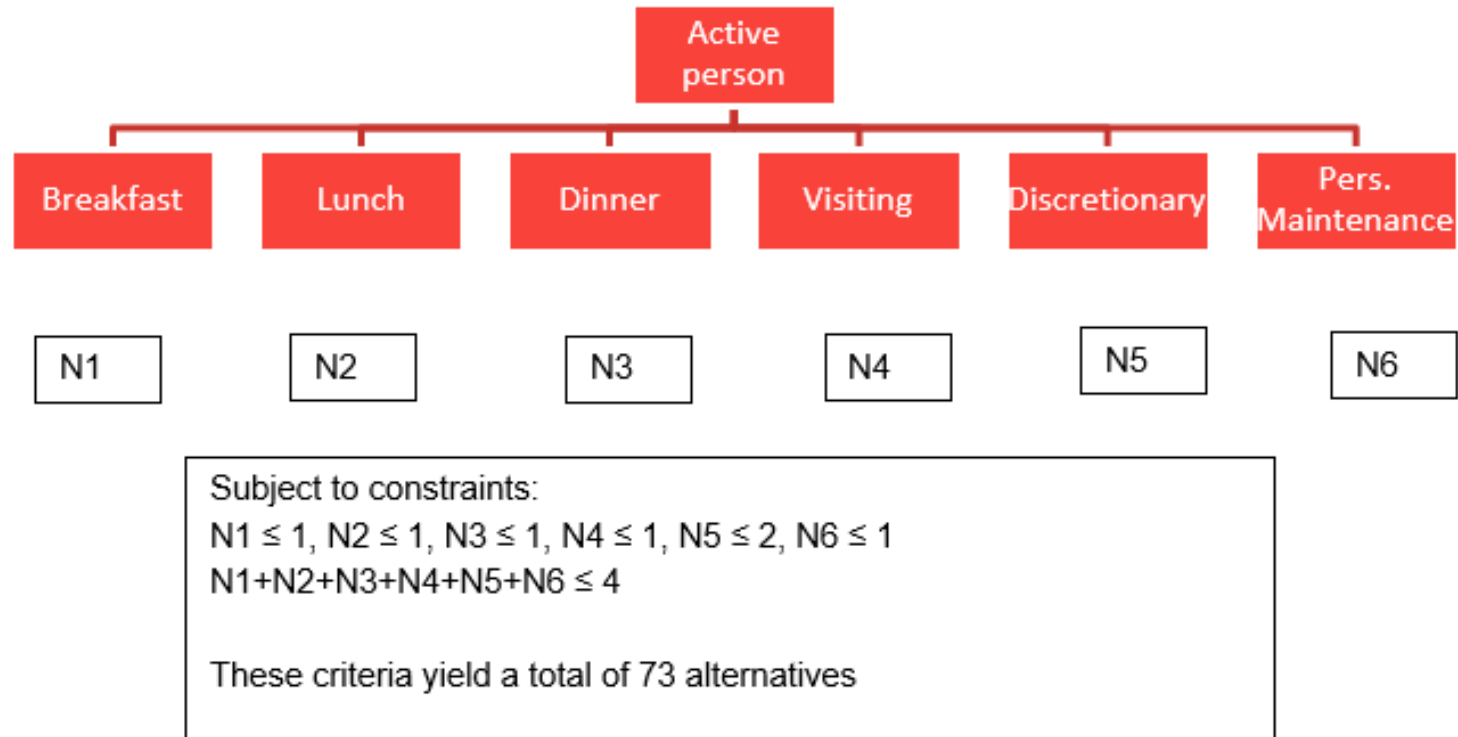
- Discretionary task frequency model

Subject to constraints:
$N1 \leq 1, N2 \leq 1, N3 \leq 1, N4 \leq 1, N5 \leq 2, N6 \leq 1$
$N1+N2+N3+N4+N5+N6 \leq 4$

These criteria yield a total of 73 alternatives

Figure 1: Model Structure

Model estimation

- Discretionary task frequency model
  - Data used in estimation
    - 2012 California Household Survey
    - Model accessibilities
    - Land-use and built environment variables
    - Outputs of upstream activity/travel decisions
  - Multinomial logit model (MNL)
  - Estimated in ALOGIT software
  - R used to create estimation dataset and ALOGIT script

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New sub-model implementation

- Trip Departure Time Choice

- In-home/Out-of-home choice for non-mandatory activities

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New sub-model implementation

- Trip Departure Time Choice

  - Activity duration allocation within a tour based on observed data

  - Affects only tours with more than one activity in a segment.

  - Results in more realistic trip departure times

Trip Departure Time Choice

Trip Departure Time Choice

New sub-model implementation

- In-home/Out-of-home choice for non-mandatory activities

    - Motivated by increasing non-mandatory activities being done remotely

    - Policy driven as opposed to Behaviorally Driven
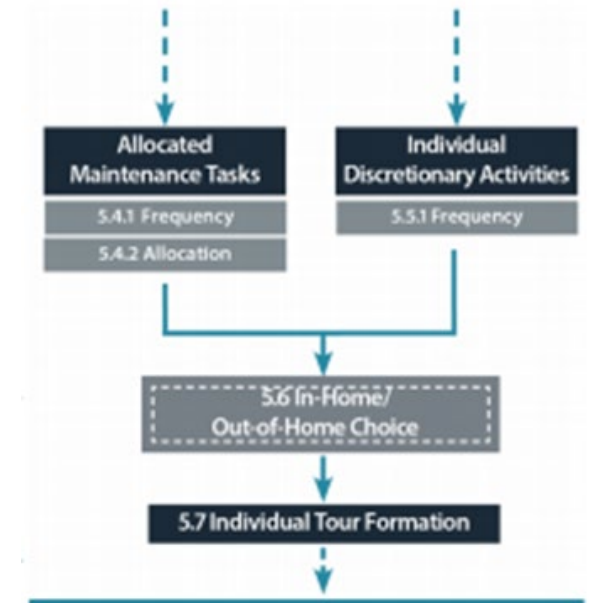
Run time improvements

- Accessibility Manager Runtime improvements

  - Java code improvements

  - Upgraded version of Java (Java 18)

  - Writing the outputs to binary format directly

Component	SCAG ABM RTP 2020	SCAG ABM RTP 2024
Accessibility manager	2:21:36	2:02:37
Binary conversion	1:36:33	
Total	3:58:09	2:02:37

Calibration and Validation Targets from SCAG

Calibration Sources

- California HH Travel Survey (Reweighted for the new base year)

- NHTS 2017

- ACS/IPUMS 2019

- LEHD 2018

- DMV 2019

- CTPP 2012-2016

Highway and Transit Validation Sources

- PEMS

- StreetLight/Replica

- Caltrans Traffic Counts (All Vehicles and Trucks)

- SCAG's 2017 Screenline Vehicle Classification (One Day Field Counts)

Calibration and Validation Process

Developing R scripts to compare model outputs to target metrics

Adjust model coefficients so that the model outputs are close enough to the target metrics

Check the model highway and transit assignments compared to validation targets for finetuning the calibration

SCAG ABM System

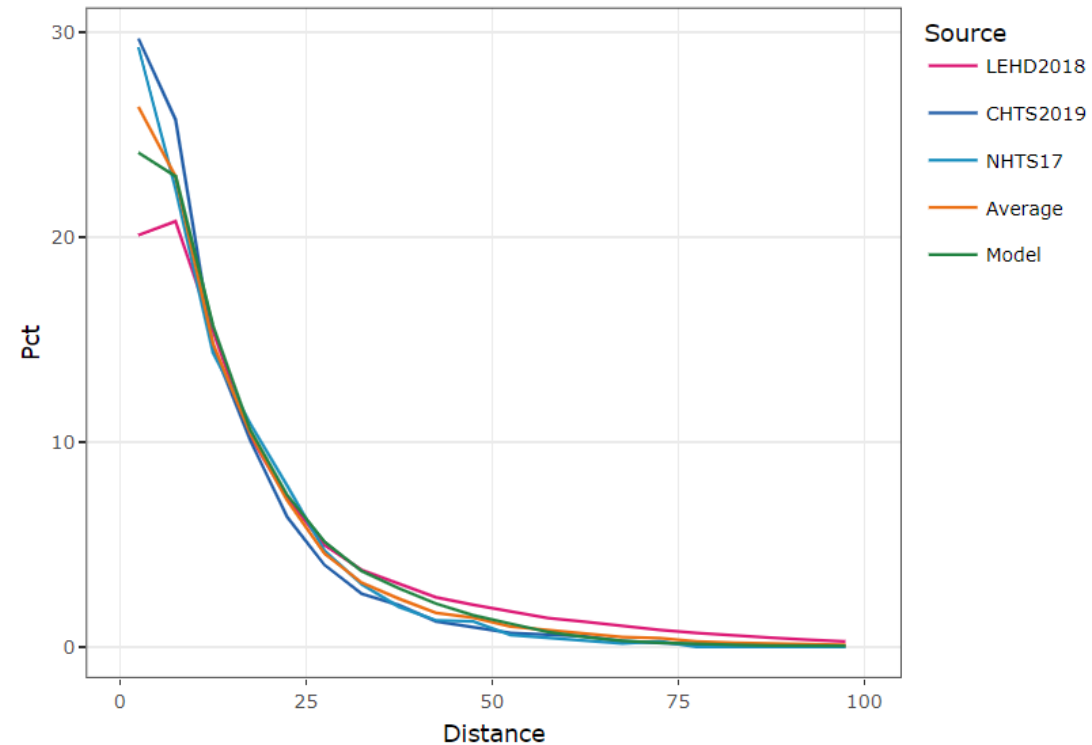# Calibrated Model Outputs
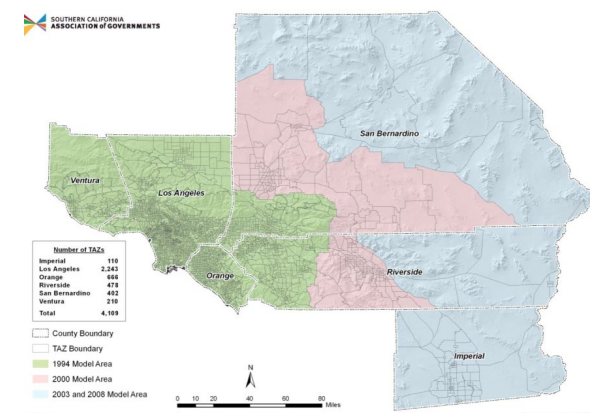
Work Duration by Income
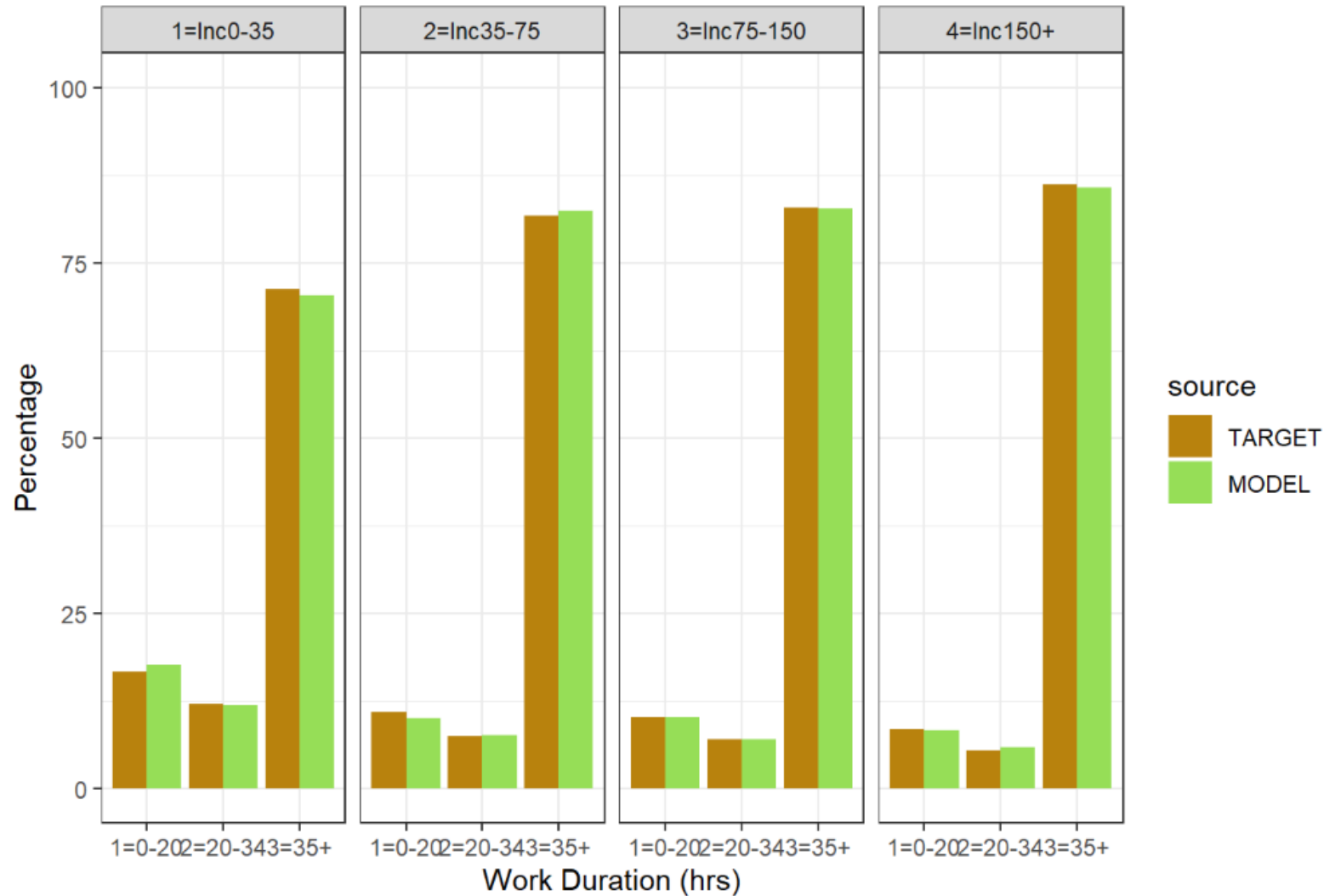
Calibrated Model Outputs

Work Location

Source	WeightedLength
LEHD2018	20.1
CHTS2019	13.0
NHTS17	13.2
Average	15.4
Model	15.9

Calibrated Model Outputs

Work Location – County to County Flow

Final Targets

HomeCounty	IM	LA	OR	RIV	SBD	VN
IM	0.91	0.02	0.01	0.05	0.01	0.00
LA	0.00	0.91	0.06	0.01	0.02	0.01
OR	0.00	0.16	0.81	0.02	0.01	0.00
RIV	0.00	0.08	0.10	0.68	0.13	0.00
SBD	0.00	0.19	0.06	0.09	0.66	0.00
VN	0.00	0.24	0.01	0.00	0.00	0.74

Model

Target is a combination of CA HH travel survey, LODES19, CTPP12-16, IPUMS19, LEHD19

HomeCounty	IM	LA	OR	RIV	SBD	VN
IM	0.90	0.00	0.00	0.10	0.00	0.00
LA	0.00	0.90	0.05	0.02	0.02	0.02
OR	0.00	0.13	0.79	0.05	0.02	0.00
RIV	0.00	0.07	0.09	0.69	0.14	0.00
SBD	0.00	0.18	0.05	0.10	0.67	0.00
VN	0.01	0.24	0.00	0.01	0.00	0.75

Calibrated Model Outputs

Driver's License
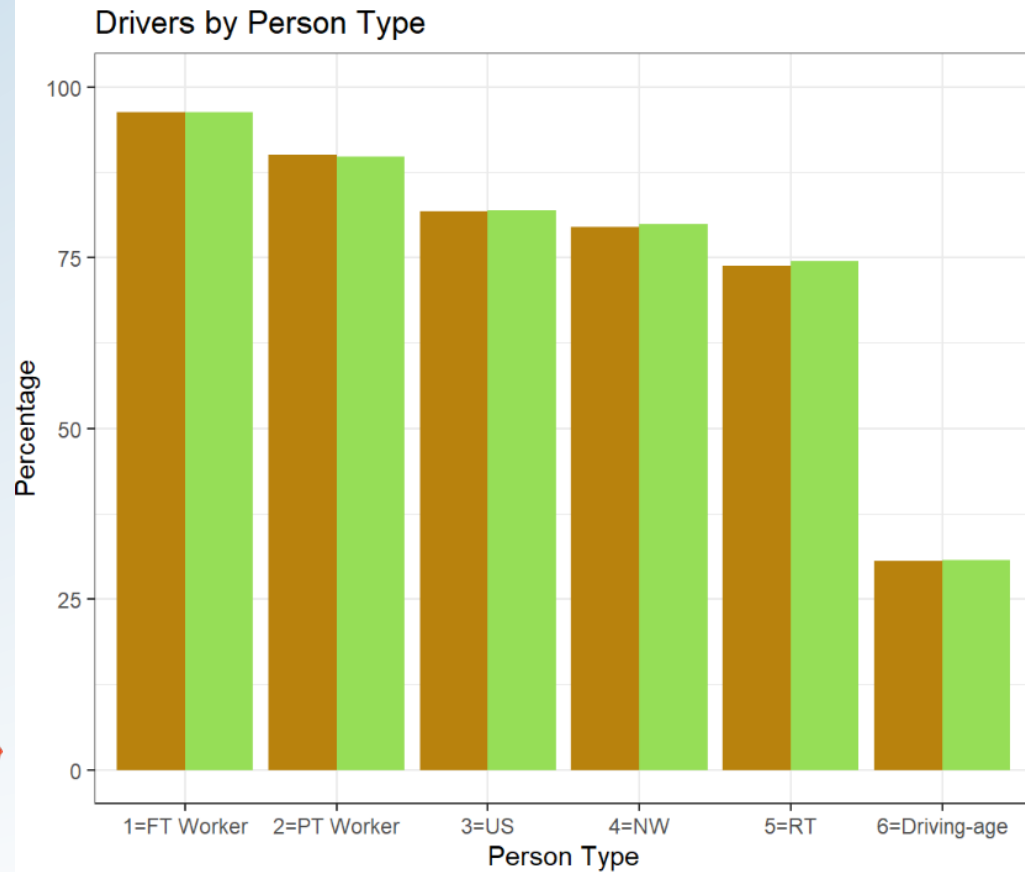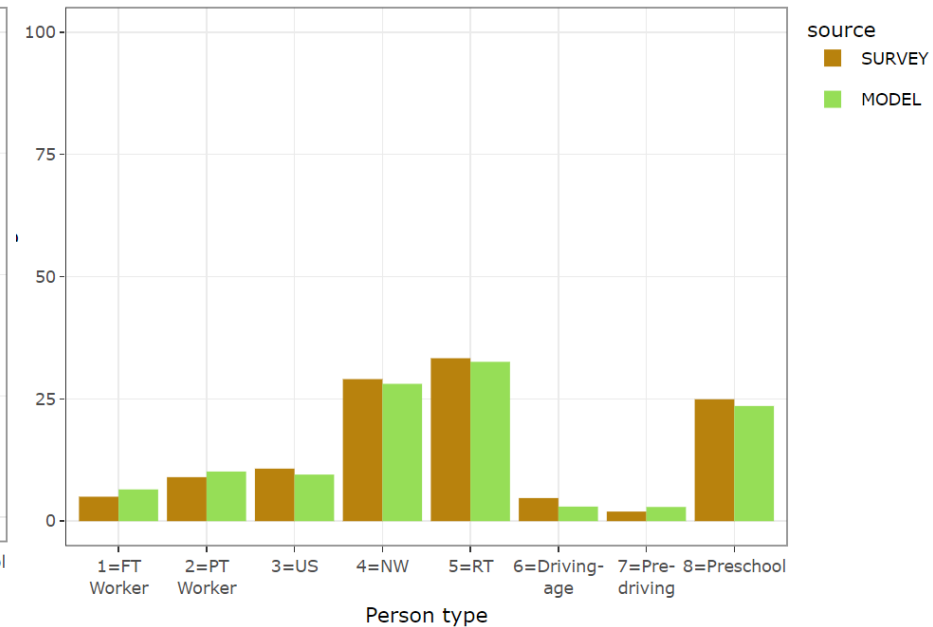
Calibrated Model Outputs

Daily Activity Pattern
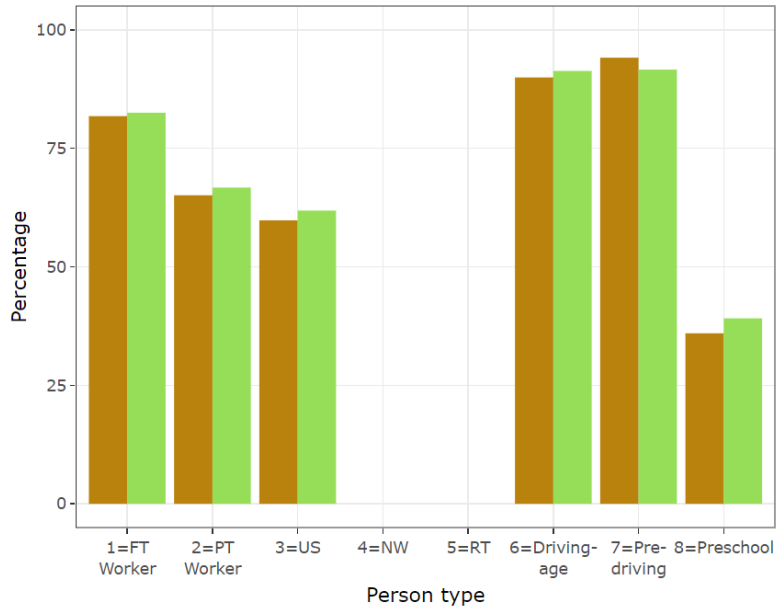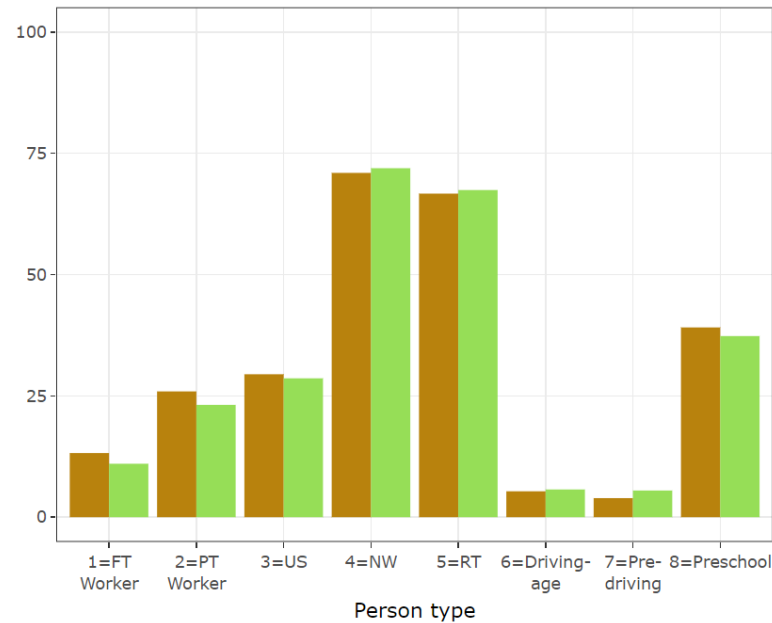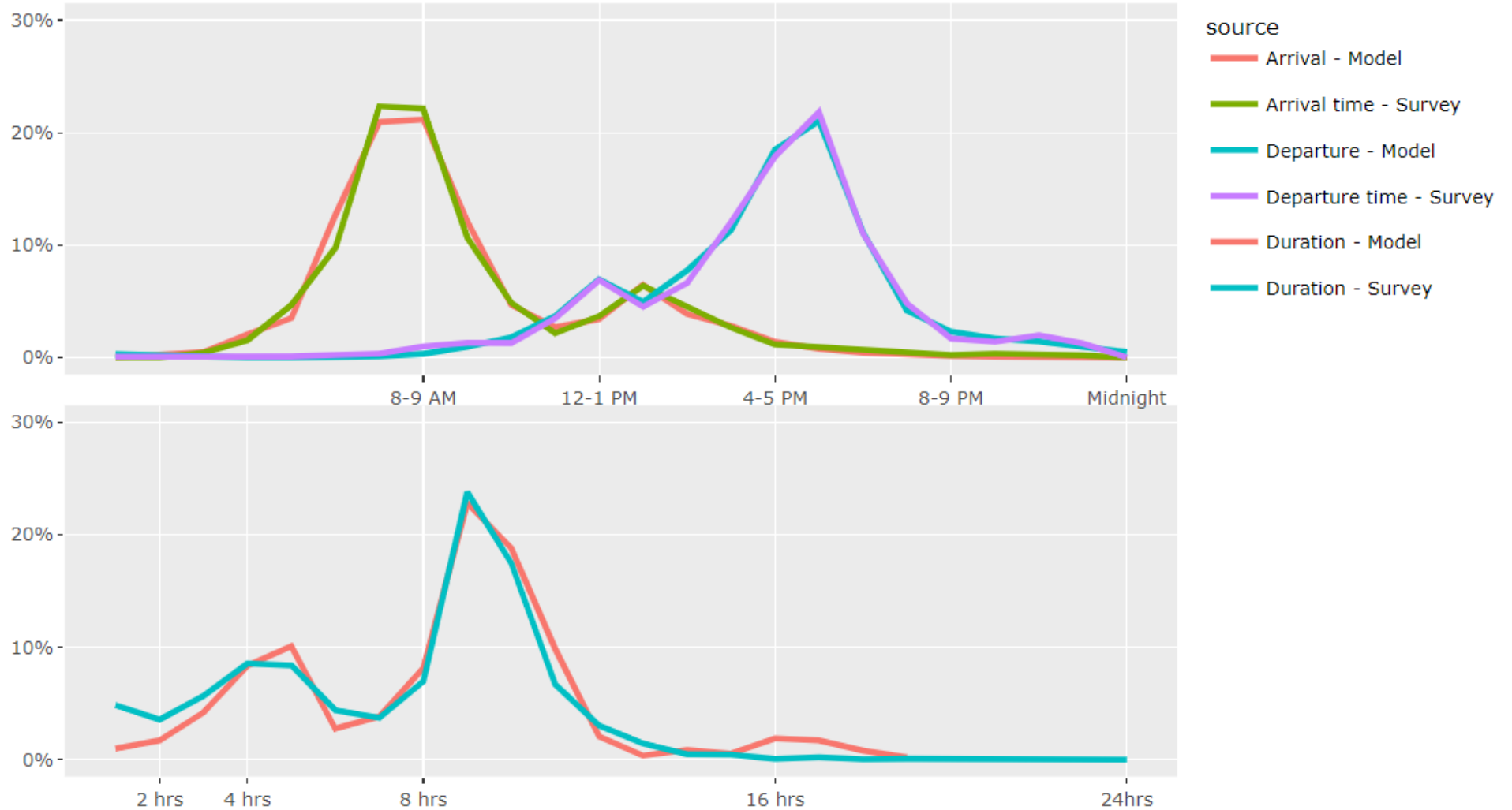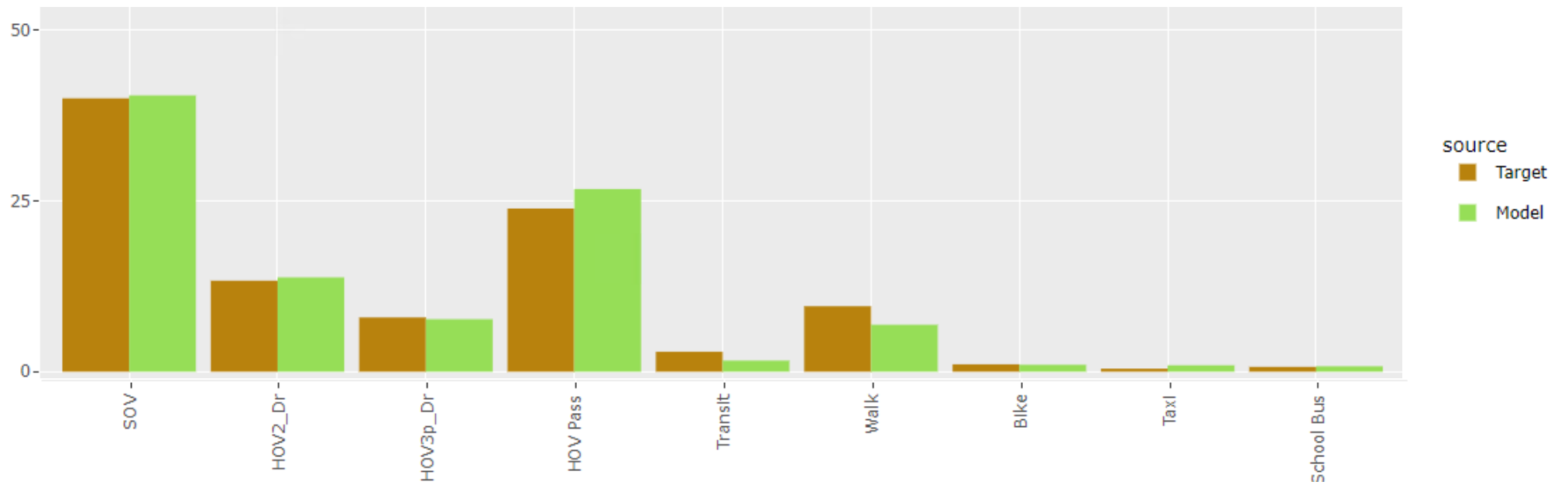
Calibrated Model Outputs

Work Tour Time of Day for Full-time Workers

Calibrated Model Outputs

Trip Mode Share

Addition of New Transportation Modes

- TNC
    - Replaces the old taxi mode
    - Private and shared TNC will be modeled together

- Micro-mobility
    - Performs as a new access mode to transit in the model

Impacts of the carsharing, old taxi trips, and micro-mobility trips (not to access transit) will be calculated off-model due to very small portions.

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Conclusion and Next Steps

- Model refinement task is completed

- First round of calibration has been completed based on calibration targets

- The second round of calibration will consider both the validation results as well as calibration targets.

- The following documents will be reported in preparation for the Peer-review meeting:
  - SCAG ABM Model Validation Report
  - SCAG ABM Model Specification Report
  - SCAG ABM Sensitivity Report
  - SCAG ABM Software and User guide