Comparing Operational Activity-Based Models (ABMs):

What is Different and What is Not?

Siva Srinivasan

Associate Professor

Transportation Research Center

Dept. of Civil & Coastal Engg.

UF | UNIVERSITY of FLORIDA

The Foundation for The Gator Nation

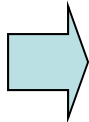---

Presentation Outline

- What is the Issue?

- Why does it Matter?

- Conceptual and Operational Similarities

- Structural and Implementation Differences

- Summary and Closing Thoughts
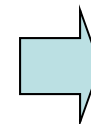
The Structure of Travel Demand Models

Socio-Economic Characteristics

Land Use Characteristics

Transportation System Characteristics

Travel-Demand Model

Link Volumes, Speeds, Travel Times,...

The Structure of Travel Demand Models

The Trip-Based or Four-Step Structure

Socio-Economic Characteristics

Land Use Characteristics

Transportation System Characteristics

Trip Generation

(frequency)

Trip Distribution

(destination)

Largely Similar Structures for all Regions!

Mode Split

(mode)

Network Assignment

(route)

Link Volumes, Speeds, Travel Times,…

The Structure of Travel Demand Models

Socio-Economic Characteristics

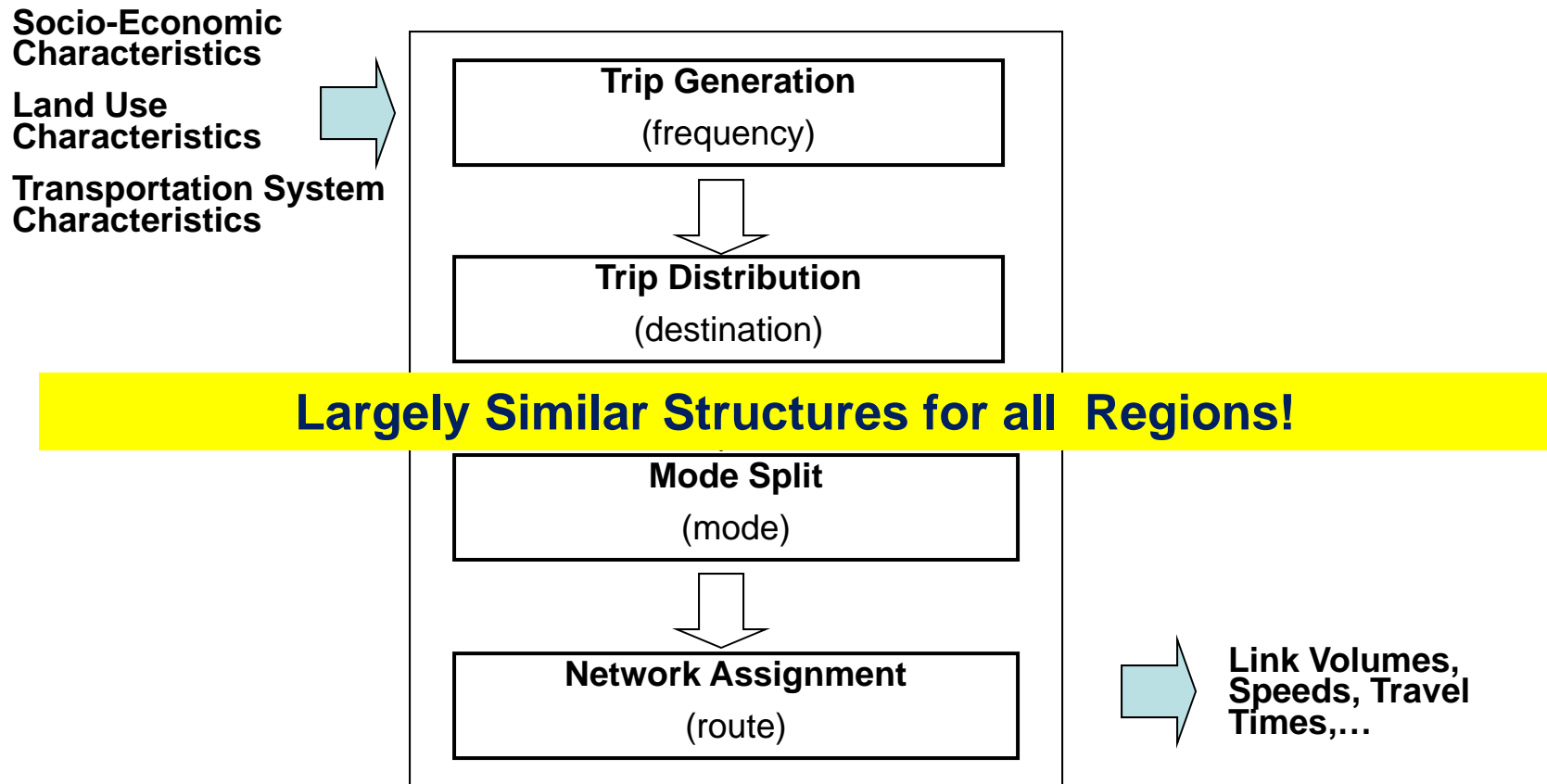**Land Use Characteristics**

Transportation System Characteristics

Detailed / Disaggregate Inputs
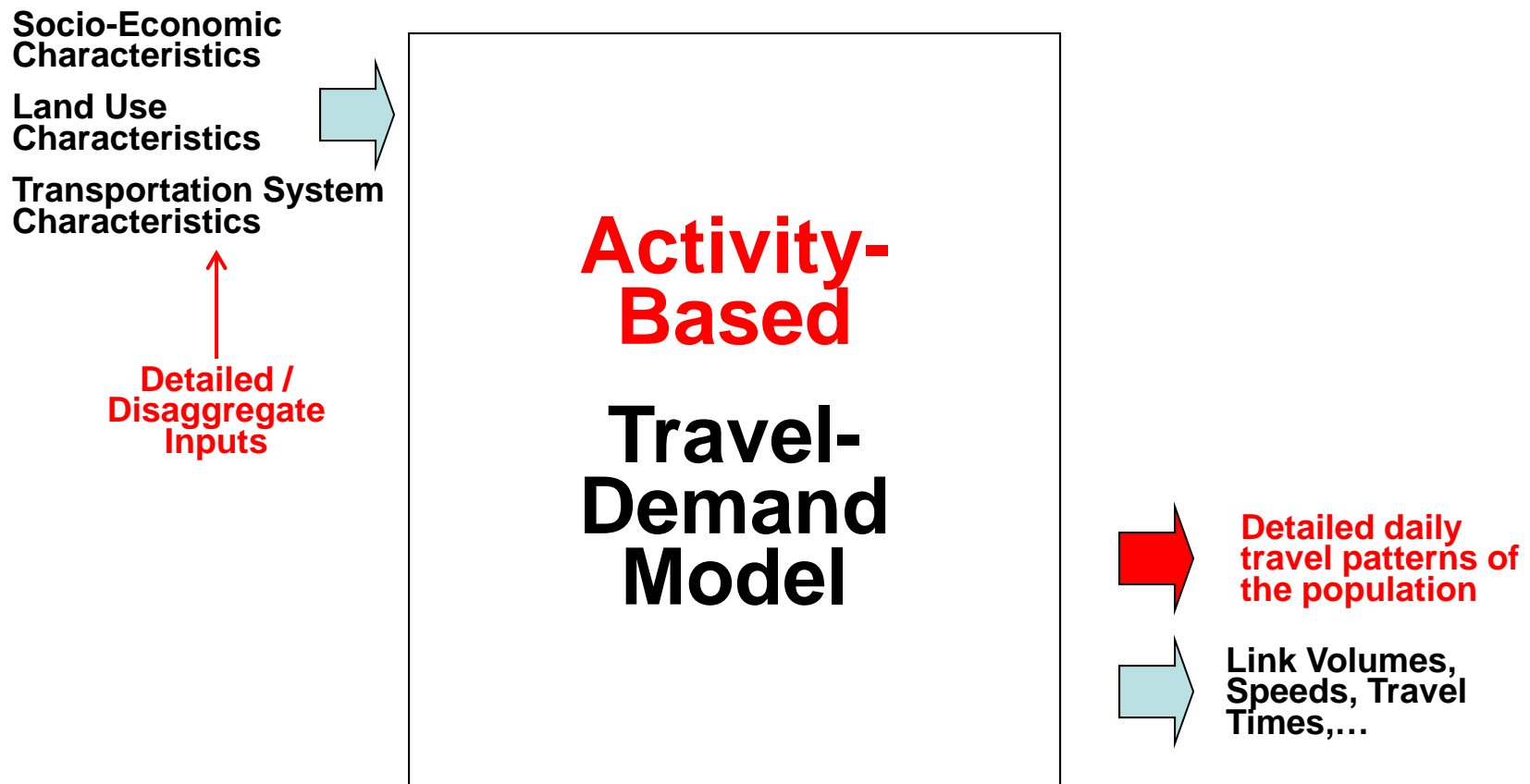
Activity-Based

Travel-Demand Model

Detailed daily travel patterns of the population

Link Volumes, Speeds, Travel Times,…

ABMs in the United States

Seattle
Portland
Oregon
Sacramento
Lake Tahoe
San Francisco
Bay Area
San Joaquin Valley
Los Angeles
San Diego
Denver
Phoenix
Dallas
Houston
Chicago
Columbus
Ohio
NY
Philadelphia
Atlanta
Jacksonville
Tampa
Miami

In application
Under development

ABMs in the United States

The CT-RAMP Family

New York*

Columbus

Bay Area MTC

Atlanta

San Diego

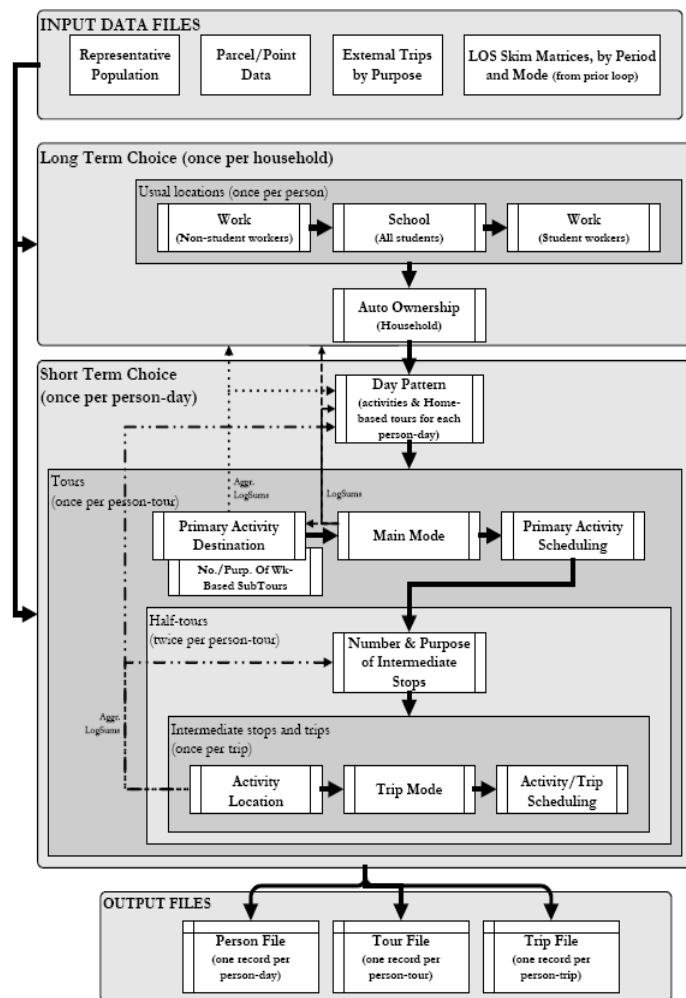Phoenix

Chicago

Miami

…more

The DaySim Family

Portland METRO**

San Francisco County

Sacramento

Seattle

Denver

Philadelphia

Tampa

Jacksonville

…more

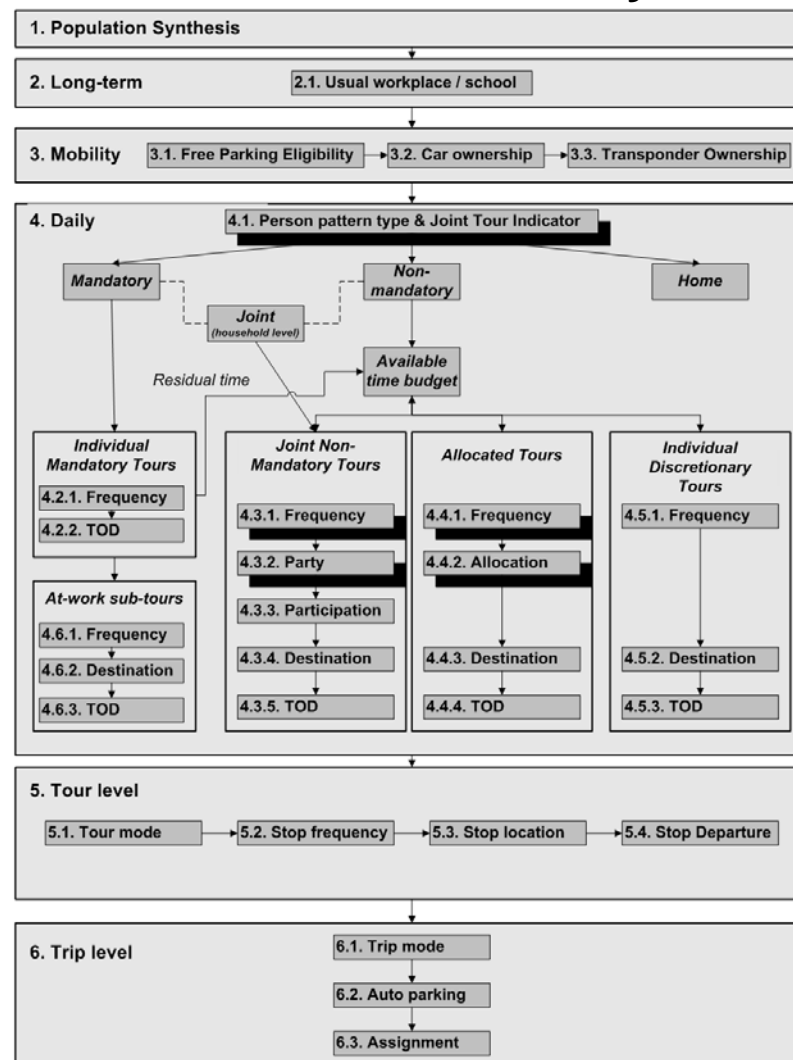***The New York Best Practice Model pre-dates the name CT-RAMP**

** The earliest implementation (1998) No longer in use

The Two Major Operational Frameworks

The DaySim Family

INPUT DATA FILES

Representative Population	Parcel/Point Data	External Trips by Purpose	LOS Skim Matrices, by Period and Mode (from prior loop)

Long Term Choice (once per household)

Usual locations (once per person)

- Work (Non-student workers)
- School (All students)
- Work (Student workers)

Auto Ownership (Household)

Short Term Choice (once per person-day)

Day Pattern (activities & Home-based tours for each person-day)

Tours (once per person-tour) — Aggr. LogSums — LogSums

- Primary Activity Destination
- No./Purp. Of Wk-Based SubTours
- Main Mode
- Primary Activity Scheduling

Half-tours (twice per person-tour) — Aggr. LogSums

Number & Purpose of Intermediate Stops

Intermediate stops and trips (once per trip)

- Activity Location
- Trip Mode
- Activity/Trip Scheduling

OUTPUT FILES

Person File (one record per person-day)	Tour File (one record per person-tour)	Trip File (one record per person-trip)

The CT-RAMP Family

1. Population Synthesis

2. Long-term — 2.1. Usual workplace / school

3. Mobility — 3.1. Free Parking Eligibility → 3.2. Car ownership → 3.3. Transponder Ownership

4. Daily — 4.1. Person pattern type & Joint Tour Indicator

- Mandatory
- Non-mandatory
- Home
- Joint (household level)
- Residual time
- Available time budget

Individual Mandatory Tours
- 4.2.1. Frequency
- 4.2.2. TOD

At-work sub-tours
- 4.6.1. Frequency
- 4.6.2. Destination
- 4.6.3. TOD

Joint Non-Mandatory Tours
- 4.3.1. Frequency
- 4.3.2. Party
- 4.3.3. Participation
- 4.3.4. Destination
- 4.3.5. TOD

Allocated Tours
- 4.4.1. Frequency
- 4.4.2. Allocation
- 4.4.3. Destination
- 4.4.4. TOD

Individual Discretionary Tours
- 4.5.1. Frequency
- 4.5.2. Destination
- 4.5.3. TOD

5. Tour level

5.1. Tour mode → 5.2. Stop frequency → 5.3. Stop location → 5.4. Stop Departure

6. Trip level

- 6.1. Trip mode
- 6.2. Auto parking
- 6.3. Assignment

Academic Models

CEMDAP - Dallas*, _Los Angeles_

AMOS - SE Florida*, Phoenix*

TASHA - Toronto*

ALBATROSS - Netherlands

ADAPTS

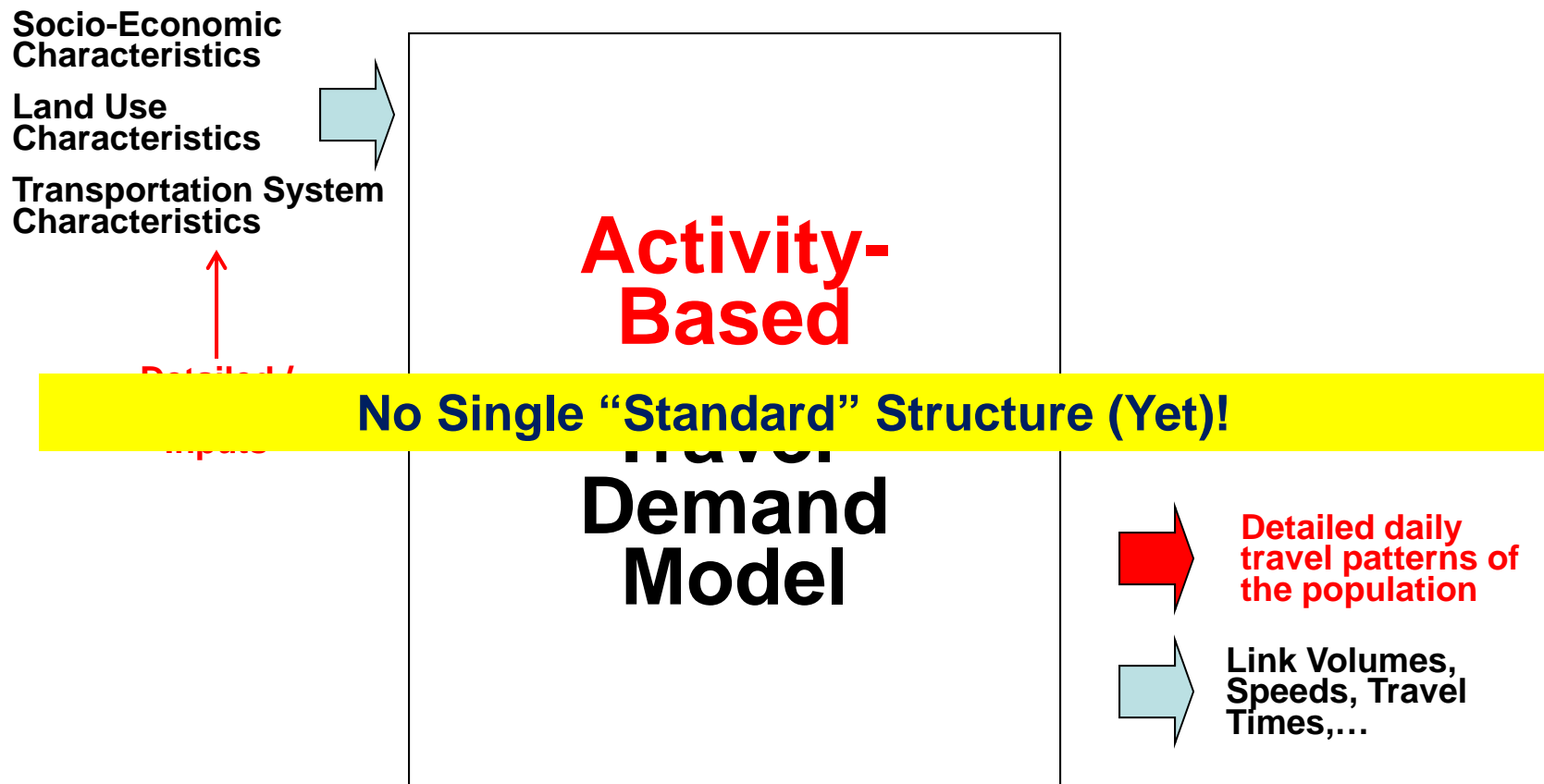DASH

…more

*Prototype regions
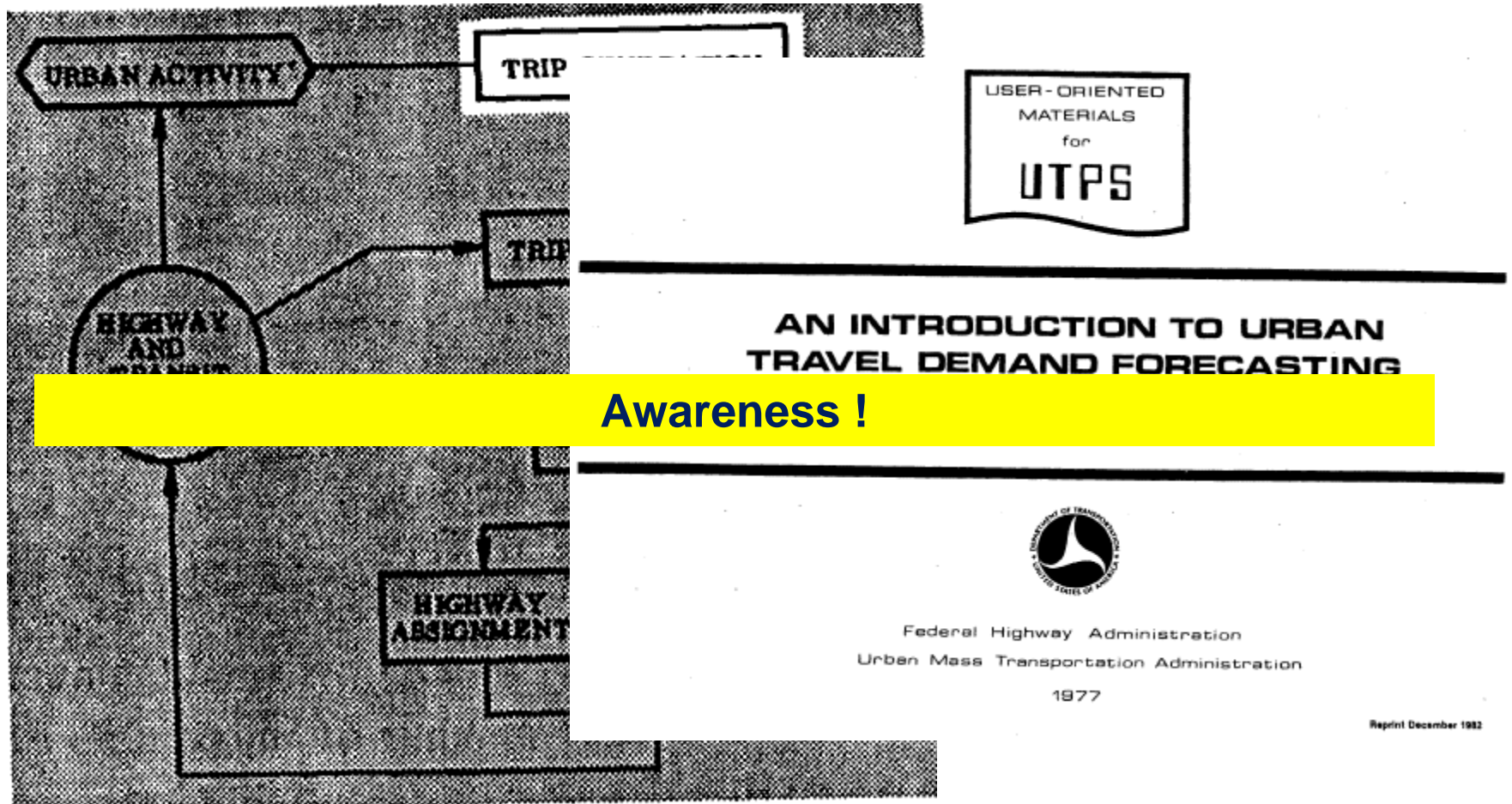
The Structure of Travel Demand Models

Socio-Economic Characteristics

Land Use Characteristics

Transportation System Characteristics

Detailed / Inputs

Activity-Based Travel Demand Model

No Single "Standard" Structure (Yet)!

Detailed daily travel patterns of the population

Link Volumes, Speeds, Travel Times,…

Okay, the Models are Different...

So what?

Why does it Matter?

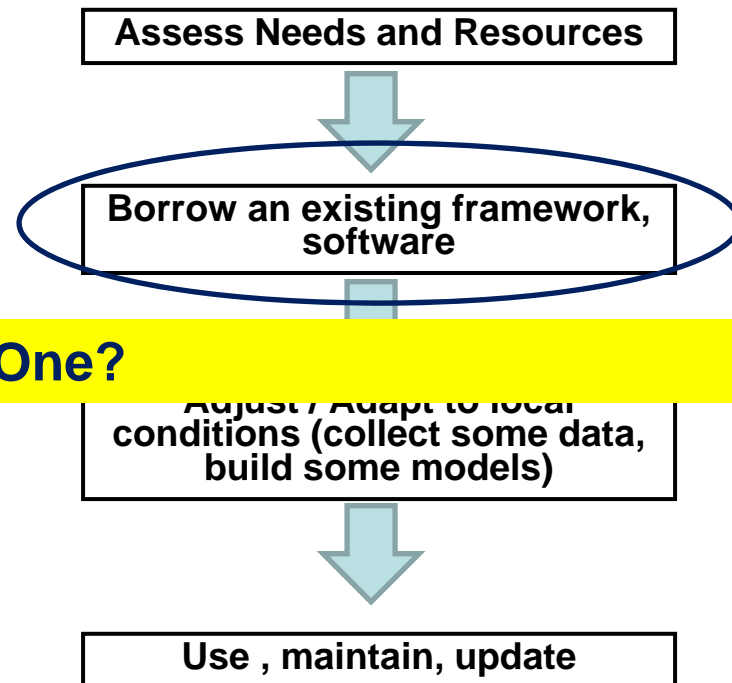# Why does it Matter?

To the Profession in General.....

USER-ORIENTED
MATERIALS
for
UTPS

**AN INTRODUCTION TO URBAN
TRAVEL DEMAND FORECASTING**

Awareness !

Federal Highway Administration
Urban Mass Transportation Administration
1977

Reprint December 1982

Why does it Matter?

To a region considering a ABM…..

The "research" approach

Assess Needs and Resources

↓

Develop a Modeling Framework

↓

Implement in Software

↓

Use , maintain, update

The "real world" approach

Assess Needs and Resources

↓

Borrow an existing framework, software

↓

Adjust / Adapt to local conditions (collect some data, build some models)

↓

Use , maintain, update

Which One?

Why does it Matter?

To a State DOT.......

NFRPM: DaySim

Other Areas: ??

CFRPM: ??

TRRPM:

Standardization ?

SERPM: CT-RAMP
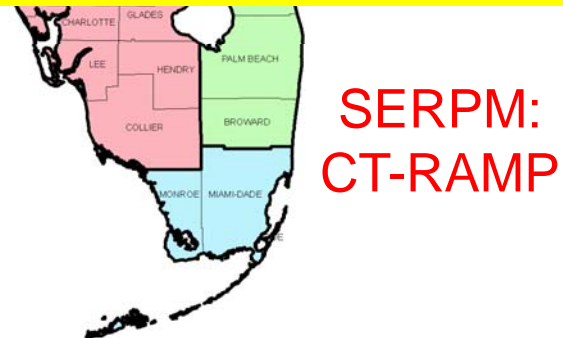
Why does it Matter?

To a Consultant / Model User........

Knowledge and Communication

Map labels: Seattle, Portland, Oregon, Sacramento, Lake Tahoe, San Francisco, Bay Area, San Joaquin Valley, San Diego, Chicago, Ohio, Columbus, NY, Philadelphia, Denver, Dallas, Houston, Jacksonville, Tampa, Miami

● In application
● Under development

Why does it Matter?

To a Software Vendor........
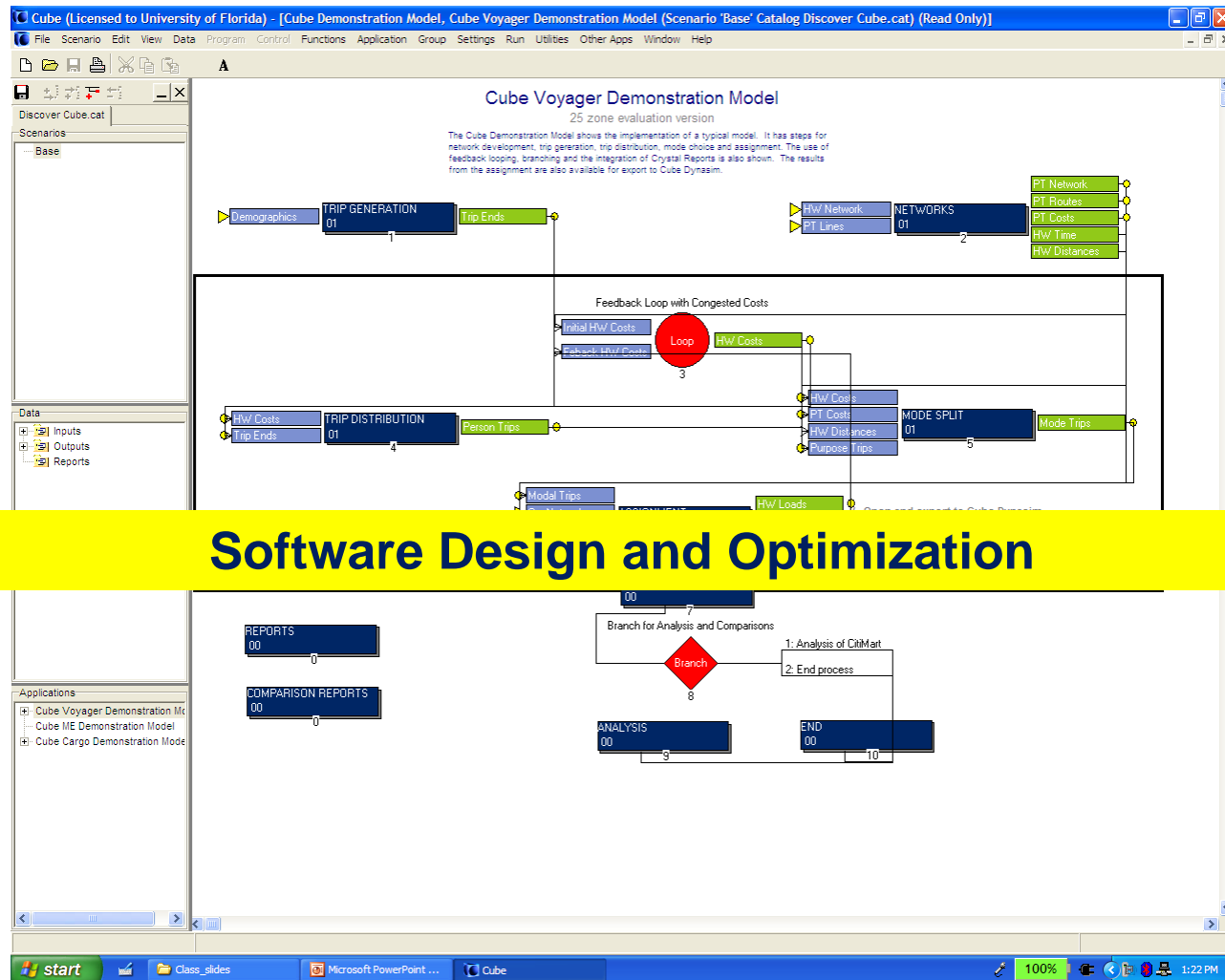
Software Design and Optimization

Why does it Matter?

To the Profession in General.....

Socio-Economic Characteristics

Land Use Characteristics

Transportation System Characteristics

Detailed/

Activity-Based

Travel Demand Model

Proactively shape the future "state of practice" model!

Detailed daily travel patterns of the population

Link Volumes, Speeds, Travel Times,…

Conceptual Similarities

ABMs simulate travel demand is in the form of an *internally-consistent* "travel diaries"

HH ID	Pers. ID	Tour ID	Trip ID	Purpose	Mode	Start	End	Origin	Dest.
1	1	1	1	Meals	Auto	7:30	8:20	853	872
1	1	1	2	Shop	Auto	9:16	9:40	872	881
1	1	1	3	Home	Auto	11:17	12:30	881	853
2	1	1	1	Work	Transit	7:30	8:00	854	600
2	1	1	2	Home	Transit	17:00	17:40	600	854
2	2	1	1	Appt.	Auto	10:00	10:15	854	862
2	2	1	2	Home	Auto	11:15	11:30	862	854
2	2	2	1	Shop	Auto	13:00	13:20	854	881
2	2	2	2	Home	Auto	14:20	14:40	881	854
.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.

Conceptual Similarities

ABMs simulate travel demand is in the form of an *internally-consistent* "travel diaries"

HH ID	Pers. ID	Tour ID	Trip ID	Purpose	Mode	Start	End	Origin	Dest.
1	1	1	1	Meals	Auto	7:30	8:20	853	872
1	1	1	2	Shop	Auto	9:16	9:40	872	881
1	1	1	3	Home	Auto	11:17	12:30	881	853

HH ID	Pers. ID	HH Size	# Cars	Income	Gender	Age	.	.
1	1	1	1	50,000	M	40	.	.
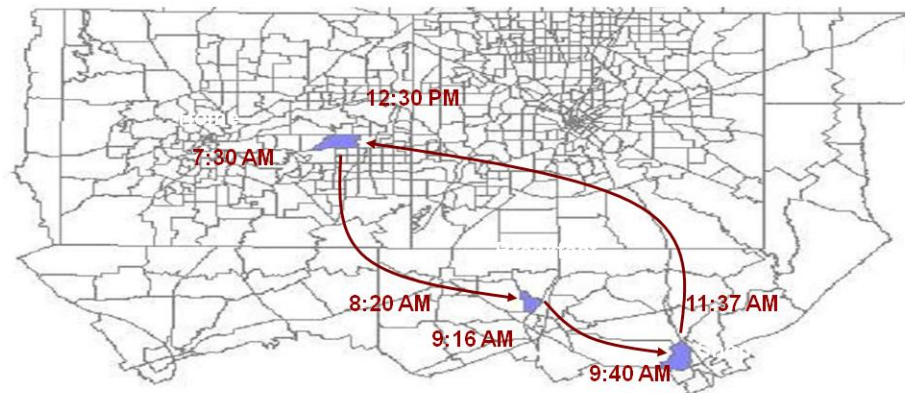
Conceptual Similarities

ABMs generate synthetic populations prior to similating travel demand

HH ID	Pers. ID	HH Size	# Cars	Income	Gender	Age	.	.
1	1	1	1	50,000	M	40	.	.
2	1	2	2	45,000	M	38	.	.
2	2	2	2	45,000	F	35	.	.
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.

A synthetic population is generated using aggregate socio-economic data (similar to what we currently use for 4-step models) as control totals

Conceptual Similarities

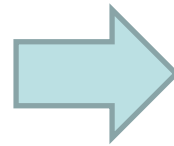ABMs distinguish between "long-term" and "short-term" choices
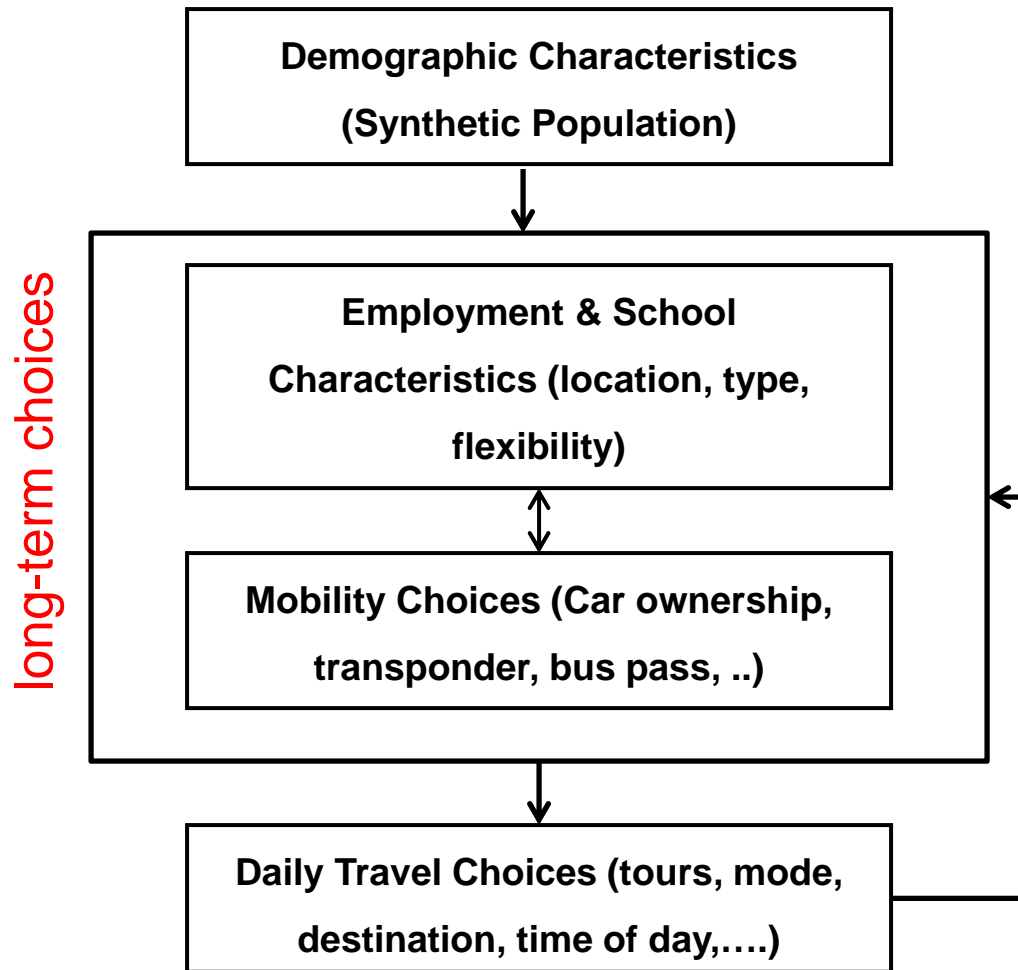
Conceptual Similarities

ABMs allow policies to affect <u>all</u> travel choices,
and <u>differentially</u> across population segments

Multi-modal transportation system characteristics

Land use and accessibility variables

Individual specific "log-sum" variables

Activity / Tour Generation, Mode, Destination, Time of Day, Joint Travel, ….

Conceptual Similarities

Trip Based Models allow limited policy sensitivity and equal sensitivities across population groups

Trip Generation

Trip Productions (P_i)

Zone	P_i
1	34
2	66

Trip Attractions (A_j)

Zone	A_j
1	82
2	18

Land use (employment data)

Trip Distribution

Friction factors (highway travel time)

From Zone	To Zone		
	1	2	Total P_i
1	27	7	34
2	55	11	66
Total A_j	82	18	100

Mode Choice

Travel times by mode (peak and off peak)
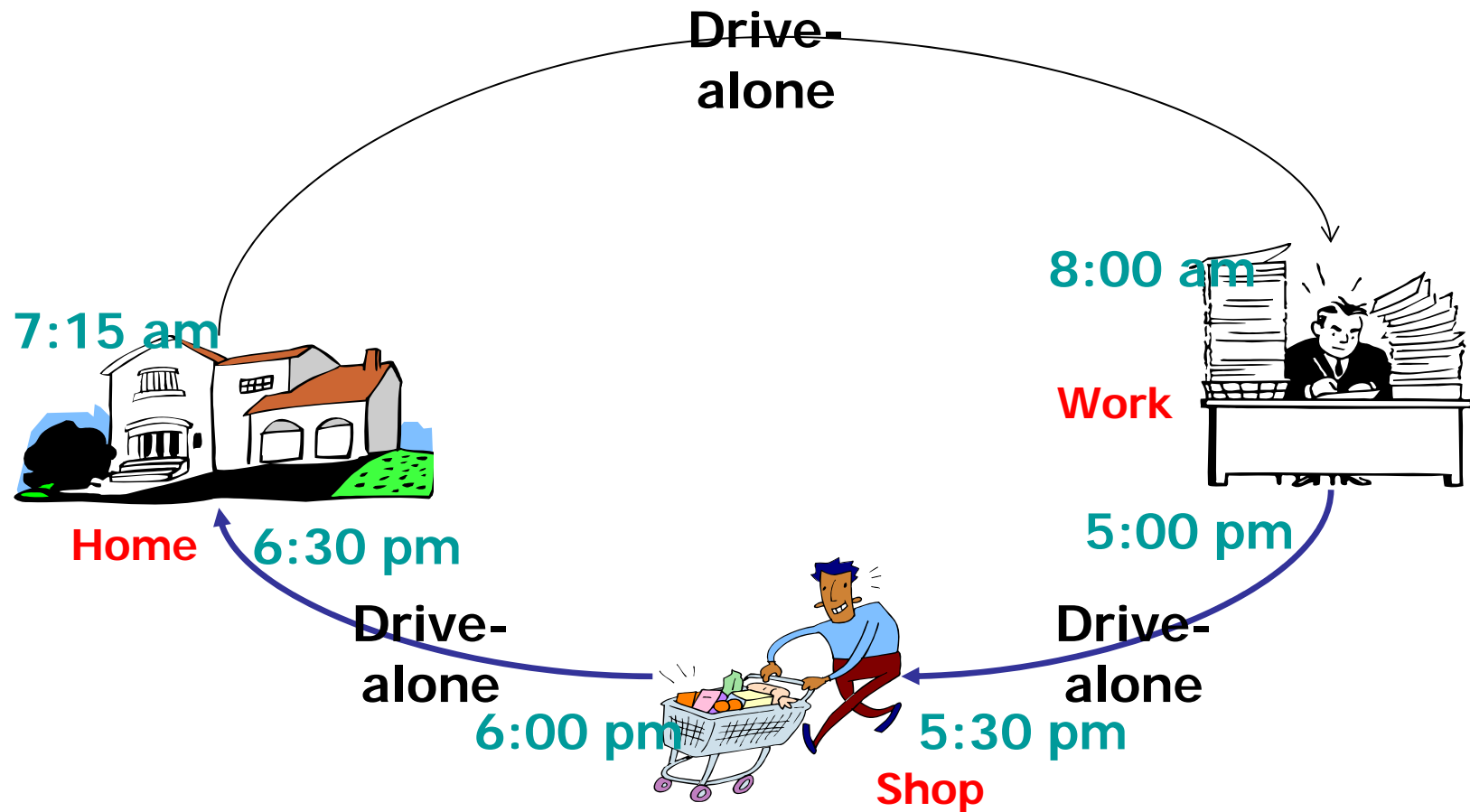
Mode	Trips (T_{ijm})
Auto	30
Transit	25

Trip Assignment

Route	Trips (T_{ijmr})
Route A	18
Route B	7

Conceptual Similarities

ABMs allow policies to affect <u>all</u> travel choices,
and <u>differentially</u> across population segments

Drive-alone

7:15 am

8:00 am

Home

Work

6:30 pm

5:00 pm

Drive-alone

Drive-alone

6:00 pm

5:30 pm

Shop

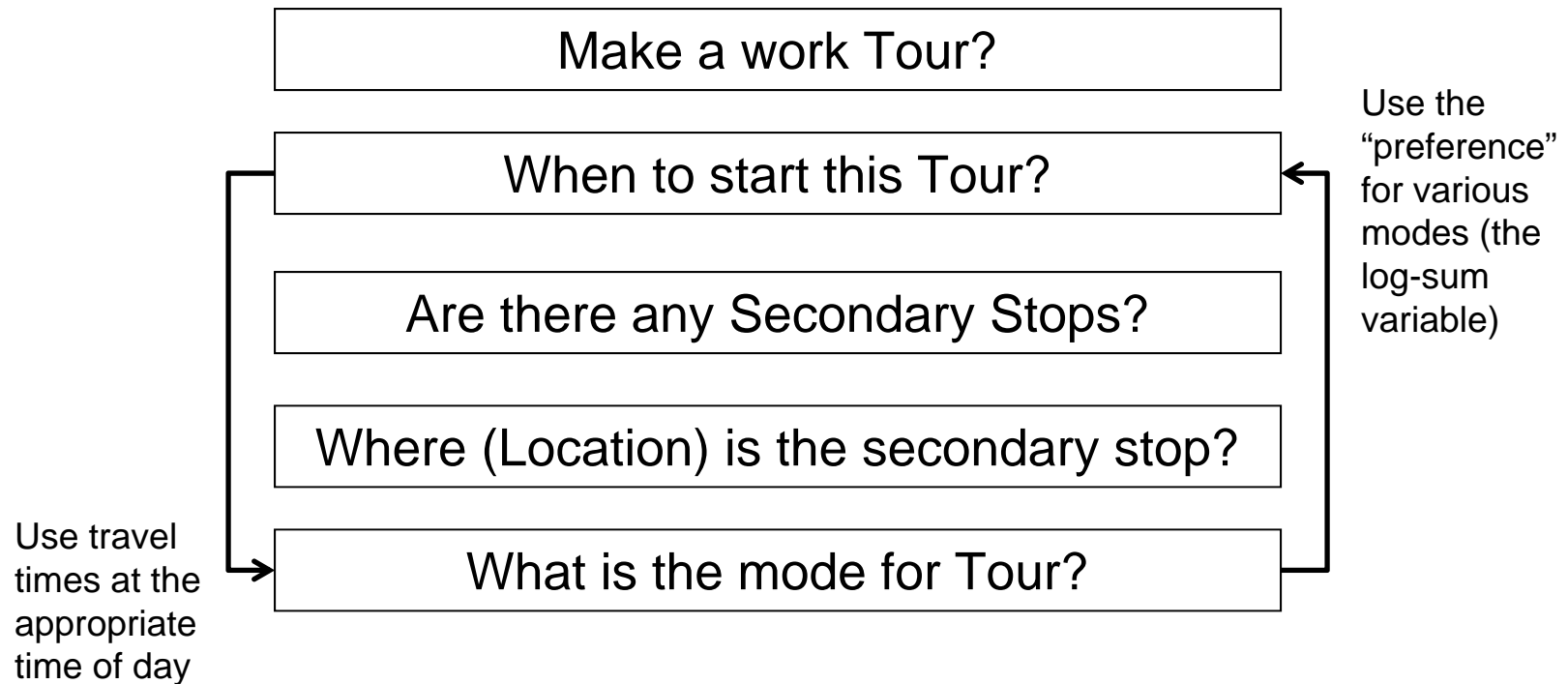# Conceptual Similarities

ABMs allow policies to affect <u>all</u> travel choices,
and <u>differentially</u> across population segments

Make a work Tour?

When to start this Tour?

Are there any Secondary Stops?

Where (Location) is the secondary stop?

What is the mode for Tour?

Use the "preference" for various modes (the log-sum variable)
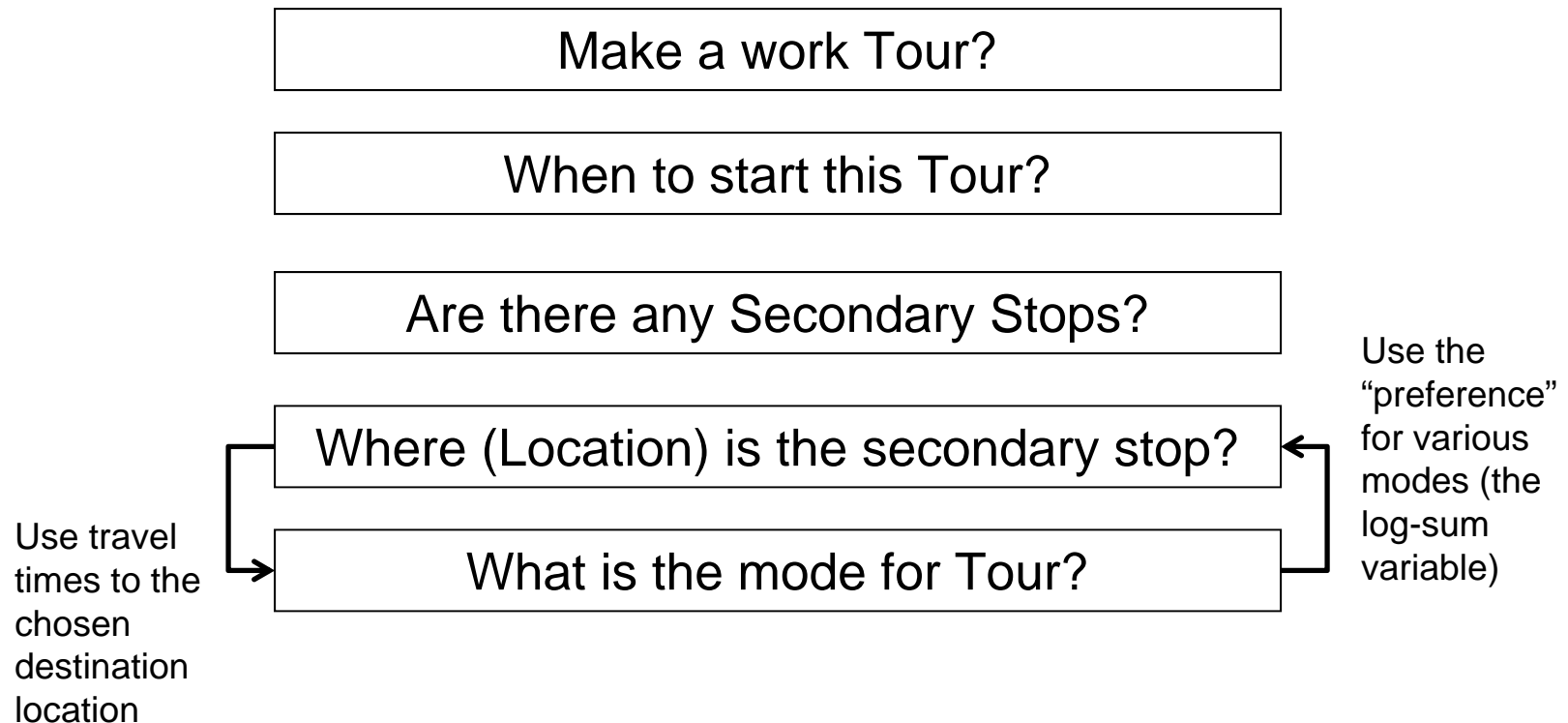
Use travel times at the appropriate time of day

Conceptual Similarities

ABMs allow policies to affect <u>all</u> travel choices,
and <u>differentially</u> across population segments

Make a work Tour?

When to start this Tour?

Are there any Secondary Stops?

Where (Location) is the secondary stop?

What is the mode for Tour?

Use the "preference" for various modes (the log-sum variable)

Use travel times to the chosen destination location

Operational Similarities

ABMs focus on internal-internal travel of residents
ABMs replace the first three steps of the four-step Model

Four-Step Model Structure

Zonal Socio-Economic Characteristics

Zonal Land Use Characteristics

Inter-Zonal Roadway Network Characteristics

Inter-zonal Transit Network Characteristics

→

```
┌─────────────────────┐
│   Trip Generation   │
└─────────────────────┘
          ↓
┌─────────────────────┐
│  Trip Distribution  │
└─────────────────────┘
          ↓
┌─────────────────────┐
│     Mode Split      │
└─────────────────────┘
          ↓
```

Internal-Internal Travel Demand of Residents by Mode ("OD Matrix")

External Travel (IE, EI, and EE) Demand

Freight Travel Demand

Non Resident Travel Demand

Total Daily Travel Demand by Mode ("OD Matrix")

```
┌─────────────────────┐        ┌─────────────────────┐
│ Highway Assignment  │        │ Transit Assignment  │
└─────────────────────┘        └─────────────────────┘
```

Operational Similarities

ABMs focus on internal-internal travel of residents
ABMs replace the first three steps of the four-step Model

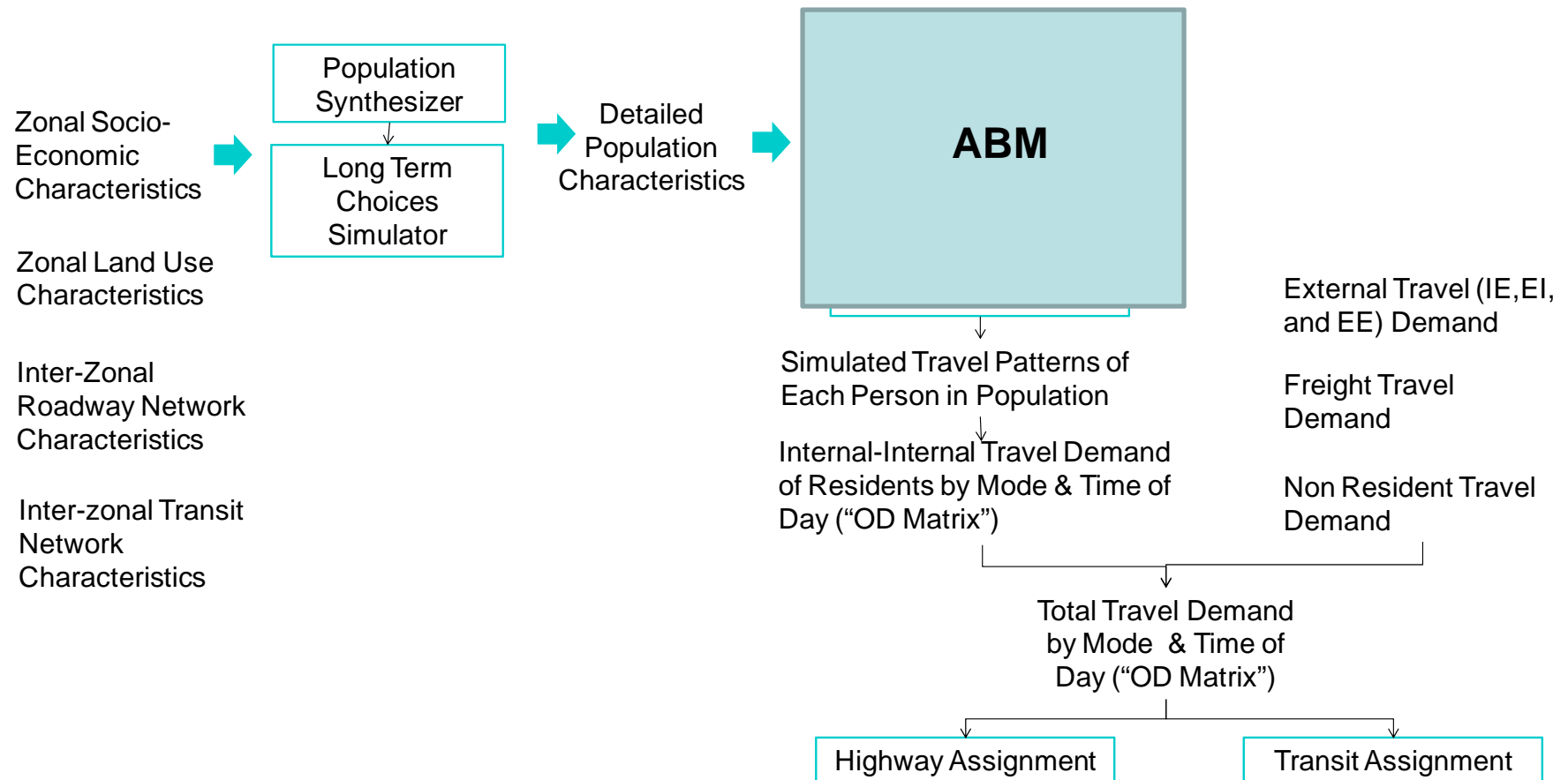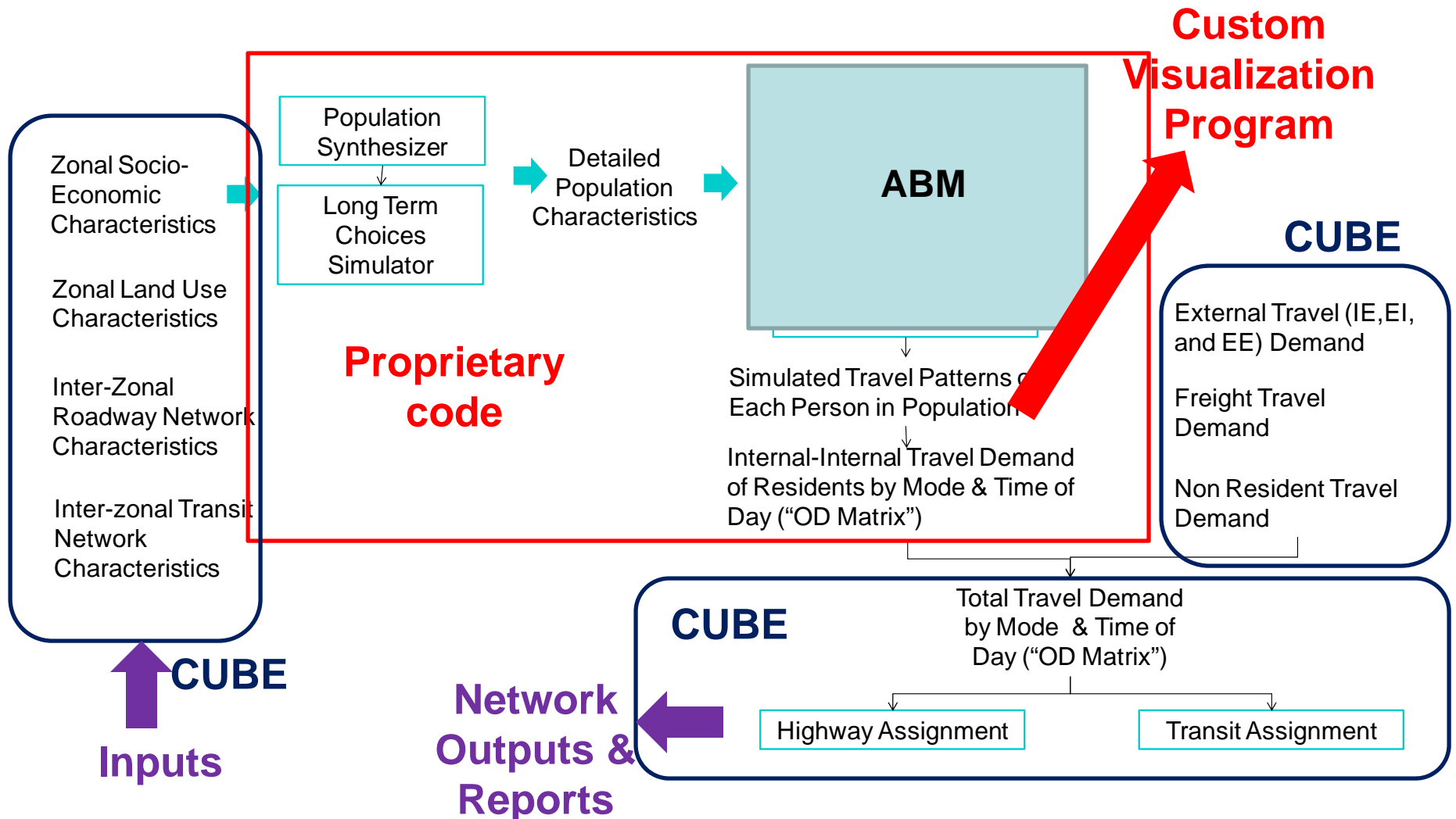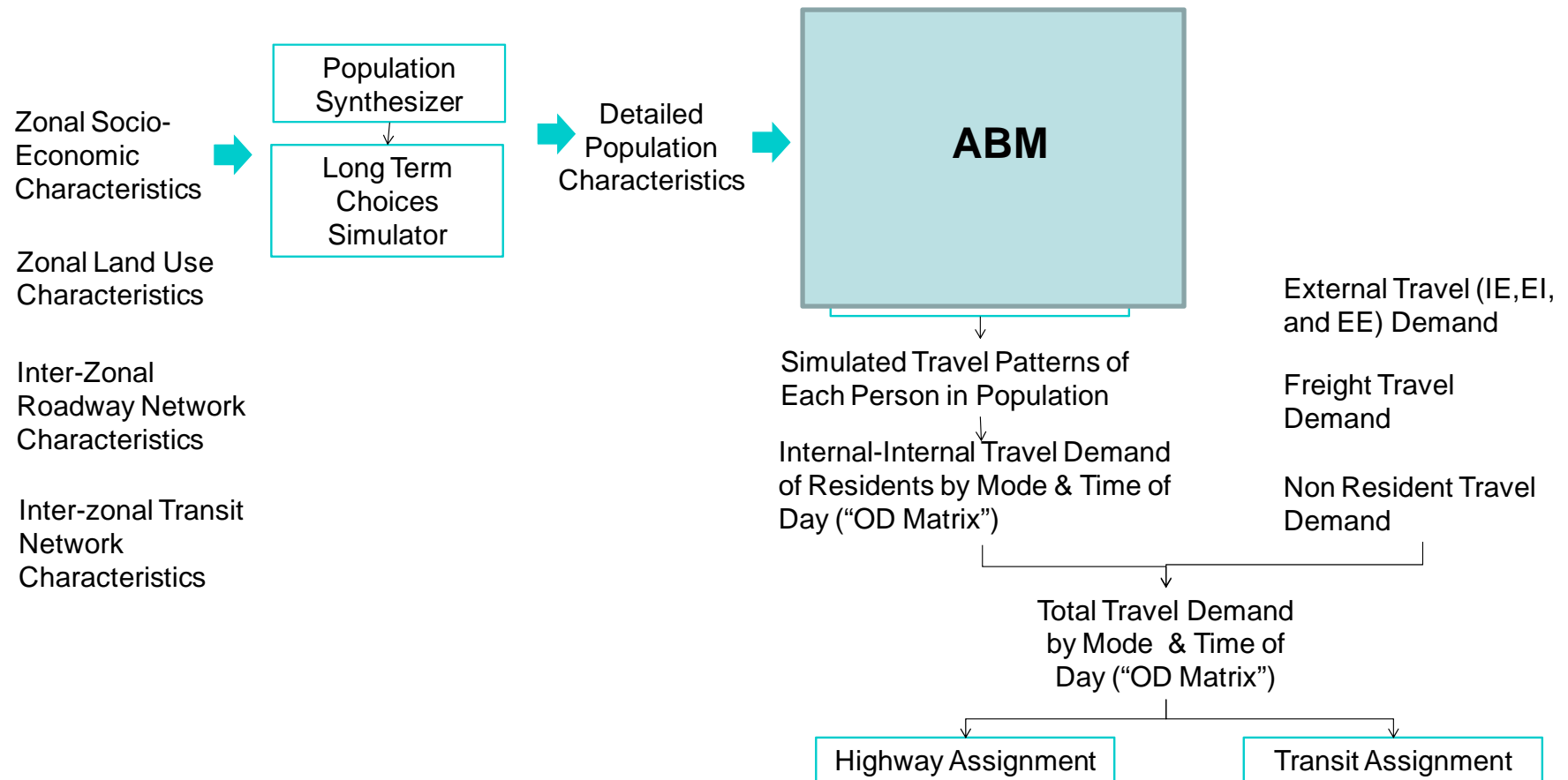## Activity-based Model Structure

Zonal Socio-Economic Characteristics

Zonal Land Use Characteristics

Inter-Zonal Roadway Network Characteristics

Inter-zonal Transit Network Characteristics

Population Synthesizer

Long Term Choices Simulator

Detailed Population Characteristics

ABM

Simulated Travel Patterns of Each Person in Population

Internal-Internal Travel Demand of Residents by Mode & Time of Day ("OD Matrix")

External Travel (IE,EI, and EE) Demand

Freight Travel Demand

Non Resident Travel Demand

Total Travel Demand by Mode & Time of Day ("OD Matrix")

Highway Assignment

Transit Assignment

Operational Similarities

ABMs interface with popular demand forecasting software

Custom Visualization Program

Inputs

CUBE

- Zonal Socio-Economic Characteristics
- Zonal Land Use Characteristics
- Inter-Zonal Roadway Network Characteristics
- Inter-zonal Transit Network Characteristics

Proprietary code

Population Synthesizer

Long Term Choices Simulator

Detailed Population Characteristics

ABM

Simulated Travel Patterns of Each Person in Population

Internal-Internal Travel Demand of Residents by Mode & Time of Day ("OD Matrix")

CUBE

- External Travel (IE,EI, and EE) Demand
- Freight Travel Demand
- Non Resident Travel Demand

CUBE

Total Travel Demand by Mode & Time of Day ("OD Matrix")

Highway Assignment

Transit Assignment

Network Outputs & Reports

Structural Differences

Activity-based Model Structure

Zonal Socio-Economic Characteristics

Zonal Land Use Characteristics

Inter-Zonal Roadway Network Characteristics

Inter-zonal Transit Network Characteristics

Population Synthesizer

Long Term Choices Simulator

Detailed Population Characteristics

ABM

Simulated Travel Patterns of Each Person in Population

Internal-Internal Travel Demand of Residents by Mode & Time of Day ("OD Matrix")

External Travel (IE,EI, and EE) Demand

Freight Travel Demand

Non Resident Travel Demand

Total Travel Demand by Mode & Time of Day ("OD Matrix")

Highway Assignment

Transit Assignment

Some Definitions

A Home-Based Tour

Three <u>trips</u> in this <u>tour</u> (Home–Work, Work–Shop, Shop–Home)

Two <u>stops</u> in this <u>tour</u> (Work and Shop)

Drive-alone

7:15 am

Home

6:30 pm

Tour Mode = "Drive Alone"

8:00 am

Work

Tour Purpose = "Work"
Primary Destination/Stop
Stop Duration = 9 Hours

5:00 pm

Drive-alone

5:30 pm

Drive-alone

6:00 pm

Shop

Secondary Stop
Stop Purpose = "Shop"
Stop Duration = 30 minutes

Drive-alone
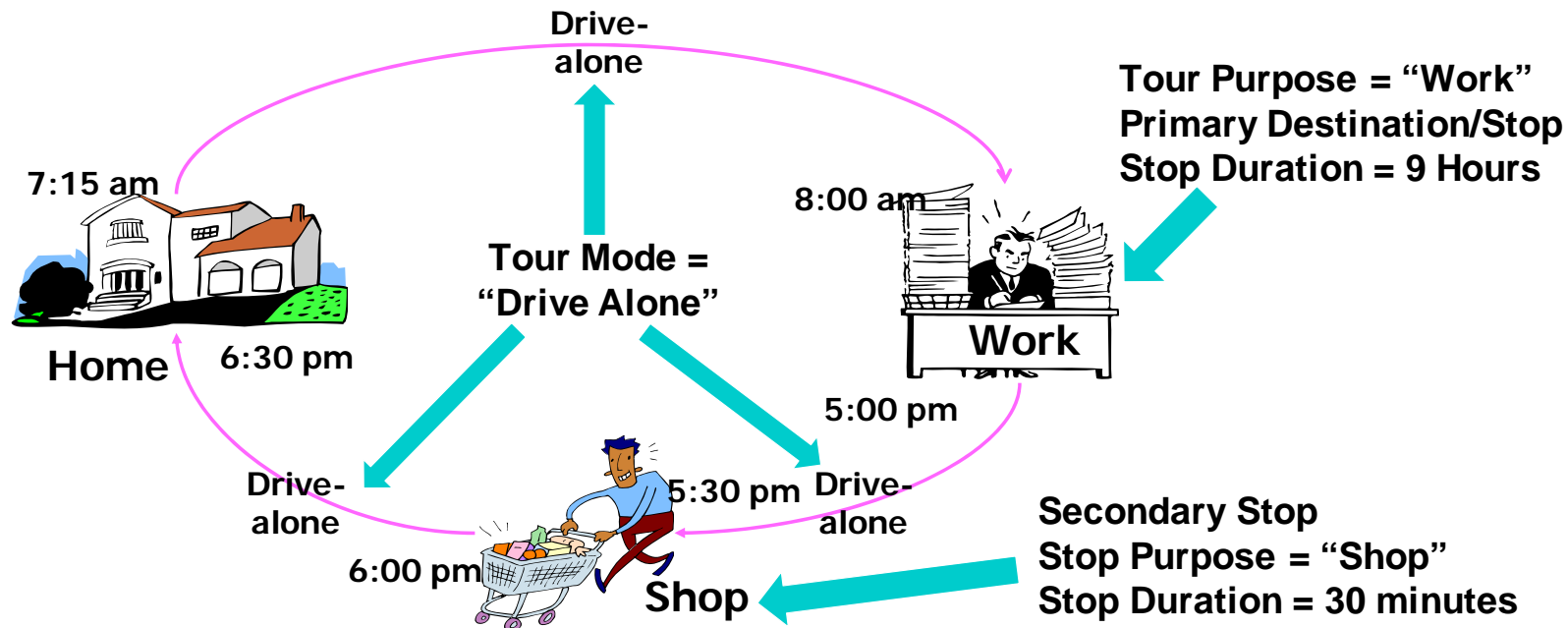
Structural Differences

The Day Activity Pattern (DAP) Module

The first step in both DaySim and CT-RAMP models

Determines what tour purposes an individual wants to undertake during the day

Analogous to the "trip generation" module in the four-step model

Structural Differences

The Day Activity Pattern (DAP) Module: **The DaySim Approach**

Assume that there are two tour purposes work (W) and non-work (NW)

What patterns are possible for any individual?

- **Neither W nor NW (at home)**
- **Only W**
- **Only NW**
- **Both W and NW**

NOTE: Only W means one or more work tours are undertaken, the extract number of such tours is determined later

Structural Differences

The Day Activity Pattern (DAP) Module: **The DaySim Approach**

Assume that there are two tour purposes work (W) and non-work (NW)

Each tour may or may not have secondary stops (trip chaining present or absent)

Considering both issues above, what patterns are possible for any individual?

- **Neither W nor NW (at home)**

- **Only W (w/o stops)**

- **Only W (w stops)**

- **Only NW (w/o stops)**

- **Only NW (w stops)**

- **W (w/o stops) & NW (w/o stops)**

- **W (w/o stops) & NW (w stops)**

- **W (w stops) & NW (w/o stops)**

- **W (w stops) & NW (w stops)**

Structural Differences

The Day Activity Pattern (DAP) Module: **The DaySim Approach**

- **Neither W nor NW (at home)**

- **Only W (w/o stops)**

- **Only W (w stops)**

- **Only NW (w/o stops)**

- **Only NW (w stops)**

- **W (w/o stops) & NW (w/o stops)**

- **W (w/o stops) & NW (w stops)**

- **W (w stops) & NW (w/o stops)**

- **W (w stops) & NW (w stops)**

The DAP Module in DaySim which of these patterns is chosen by each *person*

Generally seven tour purposes are considered, and so there are many, many more possible patterns

Structural Differences

The Day Activity Pattern (DAP) Module: **The CT-RAMP Approach**

For each person, the day is classified into Mandatory (M), Non-Mandatory(NM), and Home (H)

For a household with two persons (workers), what patterns are possible?

- **M (P1) & M (P2)**
- **M (P1) & NM (P2)**
- **M (P1) & H (P2)**

- **NM (P1) & M (P2)**
- **NM (P1) & NM (P2)**
- **NM (P1) & H (P2)**

- **H (P1) & M (P2)**
- **H (P1) & NM (P2)**
- **H (P1) & H (P2)**

NOTE: M means one or more mandatory tours are undertaken, the extract number of such tours is determined later

Structural Differences

The Day Activity Pattern (DAP) Module: **The CT-RAMP Approach**

When neither member chooses (H), joint travel is also possible!

Considering both, for a household with two persons (workers), what patterns are possible?

- **M (P1) & M (P2) & No Joint**
- **M (P1) & M (P2) & Joint**
- **M (P1) & NM (P2) & No Joint**
- **M (P1) & NM (P2) & Joint**

- **NM (P1) & M (P2) & No Joint**
- **NM (P1) & M (P2) & Joint**
- **NM (P1) & NM (P2) & No Joint**
- **NM (P1) & NM (P2) & Joint**

- **M (P1) & H (P2)**
- **NM (P1) & H (P2)**

- **H (P1) & M (P2)**
- **H (P1) & NM (P2)**
- **H (P1) & H (P2)**

Structural Differences

The Day Activity Pattern (DAP) Module: **The CT-RAMP Approach**

- **M (P1) & M (P2) & No Joint**
- **M (P1) & M (P2) & Joint**
- **M (P1) & NM (P2) & No Joint**
- **M (P1) & NM (P2) & Joint**
- **NM (P1) & M (P2) & No Joint**
- **NM (P1) & M (P2) & Joint**
- **NM (P1) & NM (P2) & No Joint**
- **NM (P1) & NM (P2) & Joint**
- **M (P1) & H (P2)**
- **NM (P1) & H (P2)**
- **H (P1) & M (P2)**
- **H (P1) & NM (P2)**
- **H (P1) & H (P2)**

The DAP Module in CT-RAMP which of these patterns is chosen by each *household*

Many households have more than two persons, and so there are many, many more possible patterns

Structural Differences

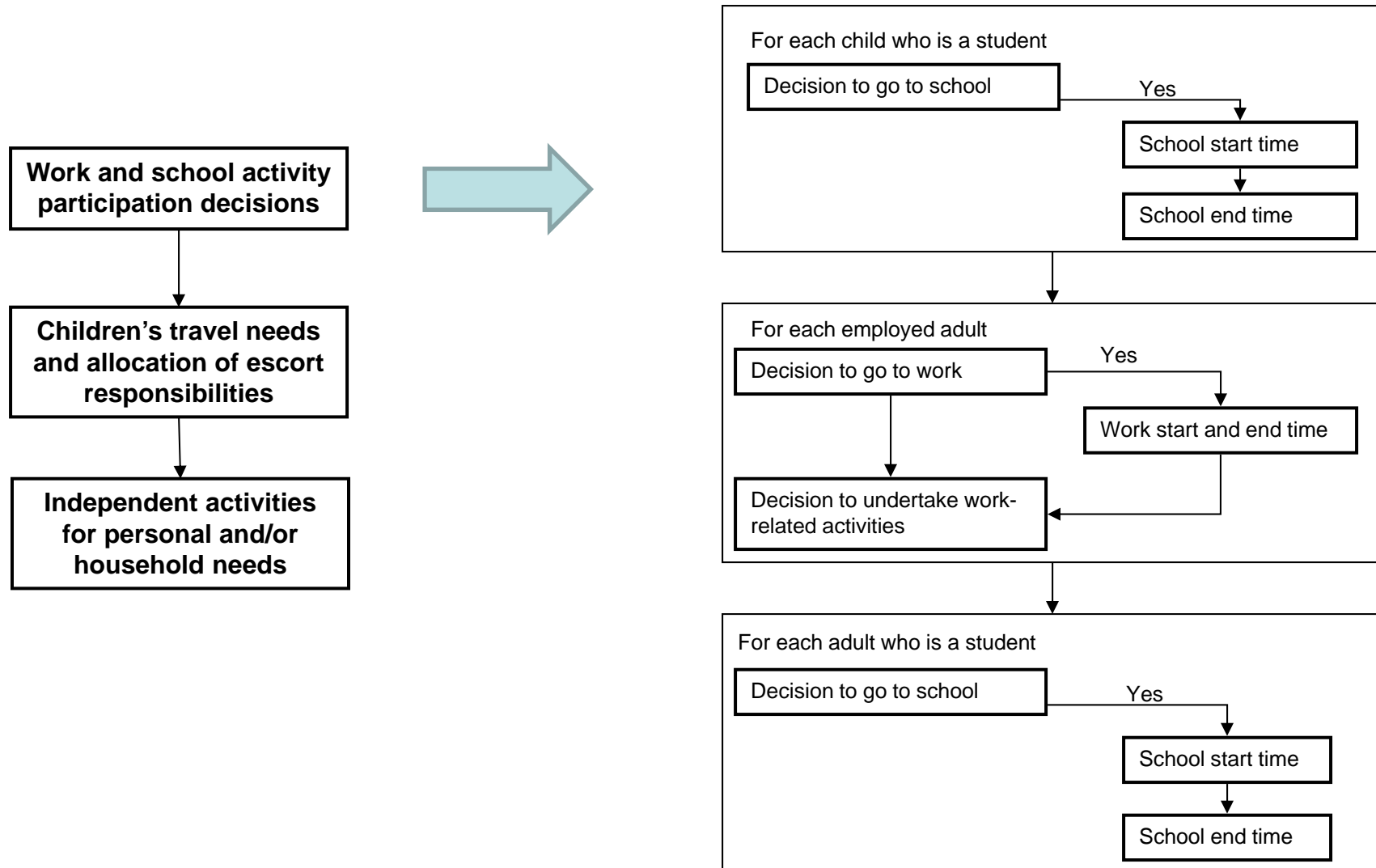The Day Activity Pattern (DAP) Module

DaySim's I-DAP approach

- **Neither W nor NW (at home)**
- **Only W (w/o stops)**
- **Only W (w stops)**
- **Only NW (w/o stops)**
- **Only NW (w stops)**
- **W (w/o stops) & NW (w/o stops)**
- **W (w/o stops) & NW (w stops)**
- **W (w stops) & NW (w/o stops)**
- **W (w stops) & NW (w stops)**

CT-RAMP's C-DAP approach

- **M (P1) & M (P2) & No Joint**
- **M (P1) & M (P2) & Joint**
- **M (P1) & NM (P2) & No Joint**
- **M (P1) & NM (P2) & Joint**
- **NM (P1) & M (P2) & No Joint**
- **NM (P1) & M (P2) & Joint**
- **NM (P1) & NM (P2) & No Joint**
- **NM (P1) & NM (P2) & Joint**
- **M (P1) & H (P2)**
- **NM (P1) & H (P2)**
- **H (P1) & M (P2)**
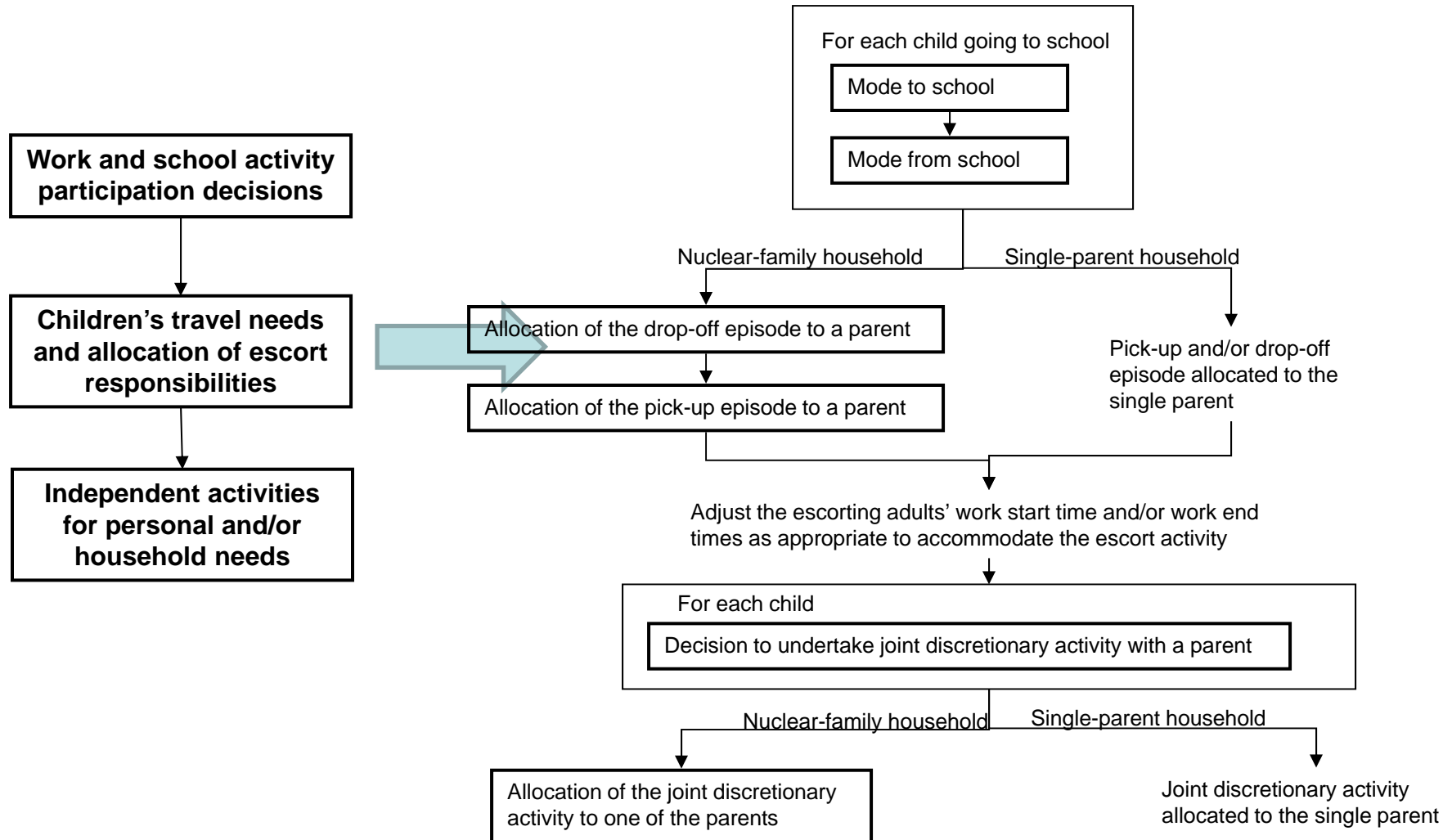- **H (P1) & NM (P2)**
- **H (P1) & H (P2)**

Structural Differences
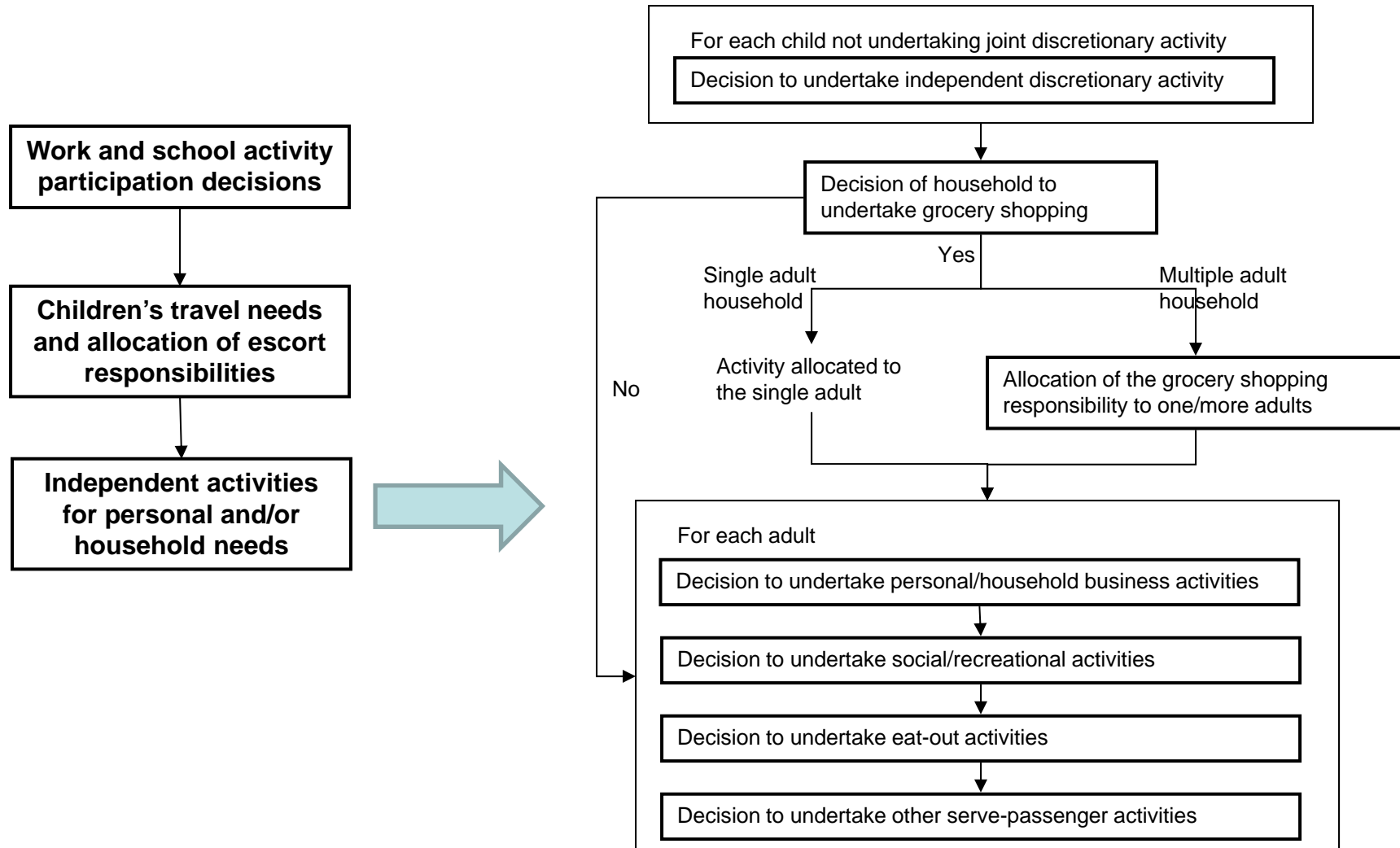
The CEMDAP approach: The Generation-Allocation Module

Work and school activity participation decisions

↓

Children's travel needs and allocation of escort responsibilities

↓

Independent activities for personal and/or household needs

⟹

For each child who is a student

| Decision to go to school | Yes → |

School start time
↓
School end time

↓

For each employed adult

Decision to go to work — Yes →

Work start and end time

↓

Decision to undertake work-related activities

↓

For each adult who is a student

Decision to go to school — Yes →

School start time
↓
School end time

Structural Differences

The CEMDAP approach: The Generation-Allocation Module

Work and school activity participation decisions

Children's travel needs and allocation of escort responsibilities

Independent activities for personal and/or household needs

For each child going to school

Mode to school

Mode from school

Nuclear-family household

Single-parent household

Allocation of the drop-off episode to a parent

Allocation of the pick-up episode to a parent

Pick-up and/or drop-off episode allocated to the single parent

Adjust the escorting adults' work start time and/or work end times as appropriate to accommodate the escort activity

For each child

Decision to undertake joint discretionary activity with a parent

Nuclear-family household

Single-parent household

Allocation of the joint discretionary activity to one of the parents

Joint discretionary activity allocated to the single parent

Structural Differences

The CEMDAP approach: The Generation-Allocation Module

Work and school activity participation decisions

↓

Children's travel needs and allocation of escort responsibilities

↓

Independent activities for personal and/or household needs

⇒

For each child not undertaking joint discretionary activity

Decision to undertake independent discretionary activity

↓

Decision of household to undertake grocery shopping

Yes

Single adult household

Multiple adult household

Activity allocated to the single adult

Allocation of the grocery shopping responsibility to one/more adults

No

For each adult

Decision to undertake personal/household business activities

↓

Decision to undertake social/recreational activities

↓

Decision to undertake eat-out activities

↓

Decision to undertake other serve-passenger activities

A Note on Household Interactions

- Allocation of Household Maintenance Responsibility
    - multiple members of the same household generally not found to do grocery shopping on the same day

- Joint Travel & Activity Participation of Household Members
    - getting vehicle trips right
    - choosing "car pool" is not the decision of a single person
    - constraints on other individual trips

- Child Care
    - stay at home to take care of a child
    - escort child to/from school and other activities
    - joint participation in activities with children

- Auto Allocation
    - single vehicle / multi-driver households

Structural Differences

Tour Frequency and Primary Destination Location

Largely similar approaches across DaySim and CT-RAMP

Across tour purposes, the more important tours are generated first (mandatory > maintenance > leisure)

In CT-RAMP, the joint tours are generated before independent leisure tours

Some implementations explicitly consider the times and time-of-day periods already allocated to previous tours in generating further tours

Every tour has a primary activity and the location of this activity is modeled – except when this primary activity is work (work location is a "long-term" choice)

Structural Differences

Tour Time of Day

Total tour duration is known & all activities and travel for this tour are fit within this time window

Drive-alone

CT-RAMP

7:15 am

Home   6:30 pm

8:00 am

Work

5:00 pm

DaySim

Drive-alone

5:30 pm   **Drive-alone**

6:00 pm   **Shop**

Drive-alone
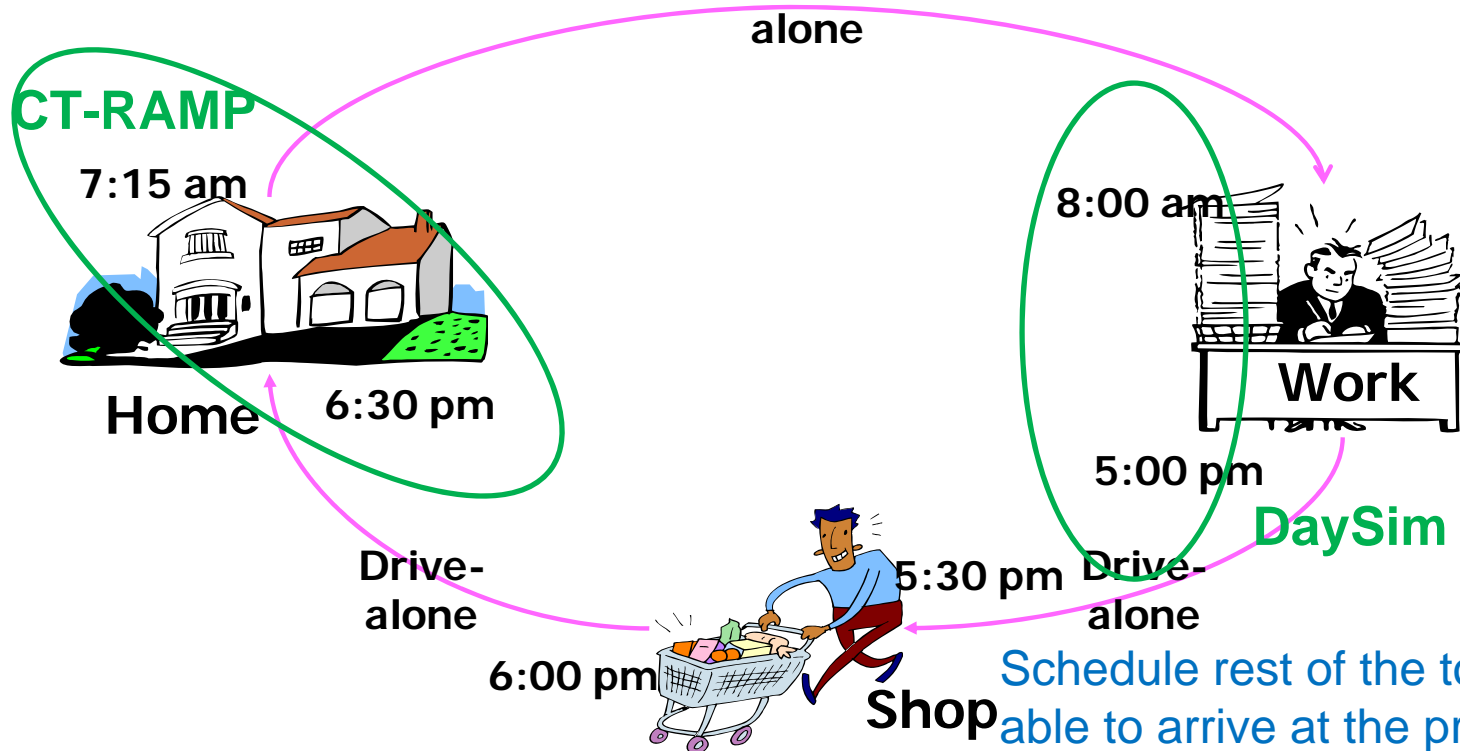
Schedule rest of the tour to be able to arrive at the primary location at the required time & stay there for the required duration

Structural Differences

Tour & Trip Time of Day

At the tour level, the departure and arrival times are determined *simultaneously* by both models

Generally, the day is divided into 30-minute periods and the arrival / departures times can fall within one of these discrete periods

Within a tour, additional stops are generally chronologically inserted.

Structural Differences

Time of Day in CEMDAP
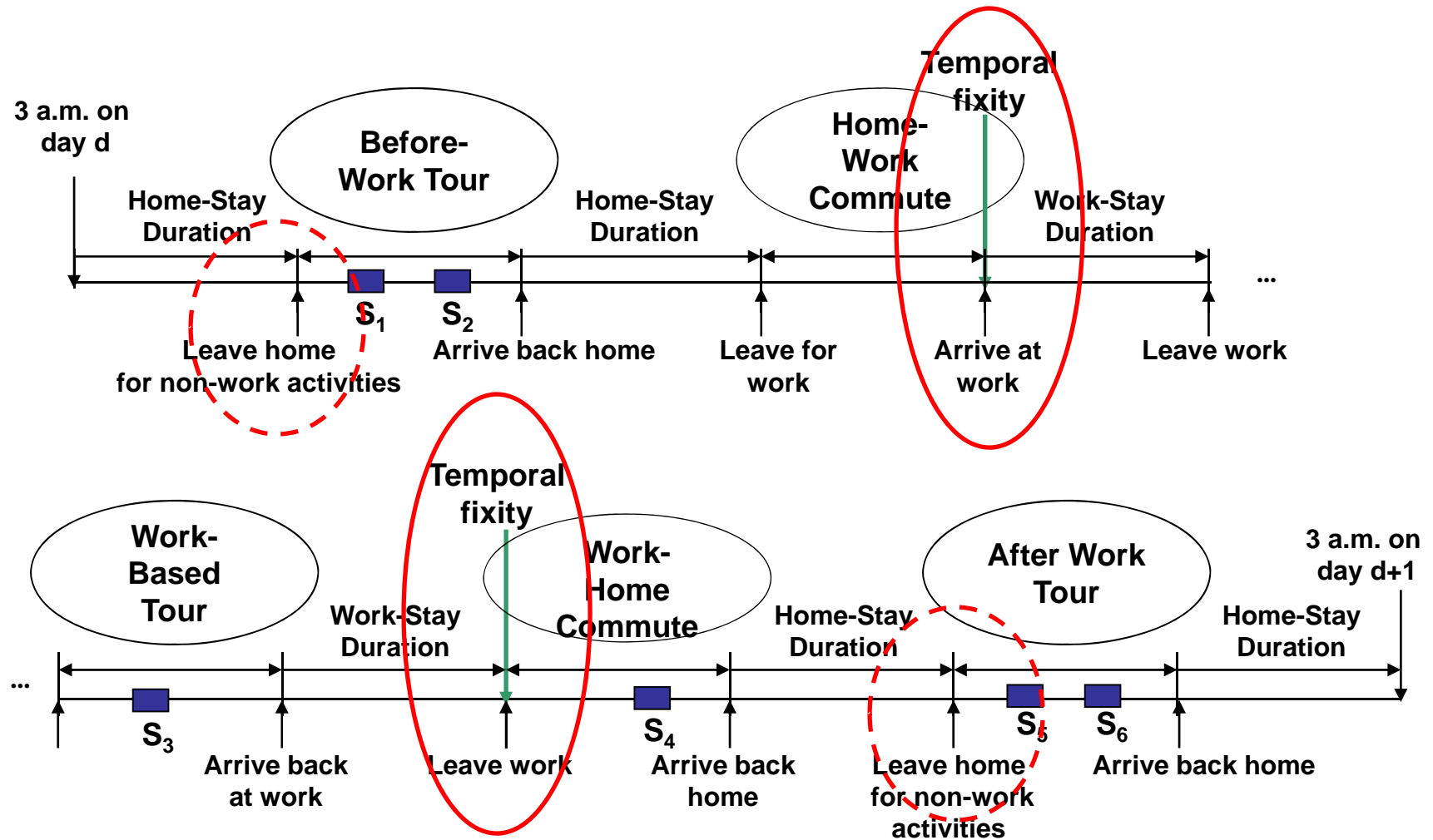
Structural Differences

Tour and Trip Mode

Largely similar approaches across DaySim and CT-RAMP

DaySim:

Trip chaining (determined from DAP module) determined *before* Tour Mode

CT-RAMP:

Tour Mode is determined *before* determining number of secondary stops (Trip chaining is not known from DAP)

Implementation Differences

- Statistically significant explanatory variables effecting the different travel choices

- Representation of space (especially for calculating accessibilities by mode)

- Number of time-of-day periods for network assignment

- Upward compatibilities achieved via "log-sum" terms

- Adding in all the other non-residential travel demands

- Feedback of assignment results back to demand generation

In Summary …..

Conceptually

All ABMs simulate internally-consistent (individual level) travel patterns of people

All ABMs distinguish between long-term and short-term choices

All ABMs strive for extensive policy sensitivity

Practically

Alls ABMs focus on the resident internal-internal travel (data issues)

All ABMs still use static-assignment techniques for network loading

All ABMs involve proprietary code interfaced with popular planning software

Structurally

ABMs adopt different approaches to generating the overall travel patterns

Some ABMs do better with ensuring intra-household consistency in travel choices

Are still evolving!

Closing Thoughts

Which ABM should I use?

Choices that are modeled but differently……
- We <u>don't know</u> whether one approach is necessary superior than the other!
- We <u>do</u> know that a consistent travel pattern can be generated by both approaches!

Choices that are modeled in one but not the other……….
- Is there a critical policy need for incorporating that travel choice?
- Do we have the data to support modeling the additional choice?
- What are the overheads (run times?)
- Is there something more important that I would rather invest in now?

Implementation Issues (software etc.)
- Talk to current uses of that product!

Closing Thoughts

Will there be a "Standard" ABM?

ABM as a conceptual standard ?

- Forget about terms such home-based trips, non-home-based trips, productions, attractions, friction factors, …
- Move towards modeling individual-level tours and activity patterns…
- Yes, that can happen

A structural standard for ABM ?

- A new "N" step model to replace the four-step model?
- Probably not a good idea….
- Allow larger MPOs with more complex policy questions & data availability to have an elaborate model
- Allow smaller regions with limited forecasting needs and data availability to have an simpler model

Conceptual Standardization and Structural Innovations – The Approach for Future FSUTMS?