

Modeling Mode in a Statewide Context

Transportation Planning Applications Conference

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ADOT

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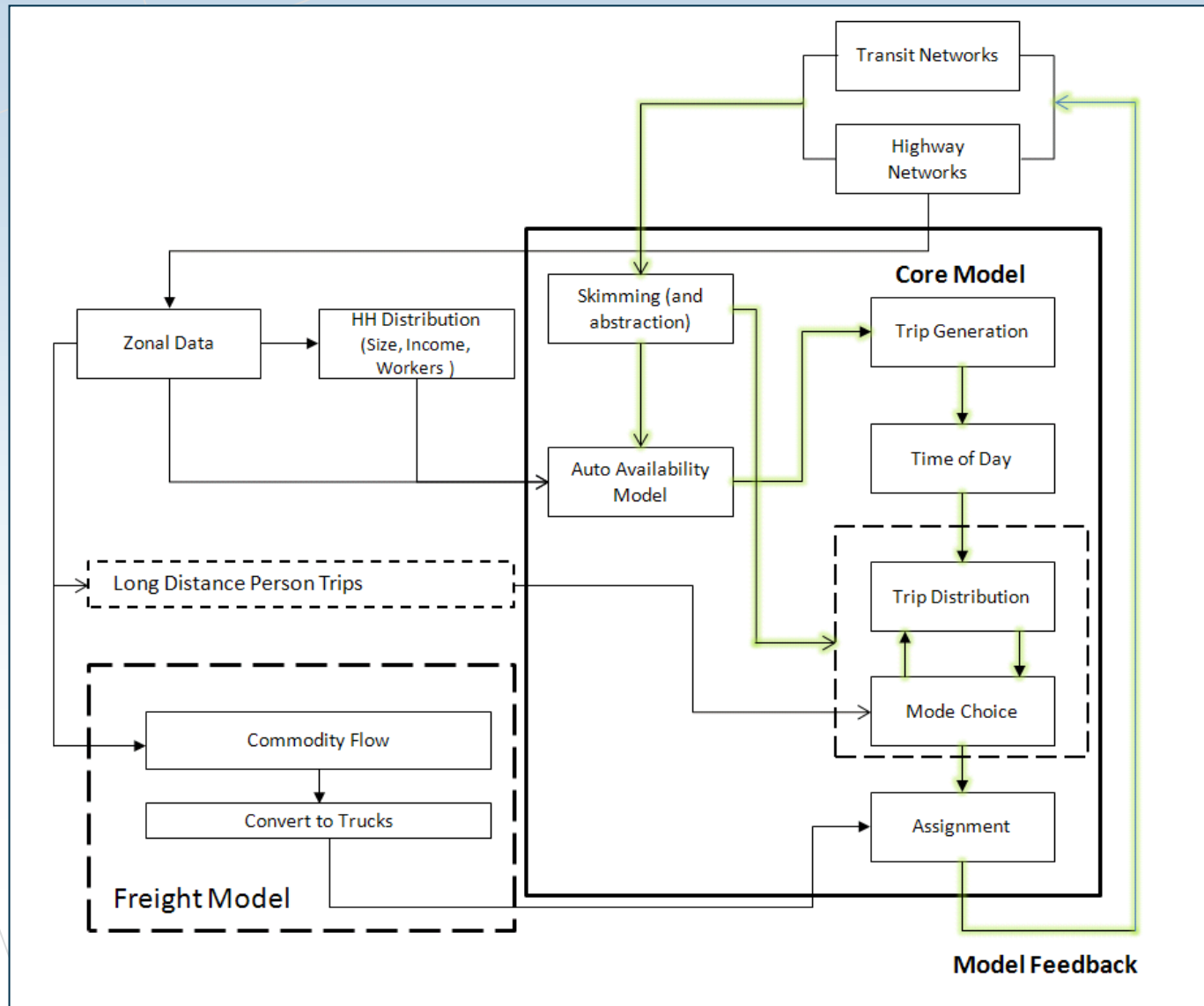
Presentation Overview

- Development Team
- AZTDM3 Overview
- AZTDM3 Modes of Travel
- Transit Abstraction Model
- Short Distance Mode Choice Model
- Long Distance Mode Choice Model
- Model Calibration
- Model Validation

AZTDM3 Model Development Team

- Arizona DOT
 - Keith Killough
 - Deng Bang Lee
 - Baloka Belezamo
 - Patrick Costinett
- CDM Smith Team
 - Rob Bostrom
 - Krishnan Viswanathan
 - Liza Amar
 - Sashi Gandavarapu (AirSage)
 - Kevin Tierney (Independent Contractor)

AZTDM3 Overview



AZTDM3 Modes of Travel

- Auto
 - Drive alone, shared ride 2, and shared ride 3+
- Transit (walk and drive access)
 - Local transit network follows California abstraction methodology
 - Rail, express bus, park & ride, and intercity bus explicitly coded
- Non-Motorized
 - Walk and Bike

Transit Abstraction - Motivation

- Abstraction methodology used to compute local bus skims
- Explicit coding of local bus network not necessary
- Appropriate for a statewide model
- Successfully implemented in California

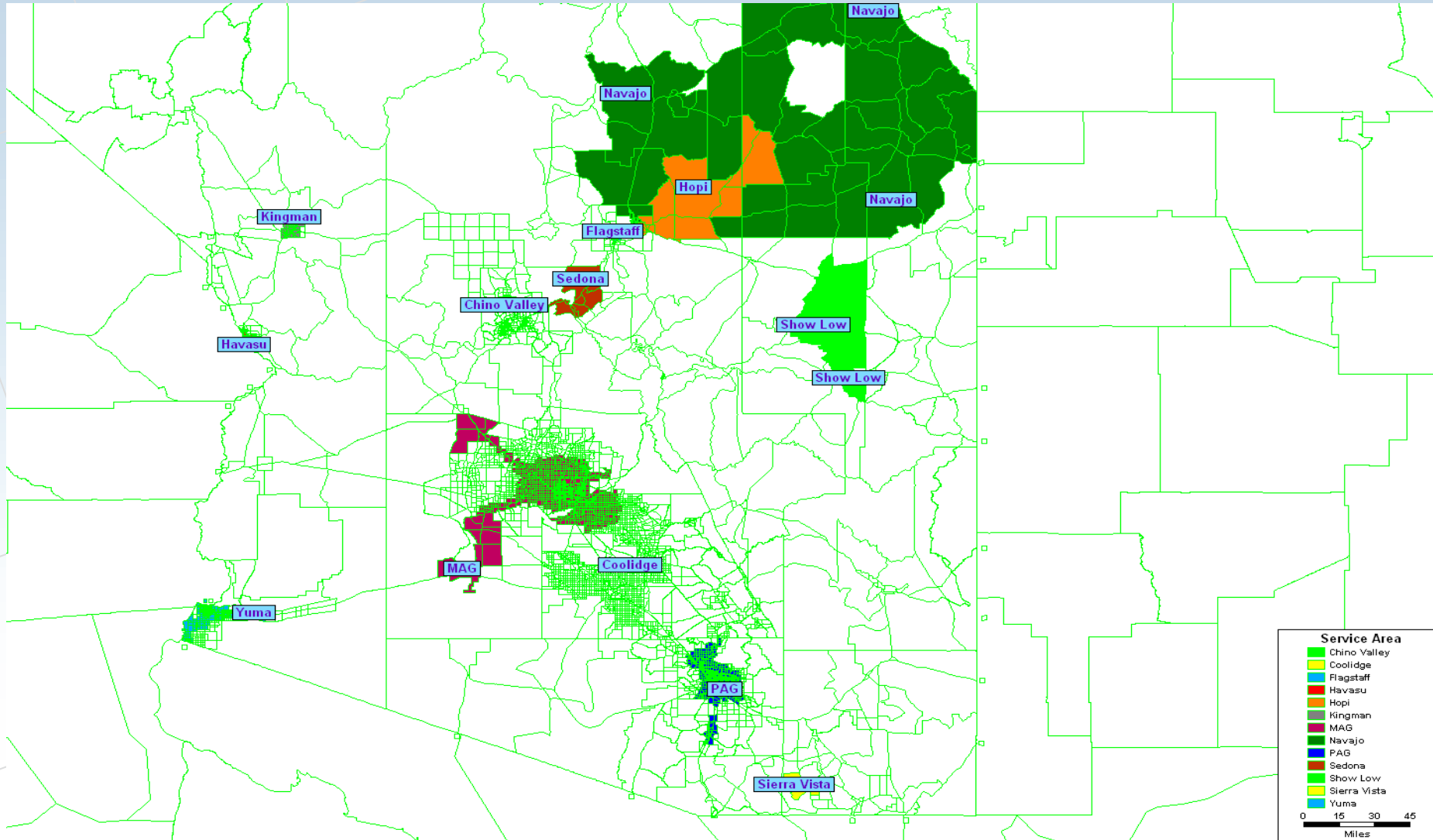
Transit Abstraction - Method

- Data Inputs
 - Transfer areas: the areas within which a person can travel
 - Service areas: the areas within which transit service is provided
 - Level of Service: a single number representing the quantity of local bus service
 - Fare: a composite value, indicating the typical fare paid by a customer
- General Transit Feed Specification (GTFS)

Transit Abstraction - Model

- IVT or OVT = $\text{fn}(\text{LU}, \text{TR})$
 - IVT/OVT: In-/Out-of-vehicle times
 - LU: Land use variables
 - TR: Transportation (highway) variables
- Takes into consideration time-of-day
- Depends on catchment area
 - Geographical accessibility to transit

Transit Abstraction - Service Areas



Transit Abstraction - Level of Service

		Service Area Population *	Revenue Miles **	Level Of Service (LOS)	Adjusted LOS
		(1)	(2)	(1)/(2)*1000	<=200
Urban Transfer Areas	RPTA/Valley Metro (MAG)	3,304,432	38,558,000	86	86
	City of Tucson (PAG)	846,633	11,209,000	76	76
	Yuma MPO (YMPO)	180,515	1,168,000	155	155
	NAIPTA (Flagstaff)	119,238	739,000	161	161
Rural Transfer Areas	City of Sedon	40,978	119,826	342	200
	Hopi Tribe	7,659	174,233	44	44
	City of Kingman	45,015	206,722	218	200
	Navajo Transit System	82,534	315,014	262	200
	City of Show Low	44,677	259,018	172	172
	City of Sierra Vista	45,906	222,198	207	200
	Town of Chino Valley	9,946	7,006	1,420	200
	City of Coolidge	11,074	91,472	121	121
	Lake Havasu City	39,985	392,668	102	102

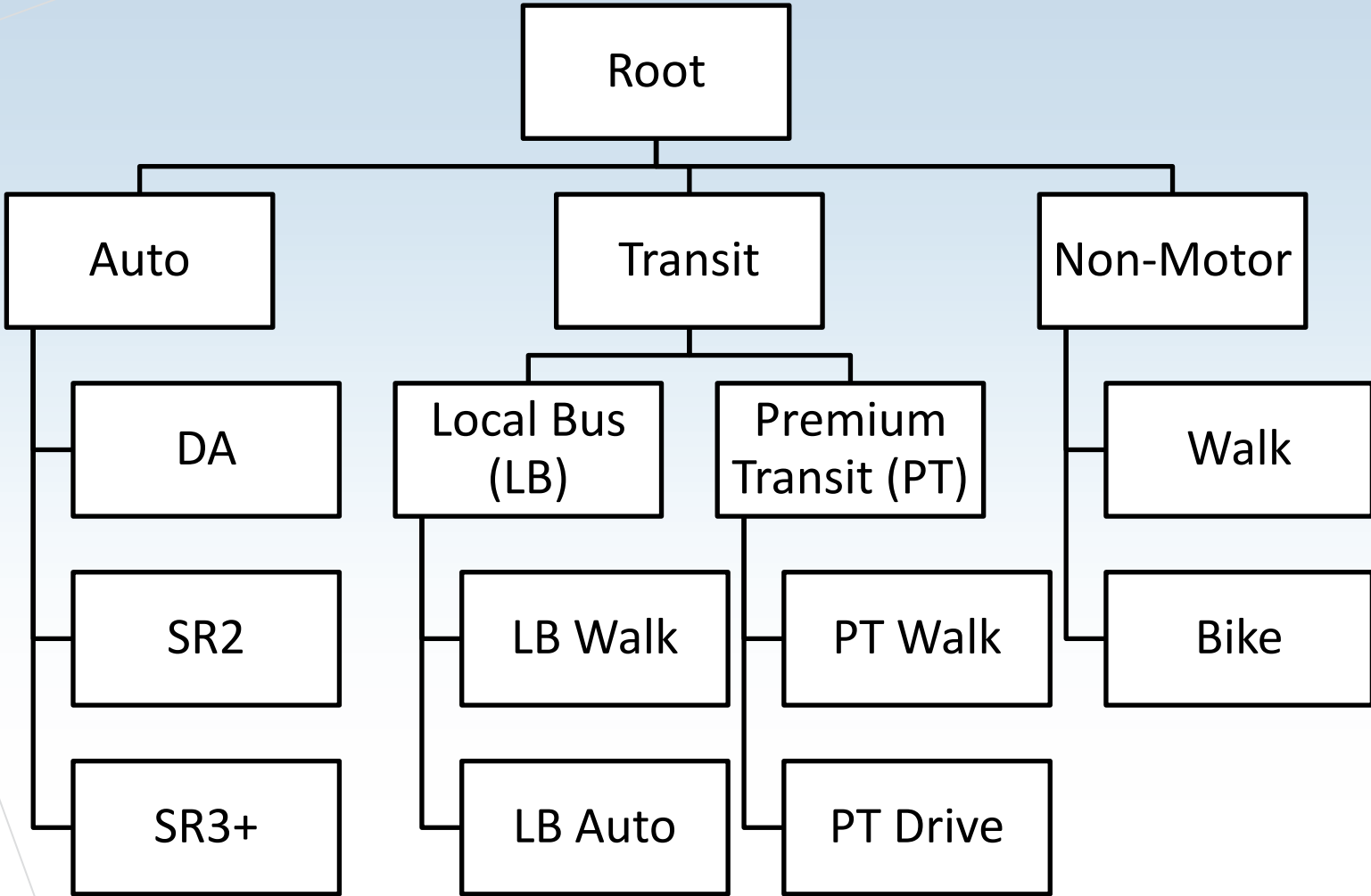
*Service Area Population are from Socio-economic data (from TransCAD)

** Urban/Rural Transit Revenue Miles are from National Transit Database (NTD) & ADOT G41 Rural Statistics data

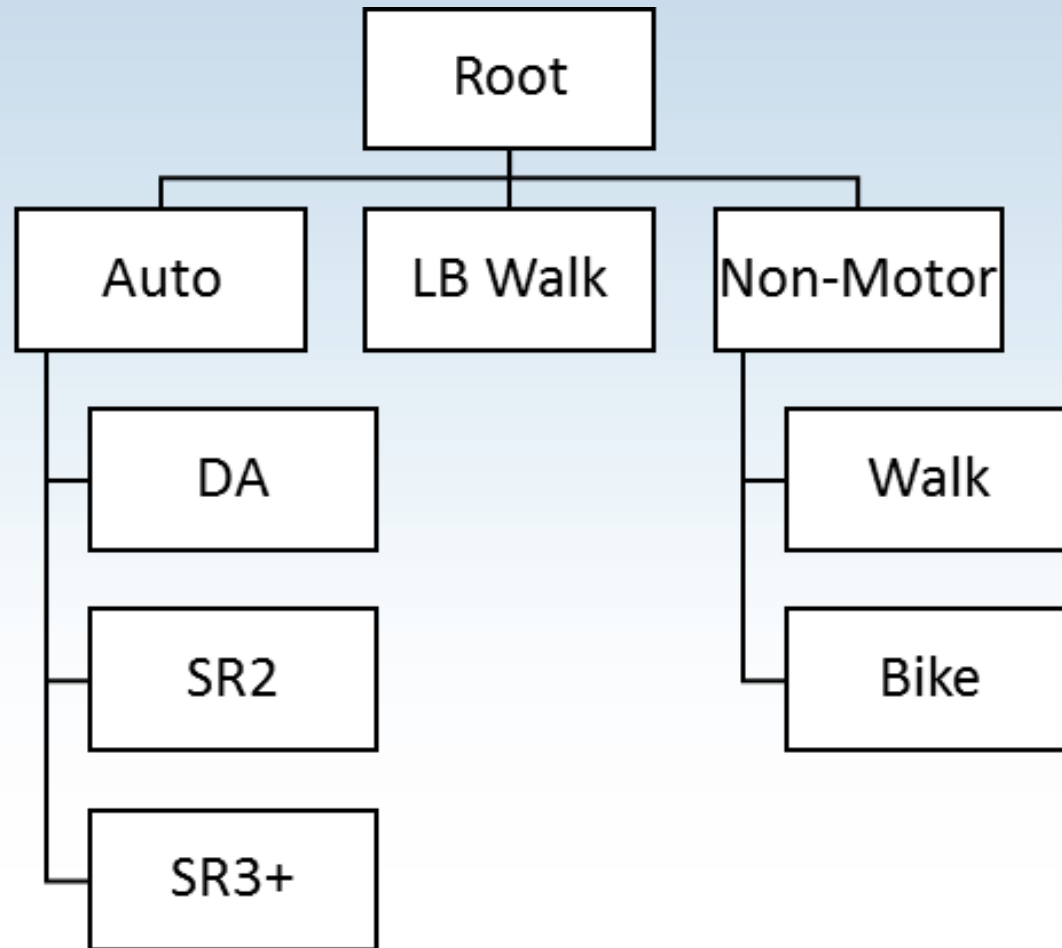
Mode Choice Model - Short Distance Passenger

- Nested logit models
- Models by trip purpose and time of day
- Five purposes: HBW, HBO, NHB, HBU, HBS
- Alternatives
 - Auto, transit, and non-motorized
- Variables
 - IVTT, OVTT, cost, distance, transit times, dummy
- NHTS 2009 add-on sample used in estimation

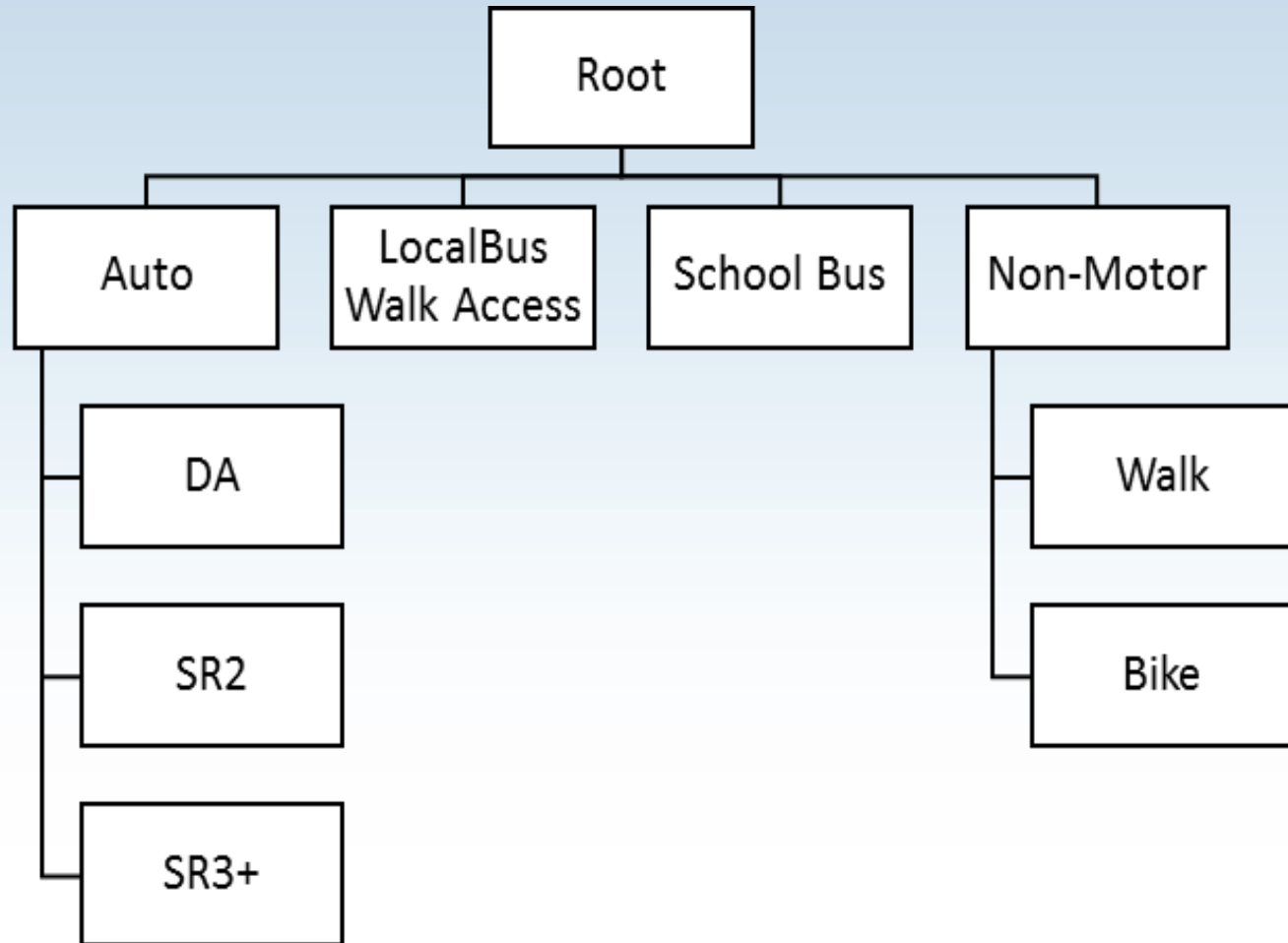
Mode Choice Model - HBW Structure



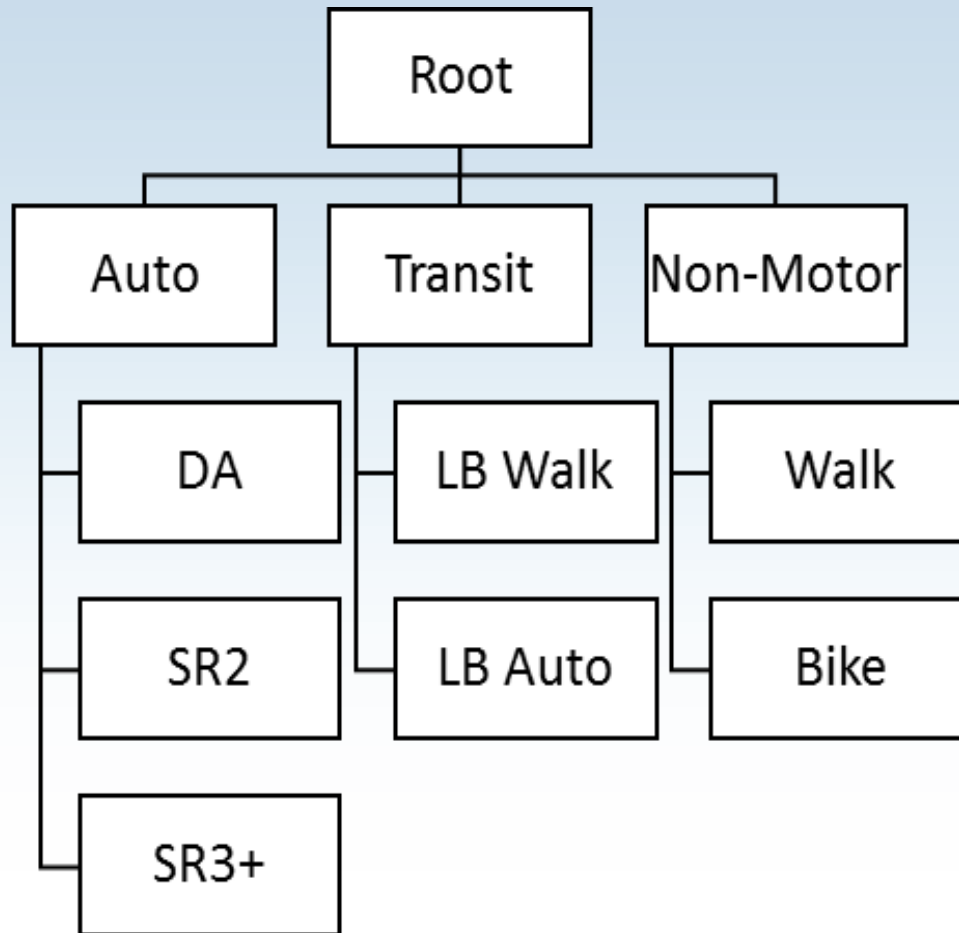
Mode Choice Model - HBO, NHB Structure



Mode Choice Model - HBS Structure



Mode Choice Model - HBU Structure



Long Distance Mode Choice

- Model Specification:
 - Transfer Model parameters
 - Sacramento to San Francisco
 - Orlando to Tampa
 - Other statewide models
- Model Application:
 - Use Traffic Analysis Framework (TAF) methodology
 - Update existing long distance model in AZTDM2

Long Distance Mode Choice - Model Specification

Variable	Units	Business	Non-Business
IVTT	Minutes	-0.0103	-0.0087
Walk-Access Time	Minutes	-0.0206	-0.0174
Drive-Access Time	Minutes	-0.0206	-0.0174
Cost	Dollars/log(income/1000)	-0.104	-0.153
Auto Nest Parameter		0.35	0.35
Transit Nest Parameter		0.35	0.35

1995 American Travel Survey

- Nationwide long distance travel
- Sample of 80,000 households
- 85% response rate
- Travel information
 - Trip origin destination (county-to-county)
 - Travel mode (3/4 auto trips)
 - Travel party
 - Trip purpose
 - Trip distance (>100 miles; 60% between 100-200 miles)

ATS Trip Purpose Reclassification

ATS Trip Purpose	Model Trip Purpose
Business	Business
Combined Business/Pleasure	Business
Convention, Conference, Or Seminar	Business
School-Related Activity	Other
Visit Relatives Or Friends	Leisure
Rest Or Relaxation	Leisure
Sightseeing, Or To Visit A Historic Or Scenic Attraction	Leisure
Outdoor Recreation (Sports, Hunting, Fishing, Boating, Camping, Etc.)	Leisure
Entertainment (Attend The Theater Or Sports Event, Etc.)	Leisure
Shopping	Leisure
Personal, Family, Or Medical (Wedding, Funeral, Health Treatment, Etc.)	Other
Other Reason	Other

Long Distance Trip Table Development

- County-to-county O-D trips for Business and Non-Business
- Added national park trip attractions
- Added port of entry trips
- Adjusted for 50 mile trip lengths
- County data disaggregated to TAZ level

Model Calibration

- Focus on broad markets
- Detailed inspection of person-trip tables
- The comparison of transit, rail and bus trip tables from the mode choice models against the "observed" patterns derived from survey data

Model Validation

- Follow steps in FHWA Model Validation Manual
 - Validation of each model component
 - Checks of model input data
 - Reasonableness checks of model parameters and base and forecast-year model results
 - Model sensitivity tests
 - Comparisons of base-year model results to observations from independent data sets

Questions?