

SOCIOECONOMIC DATA AND MODELING

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MAG INFORMATION SERVICES

TRANSIT COMMITTEE
JANUARY 8TH, 2015

Socioeconomic Modeling - Overview

- What do we do?
 - Latest official projections (adopted by MAG Regional Council mid-2013) from 2010 to 2040
 - Resident, Seasonal, and Special (e.g. GQ) Population categories
 - Dwelling Units by Type (SF, MF)
 - Employment by Industry Sector (2 digit NAICS) and Land Use Type (e.g. retail, industrial)
- Why do we do it?
 - Arizona Executive Order 2011-04
 - Transportation and Air Quality Planning and Modeling needs
 - Increasingly complex questions from stakeholders, policy analysis
- How does it get done?

Primary Input Databases

Physical and Built Environment

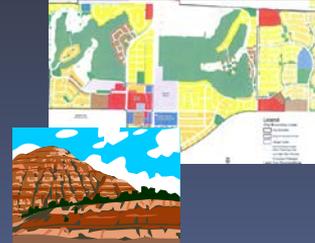
Parcels / Zones



Built space



Constraints



Development Projects



Unique ID Field	Parcel id/ Zone id	Building id	Constraint id	Proposal id, Template id
Location Links	Zones, tract, cities, zip codes...	Parcel id / Zone id	Parcel id / Zone id	Parcel id / Zone id
Data Source	Census boundaries, Assessors parcels, etc.	Assessors data	City/ Town General Plan, Slopes, Flood plains, env. sensitive areas, etc.	Known development projects from City/Town

Primary Input Databases

Building occupants/agents

Households



Persons



Businesses



Jobs

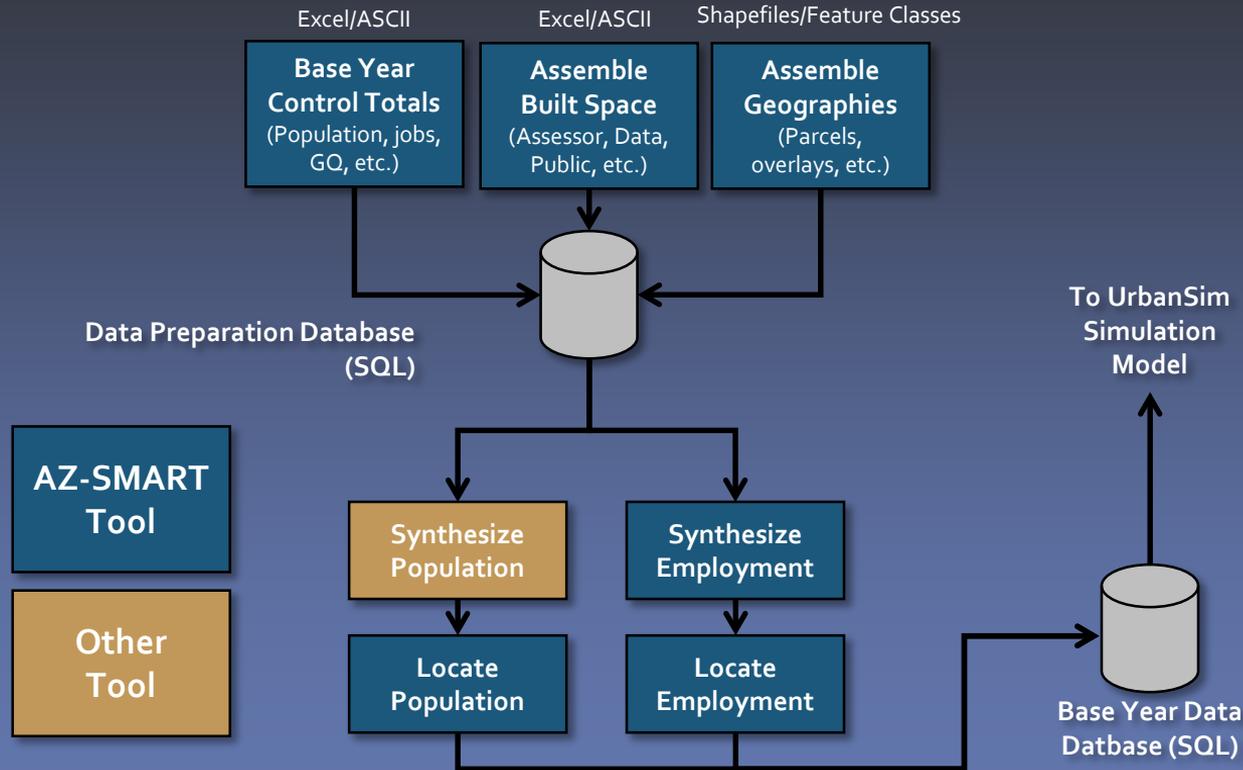


Unique ID Field	Household id	Person id	Business id	Job id
Location Links	Building id	Household id	Building id	Business id
Data Source	Synthesized from Decennial Census, American Community Survey (ACS), Public Use Microdata Samples (PUMS)		Synthesized from Employment data base from Quarterly Census of Employment and Wages (QCEW) / other proprietary sources	

Primary Input Databases – Public Review

- Existing Land Use (EXLU) – updated and reviewed annually
- Developments (DEVS) – ongoing updates, reviewed annually
- General Plan (GP) – ongoing updates, reviewed annually
- MAG Employer Database (EmpDB) – data updated and reviewed annually
- Other Inventories (e.g. group quarters, schools, etc.) – updated and reviewed annually

AZ-SMART – Data Preparation Tools



Data Model – Key Tables and Relationships



Table	Parcels	Buildings (built space)	Households	Persons	Jobs
Primary Key	zone_id	building_id	household_id	person_id	job_id
Foreign Key	taz_id, mpa_id, tract_id, etc.	zone_id	building_id	household_id	building_id
# Records	~1.4 million	~1.2 million	~1.44 million	~3.93 million	~1.79 million

Simulation Model Sequence



What about transit?

- Accessibility variables using Travel Demand Model Skims:
 - <quantity> of <some variable> within <some travel time> <during some travel period> <on some mode>
 - Examples:
 - number of low income quintile households within 30 minutes travel time during AM peak on bus transit
 - total population within 30 minutes transit combined
 - total office jobs within 20 minutes transit combined
- Proximity variables:
 - Distance to nearest bus stop, light rail stop, park and ride
 - Examples:
 - building within quarter mile of a light rail stop

Projections Public Review and Adoption



QUESTIONS OR COMMENTS?

INTERACTIVE MAPS: <http://ims.azmag.gov>

MAG DATACENTER: <http://datacenter.azmag.gov>

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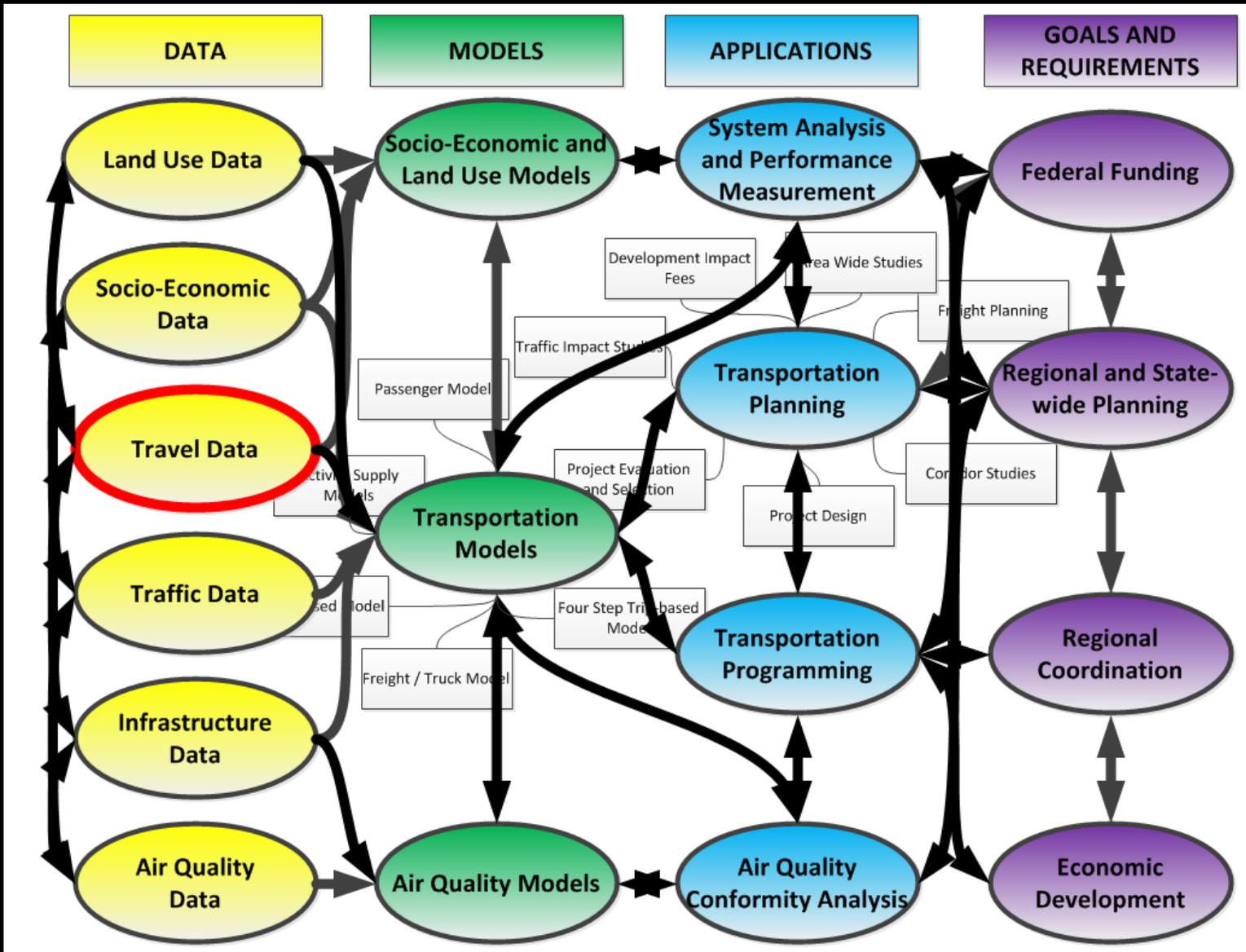
MAG Transportation Modeling 101

Vladimir Livshits, Ph.D.
System Analysis Program Manager

- What is transportation modeling?
 - Transportation modeling is the process of development and application of transportation system models (mathematical models, computer models, mental models, iconic models, etc.)
- Why do we need to model transportation system?
 - Because we cannot actually try out multiple system development scenarios in the field/real world – too expensive and/or not technically feasible
 - Because we cannot observe future conditions, we can only model future scenarios and assumptions
 - Because we have to satisfy federal regulations in order to obtain federal funding
 - Because this is a state-of-the-practice approach to system planning
- How do we model regional transportation system?
- How transportation modeling is changing?
- What data MAG collects for transportation models and system analysis?
- How You can use MAG transportation modeling and transportation data services?

Why do we need to model transportation system?

Major COG and MPO tasks will be compromised in the absence of relevant travel data and models.



How do we model regional transportation system?

Passenger Transportation Forecasting Models: Four Step Trip Based

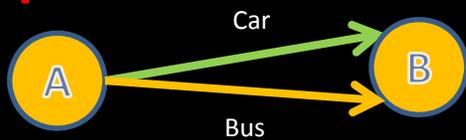
- **Trip Generation** on TAZ level based on socio-economic characteristics of TAZs



- **Trip Distribution** between TAZs



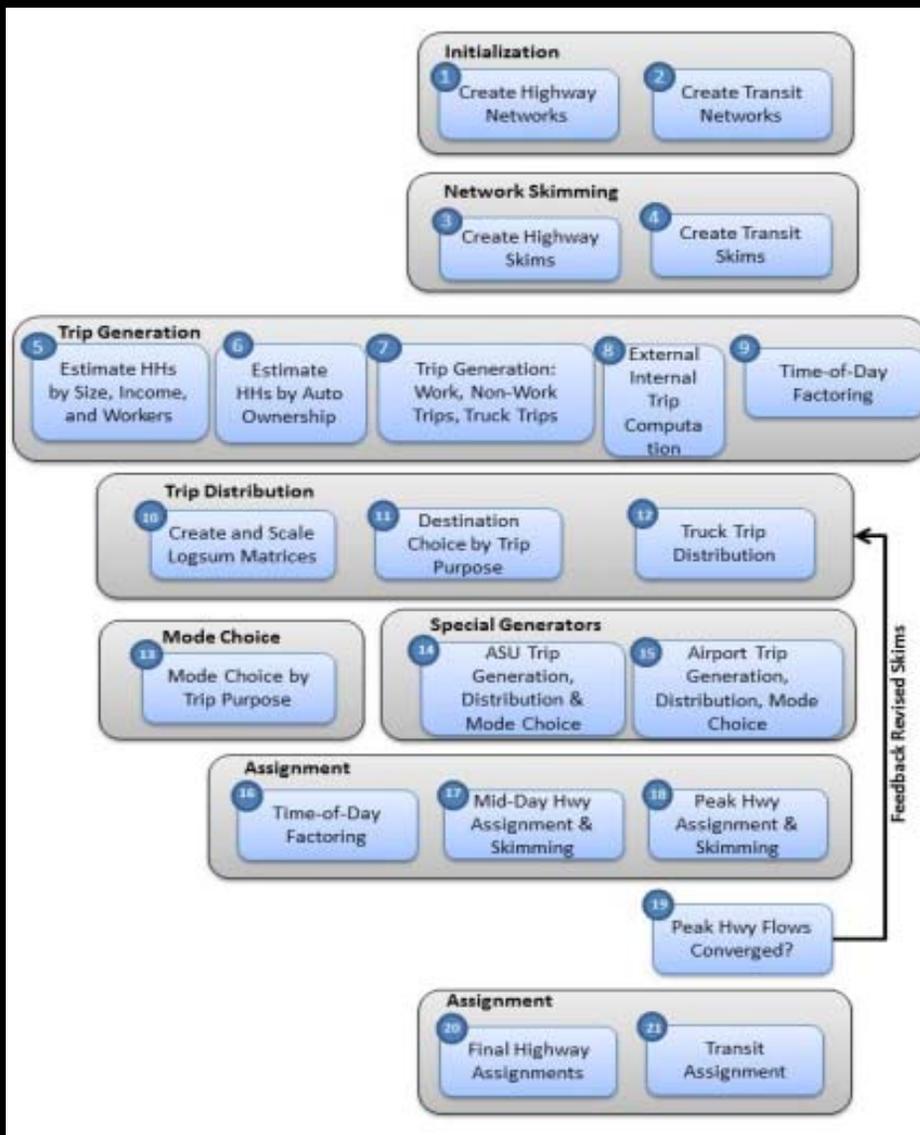
- **Modal Split**



- **Assignment**

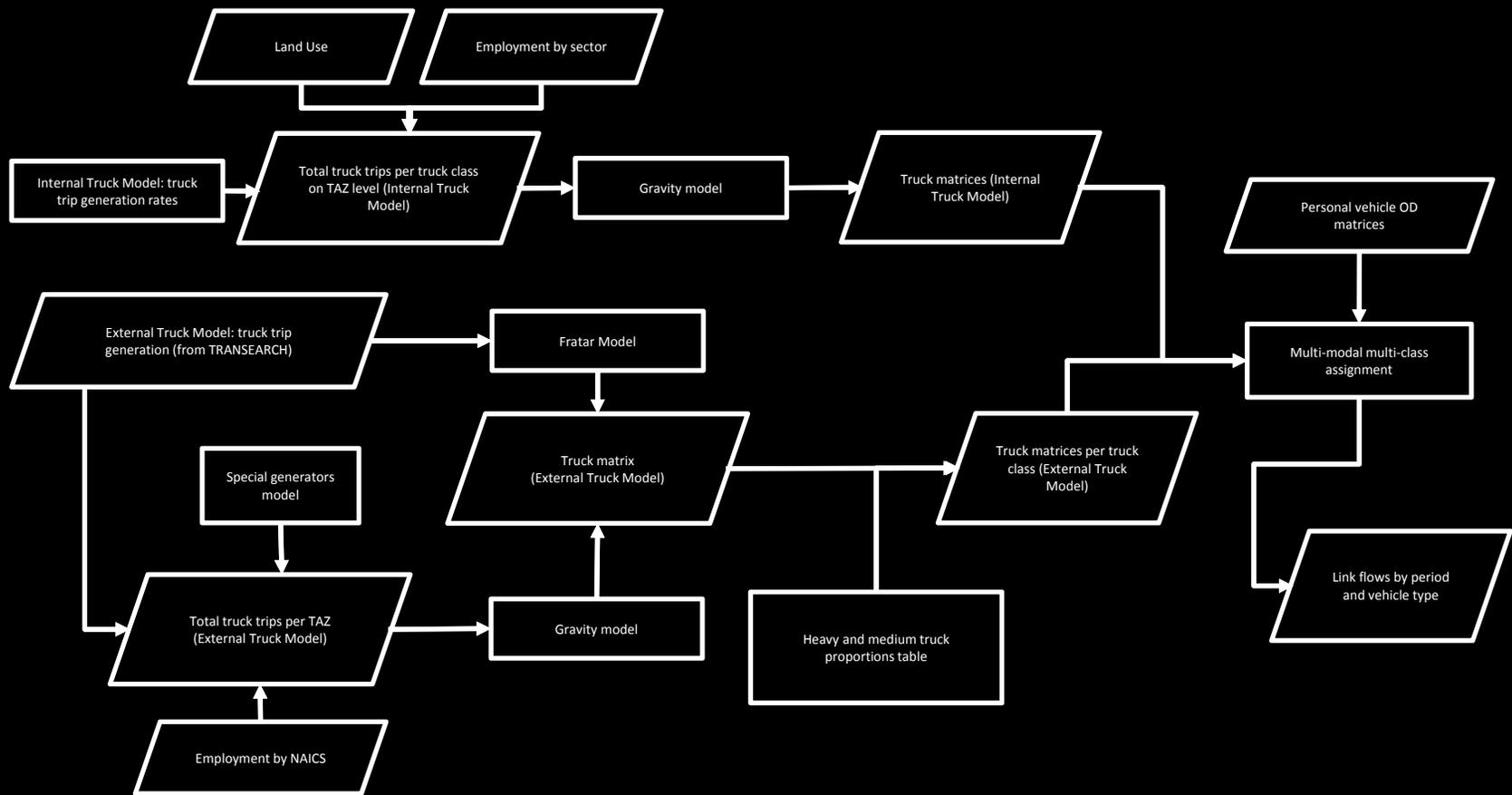


- **Feedback Loop**



How do we model regional transportation system?

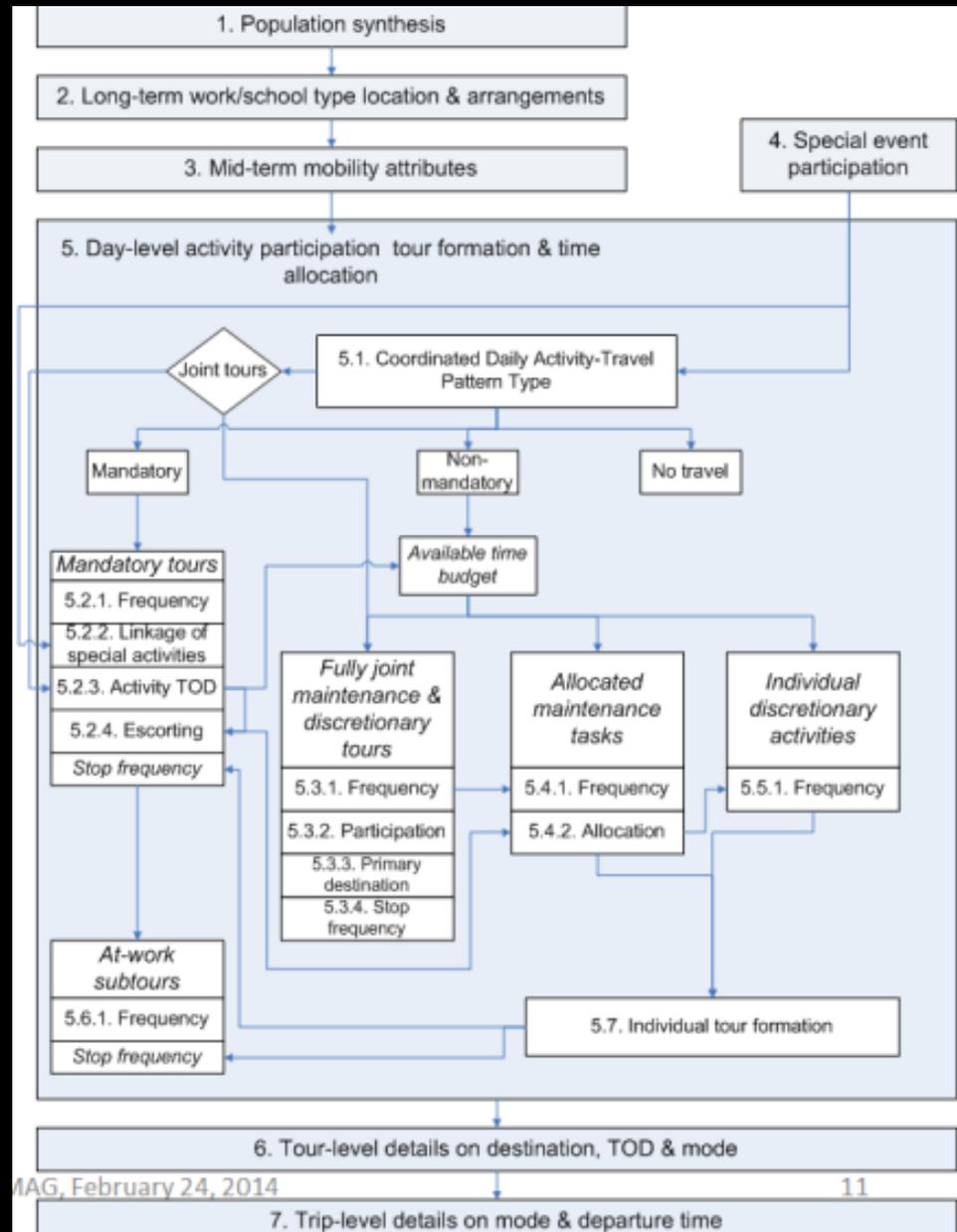
Regional Truck Model



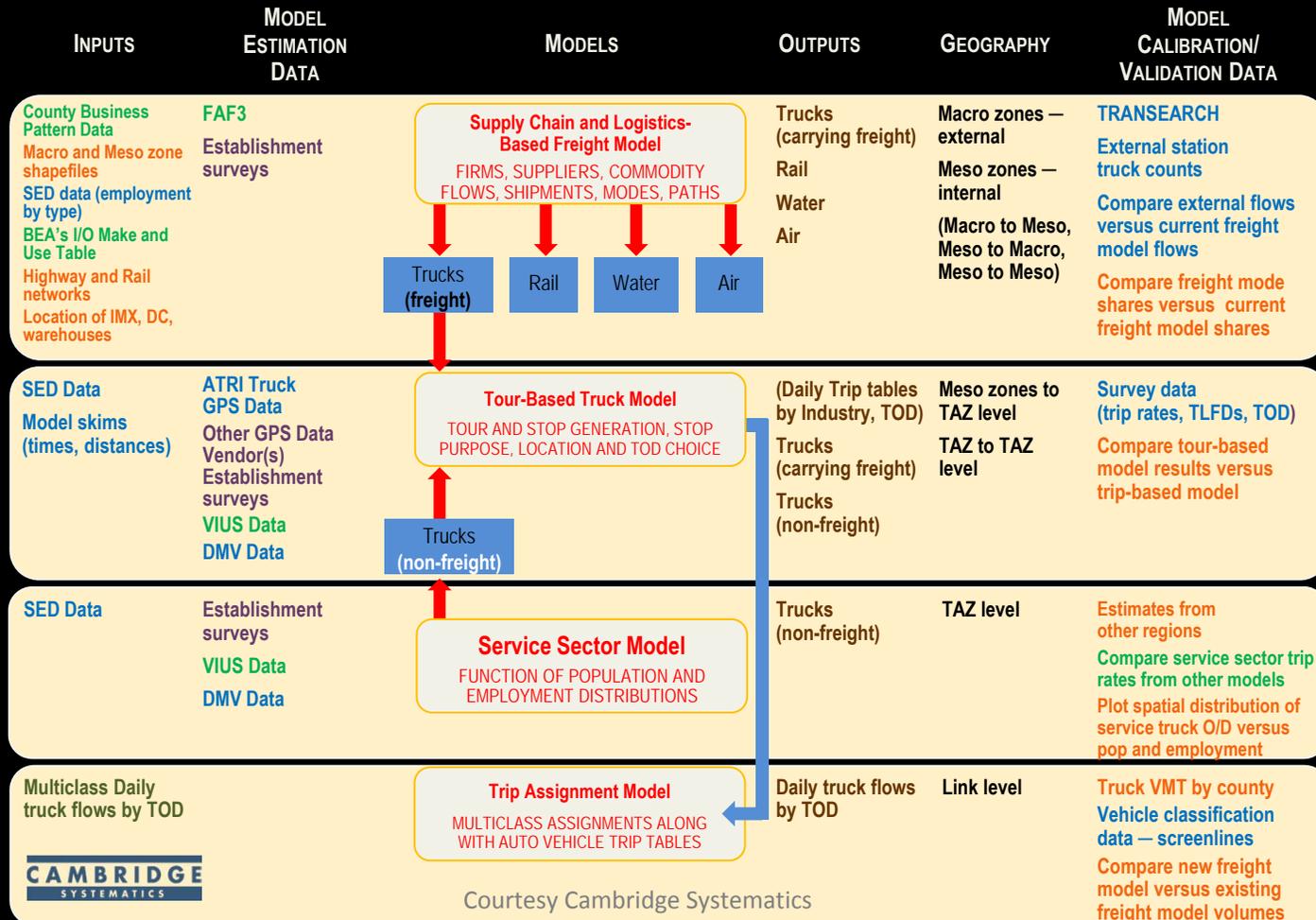
How transportation modeling is changing? Change of Paradigm: ABM, Freight and DTA

- From zone-based modeling to micro-simulation and agent-based modeling: individual households, people, establishments, vehicles
- From trip-based modeling to tour-based modeling: consistent travel tours, mode choices and travel purposes
- From static models to dynamic models
- From travel-driven models to socio-economic activity driven models

- Population Synthesis on MAZ or parcel level
- Daily activity scheduling
- Detailed purposes and person types
- Balance between residential and employment modeling
- Integration of special events model
- Tour-based modeling: Tour formation, Joint tours, Escorting
- Personal mobility attributes
- Continuous timeline



Regional Freight Model: Agent-based, Multimodal, Tour-based



Courtesy Cambridge Systematics

Green Public Data / Borrowed Models
 Blue Available to MPO / Current MPO Models
 Orange To be developed as part of this project

Purple To be collected as part of 2014 On-Call Travel Survey
 Gold Outputs of Supply Chain — Tour based Freight Model

Transportation Planning for an MPO – Utilizing Mainly Archived Data

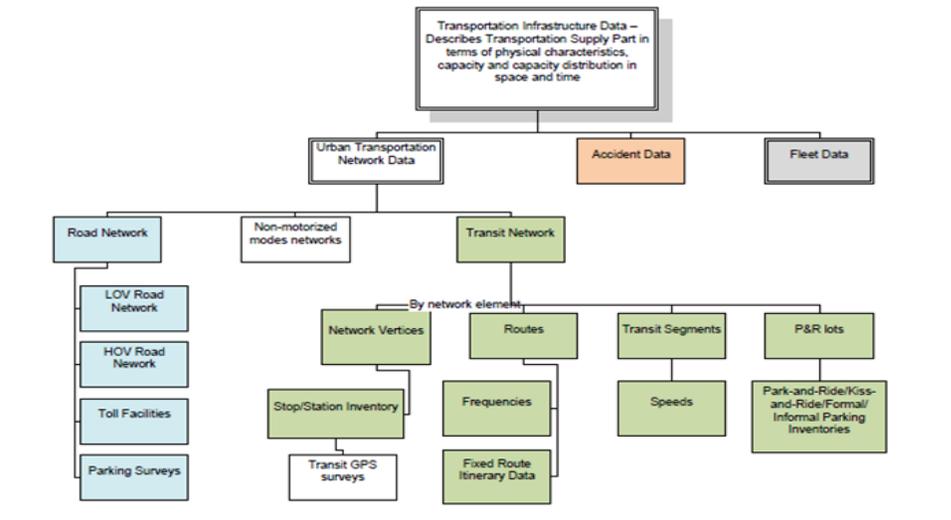
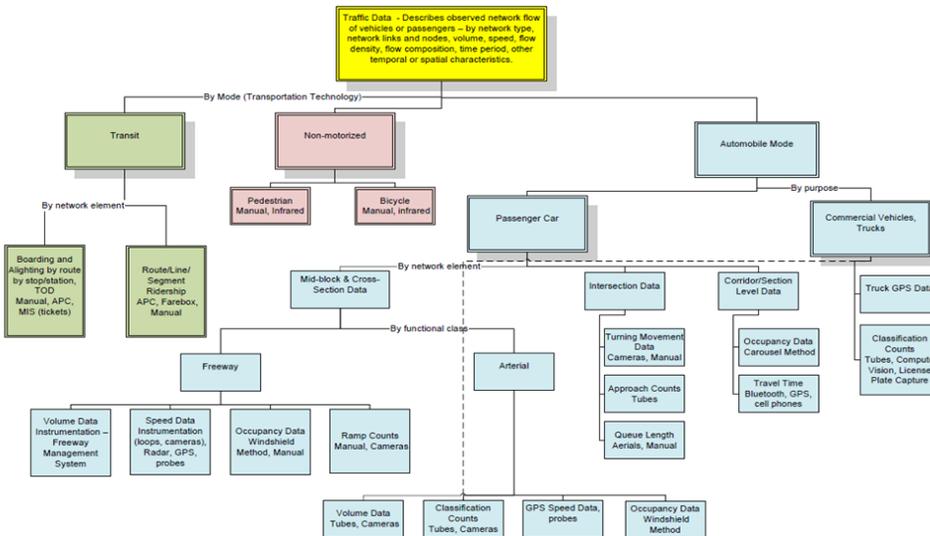
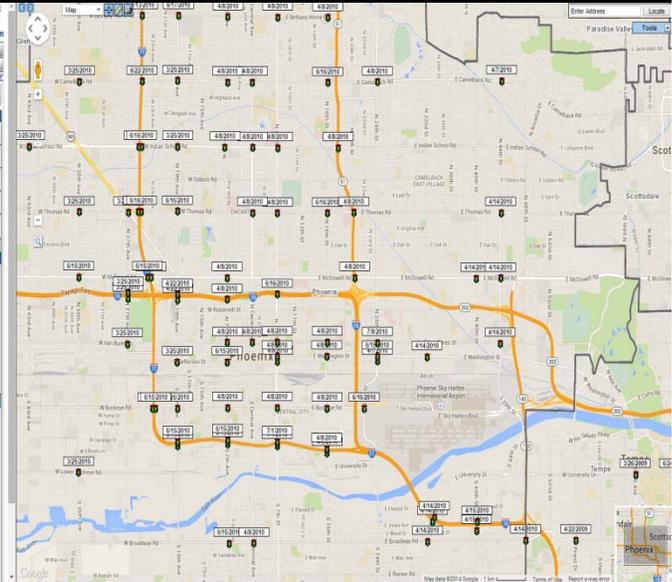
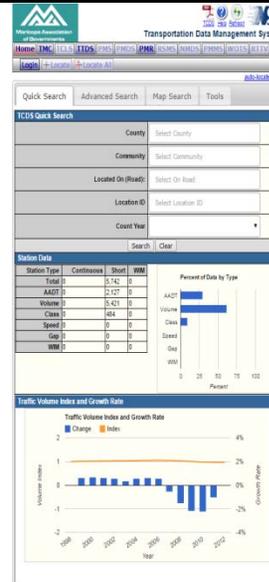
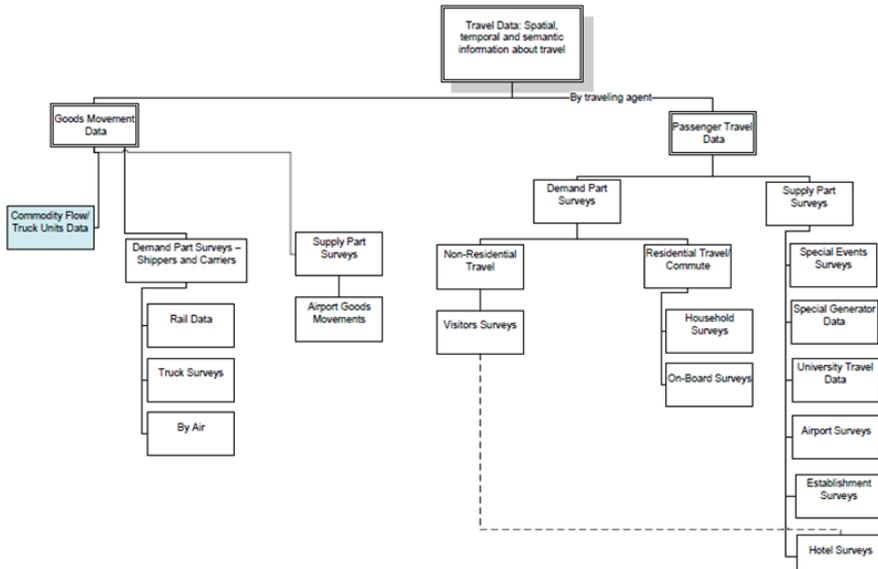
From Six Main Data Sets

- Socio-Economic Data
- Land-Use Data
- Traffic Data
- Travel Data
- Transportation Infrastructure Data
- Environmental Data

By using these Innovative Technologies

- GPS-based Travel Surveys
- GPS-based probes – Speed Data, Truck Data
- Computer vision/Video (License plate reader/ vehicle recognition, vehicle counts)
- Tablet & smart phone-based technologies
- Bluetooth
- Cell phones as probes
- Toll tag
- Telematics (vehicle-based wireless solutions – e.g. vehicle operating conditions)

Ongoing data collection and data management efforts support model development and transportation system analysis



How you can use MAG transportation modeling and transportation data services?

- Call me or send me an email (preferable) with your request and your contact information
- You can also send your request to requests@azmag.gov

TR#	Status	Project Title	Assignee(s)	Received Date
1350	In Progress	SR-30 FROM SR 202 TO Western Terminus	Arup Dutta Roger Roy	12/22/2014
1349	In Progress	Grave Ave turning movement count and peak hour factor from TDM	Wang Zhang	12/16/2014
1348	Completed	Data request related to Tempe Streetcar Project	Arup Dutta	12/17/2014
1347	In Progress	travel time to and from the intersection of Bell and 101 requested for current conditions	Haidong Zhu Petya Maneva Wang Zhang	12/09/2014
1346	Completed	2020 Model Setup	Haidong Zhu	12/09/2014
1345	Completed	107th Ave FROM Lower Buckeye TO SR30	Lavanya Vallabhaneni Roger Roy	12/03/2014
1344	Completed	Land condemnation case involving a property on the east side of Merian Road, North of US60	Pedro Camargo	12/02/2014
1343	Completed	Traffic count at Indian School Rd and Litchfield Rd	Wang Zhang	11/25/2014
1342	In Progress	Calculate and assign area type to the networks in 2011 and 2025	Petya Maneva	11/19/2014
1341	Completed	2025 and 2035 MAG model output for Queen Creek Rd (McQueen and Gilbert Rd) and Chandler Heights Rd (Arizona Ave and McQueen Rd)	Haidong Zhu	11/18/2014
1340	In Progress	10 FROM 32nd st TO SR 202	Lavanya Vallabhaneni	11/07/2014
1339	Completed	20141106 1339 ADOT Transit mode shares	Haidong Zhu	11/06/2014
1338	Completed	2025M FROM I-10 TO I-10	Roger Roy	10/27/2014

Good afternoon, Vladimir!
Currently 0 Project/s are assigned to you.

TR#	Project Name	Assignee(s)	Due Date	Map
* To see more details of each TR, please click TR number!				

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Questions?