Met Council Transportation Modeling

Transportation Committee

METROPOLITAN COUNCIL

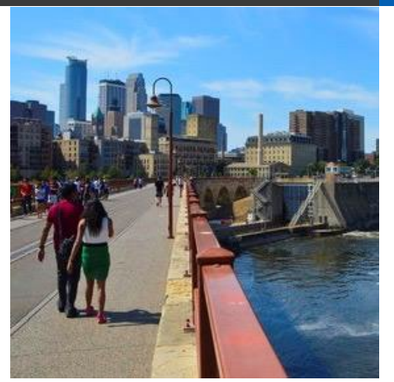
December 2023 Dennis Farmer metrocouncil.org

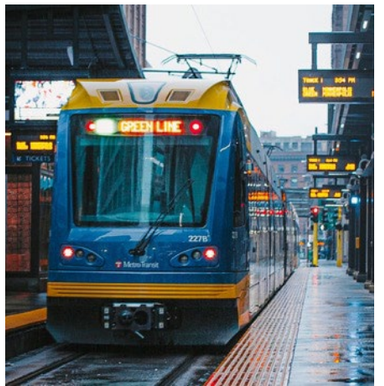
Why We Forecast

Explore how our systems might change due to:

- Large scale investments in highway and transit systems
- Regional population and employment growth
- Changes in land use patterns
- Major demographic shifts
- Transportation policy changes
- Technological shifts

As MPO, Metropolitan Council maintains the regional travel demand model used for long range planning.





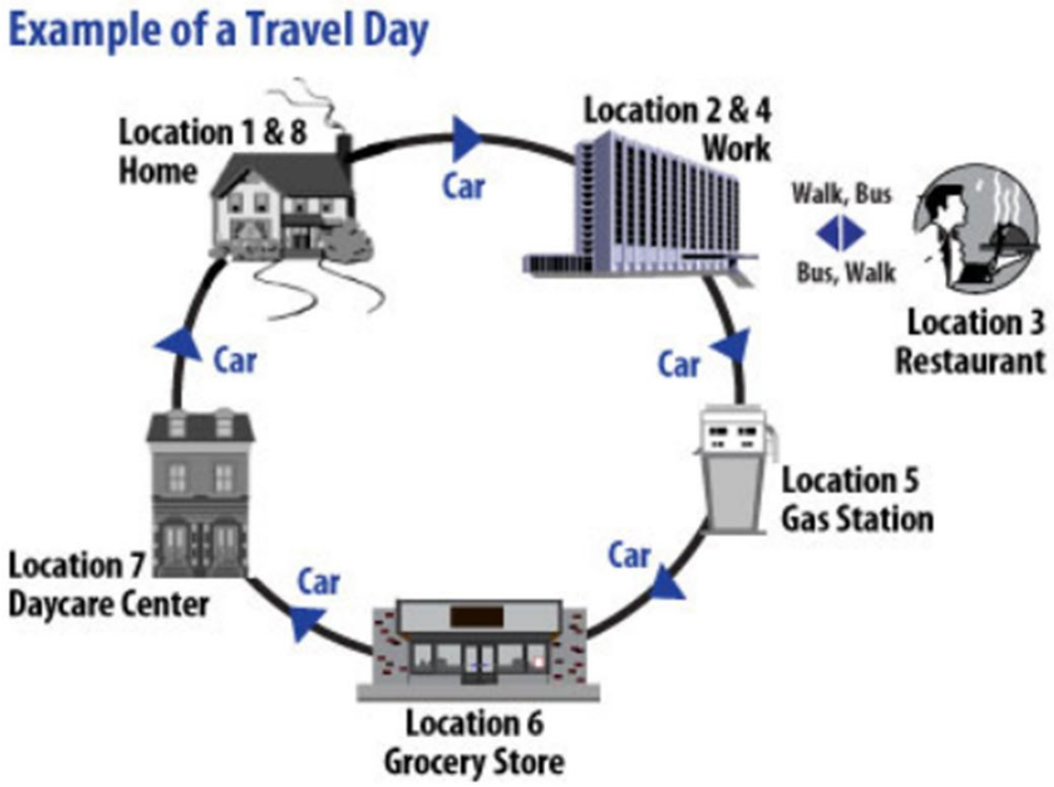
What Info Do We Get from Our Models?

Outputs include:

- Traffic volumes by roadway segment and time of day
- Trip origins and destinations
- Transit ridership forecasts
- Average forecasted speeds along roadway segments
- How long it takes to travel between destinations
- Vehicle Miles Traveled
- Accessibility Measures
- Emissions and Greenhouse Gasses from Transportation Sources

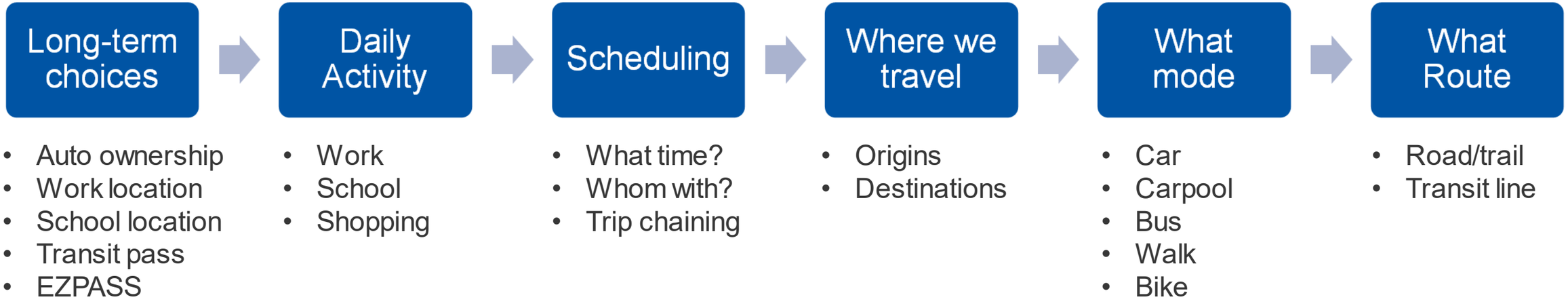
Activity Based Model Overview

Activity Based Model (Tourcast)



- People make trips during the day because they need/want to do things
- But they have limited time and resources during the day to make these trips
- To accomplish these needs, people often organize trips into tours

Model choices from long- to short-term



ActivitySim – Model in Development

Future Modeling Enhancements

- Council currently working on implementing ActivitySim
- Collaboratively developed with other agencies; captures best practices
- Faster, which makes it easier to forecast more scenarios
- Includes submodels that capture new, emerging trends:
  - Telecommuting and work from home forecasts
  - Vehicle type models (e.g. electric vehicle use)
  - New travel models – TNCs, CAVs

Suite of Models

Multiple Models used for Planning

- Activity Based Models: Tourcast and ActivitySim

- STOPS
  - Simplified Trips on Stops Software
  - Schedule-based modeling of transit ridership
  - Uses highway speeds from regional travel demand model

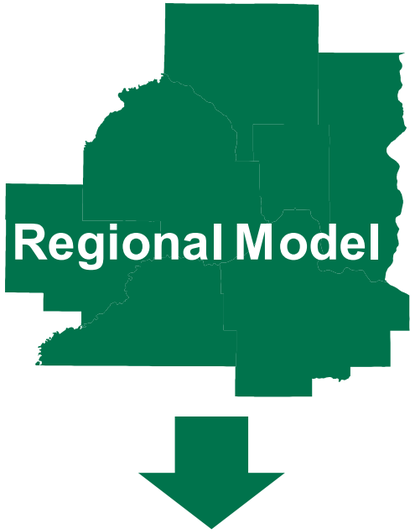
- MOVES
  - EPA's MOtor Vehicle Emission Simulator
  - Uses outputs from regional travel demand model to simulate pollutant and greenhouse gas emissions for each scenario

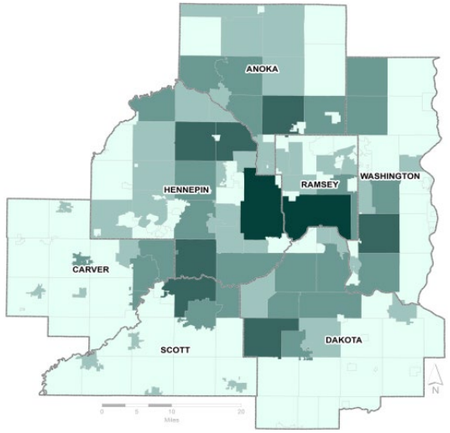
- UrbanSim
  - Land Use Model
  - Provides local forecasts of population, households, and employment used in transportation models

Local Forecast Model Overview

Socioeconomic Forecasts

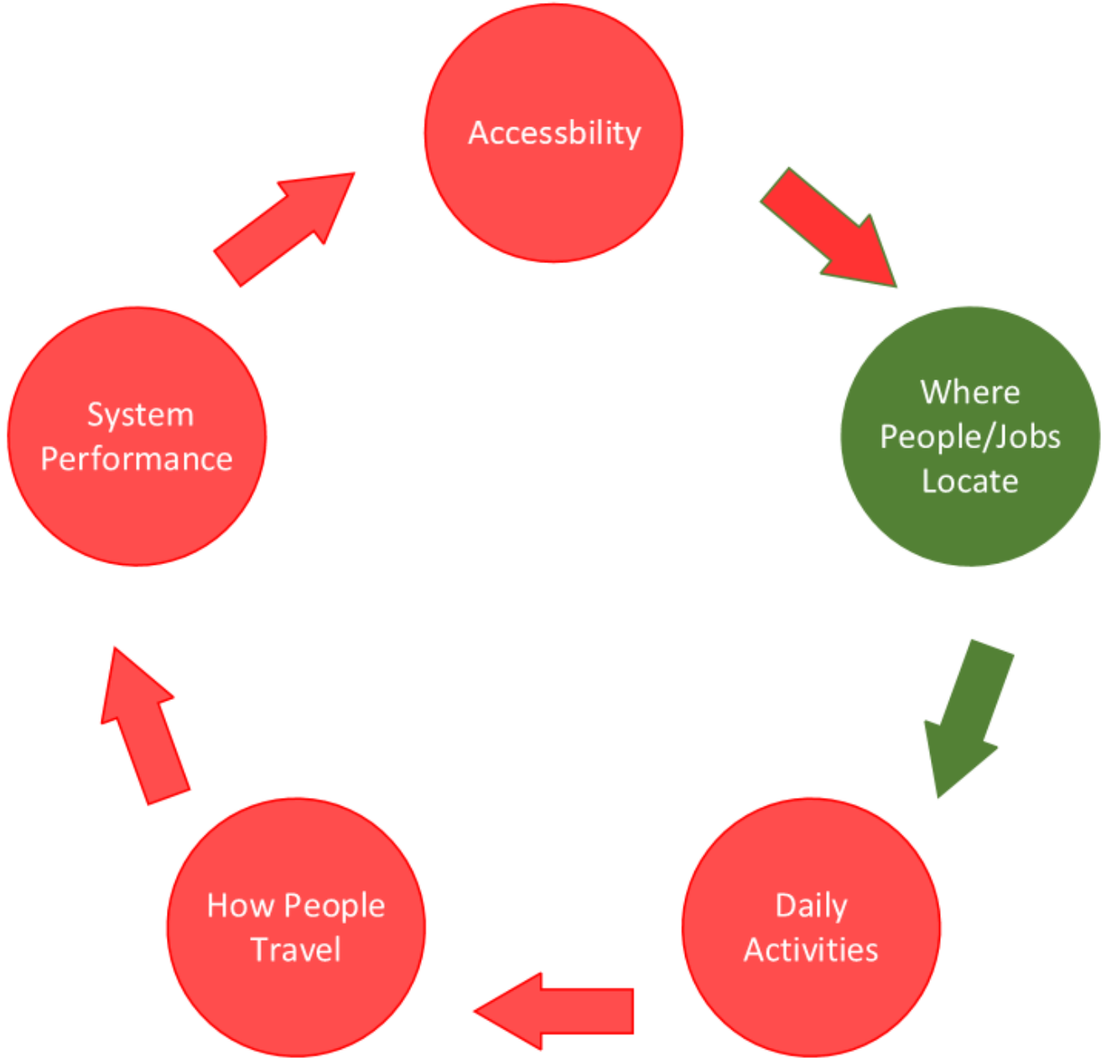
- Future total population, households, and employment forecasted using regional model
  - REMI – regional economic model that produces growth forecasts using current national economic forecasts
- A land use model takes these future population, households, and employment totals and allocates them to transportation analysis zones
  - UrbanSim – land use model that simulates where future population and employment will live and work
- These socioeconomic forecasts are a major input to the transportation forecast model





Land Use Model

How Transportation Model Interacts with Land Use Model



Land Use/Travel Models Work Together

UrbanSim Land Use Model

- Forecasts where people live and work based on a future scenario
- Used in the Council's local forecasts
- ***Transportation system influences where people live and work***

Transportation Model

- Forecasts travel behavior based on a future scenario
- Used in Transporation Policy/project plans
- ***Where people live and work influences transportation system***

Issues in Forecasting

Induced demand

Effect of pandemic

Uncertainty around technology

Uncertainty about effects of climate change

Statistical and other errors in models

“All models are wrong, but some are useful”, George Box

Induced Demand in Regional Model

- The Council's Activity Based Model does capture some aspects of induced demand
- MTS still testing model sensitivity to induced demand; reviewing studies
- Transportation model does not forecast how new transportation investments will affect land use
  - Other tools needed to capture land use effects (e.g. land use model; use of scenarios; research findings)

Source of New Trips*	Where Captured in Model
Location of Travel	• Routing trips onto new roads • Increasing trips
Mode of Travel	• Forecasting shifts to automobile travel
Time of Travel	• Shifting trips to peak traffic periods

* Source: Anthony Down's theory of triple convergence

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