

# Land Use Models for Regional Planning and Growth Management

USP549 Guest Lecture

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# About me

- Faculty member of Urban Studies and Planning at Portland State University
- Did dissertation research on urban simulation models (with Paul Waddell)
- Involved in the development and applications of a popular land use model UrbanSim
- Research interest on land use - transportation interaction (LUTI) models

# Visioning vs Land Use Models

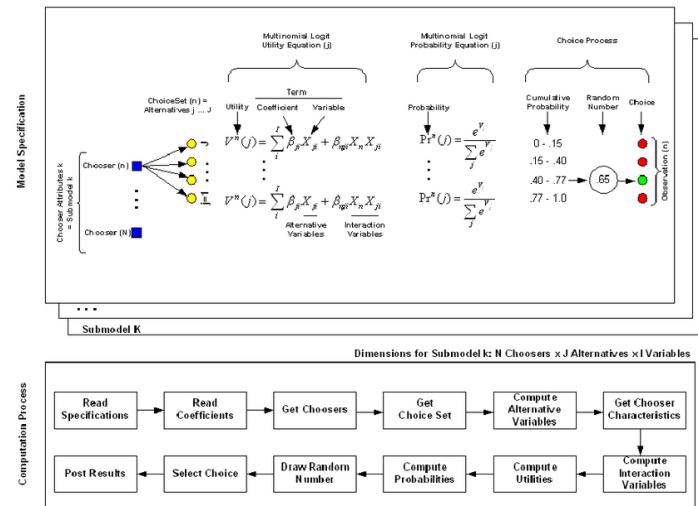
- **Visioning** is a community oriented planning technique used to identify regional land-use and transportation goals
- **Objectives:** Consensus-building of the region's future
- **Tools:** Sketch planning tools (Envision Tomorrow+, CommunityViz, ...), paper/tablet maps, lego bricks
- Primarily driving by user-controlled inputs
- Limited by the quality of the public involvement and consensus-building, the feasibility of the preferred scenario



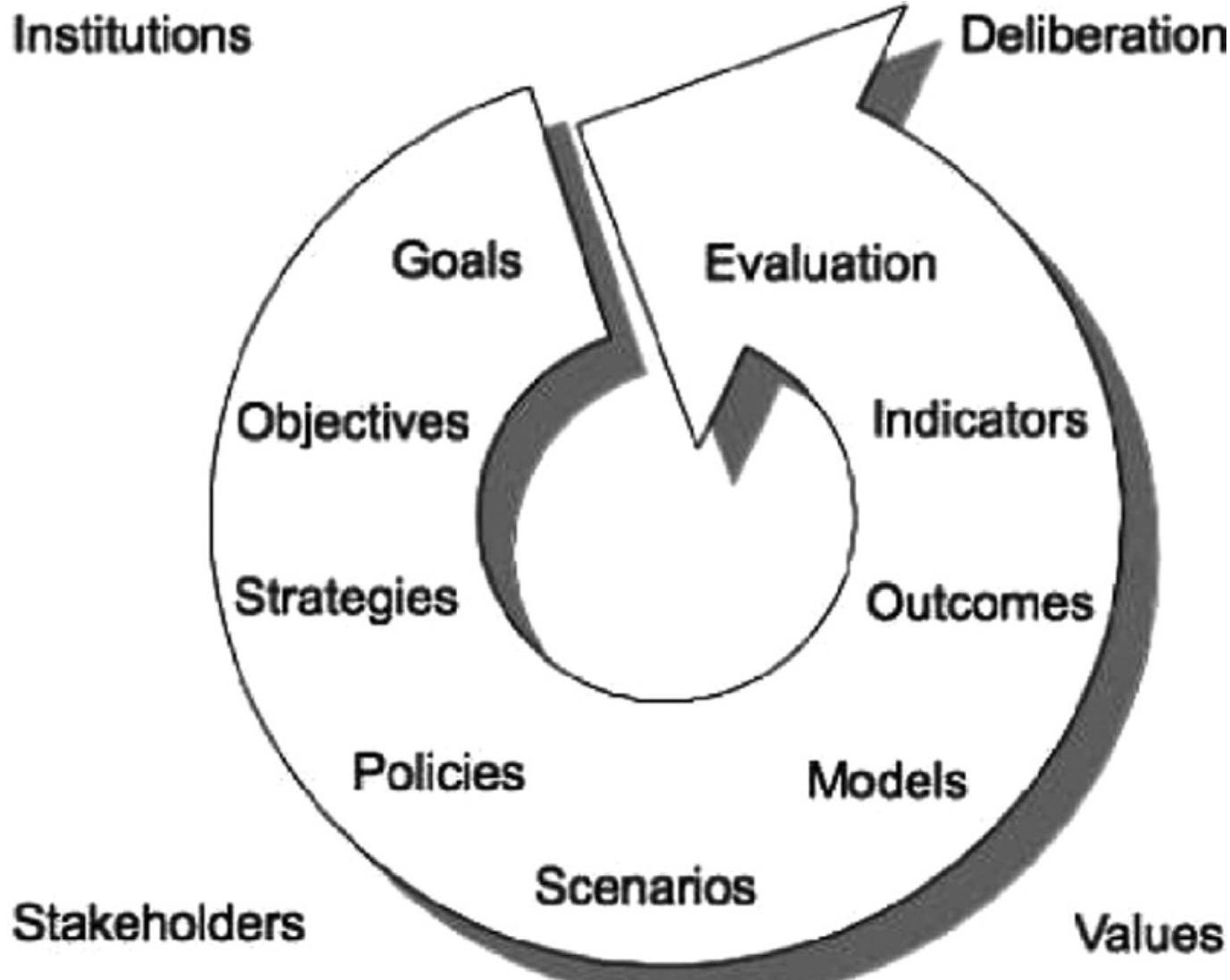
Credit: [City of Milwaukie, OR](#)

# Visioning vs Land Use Models

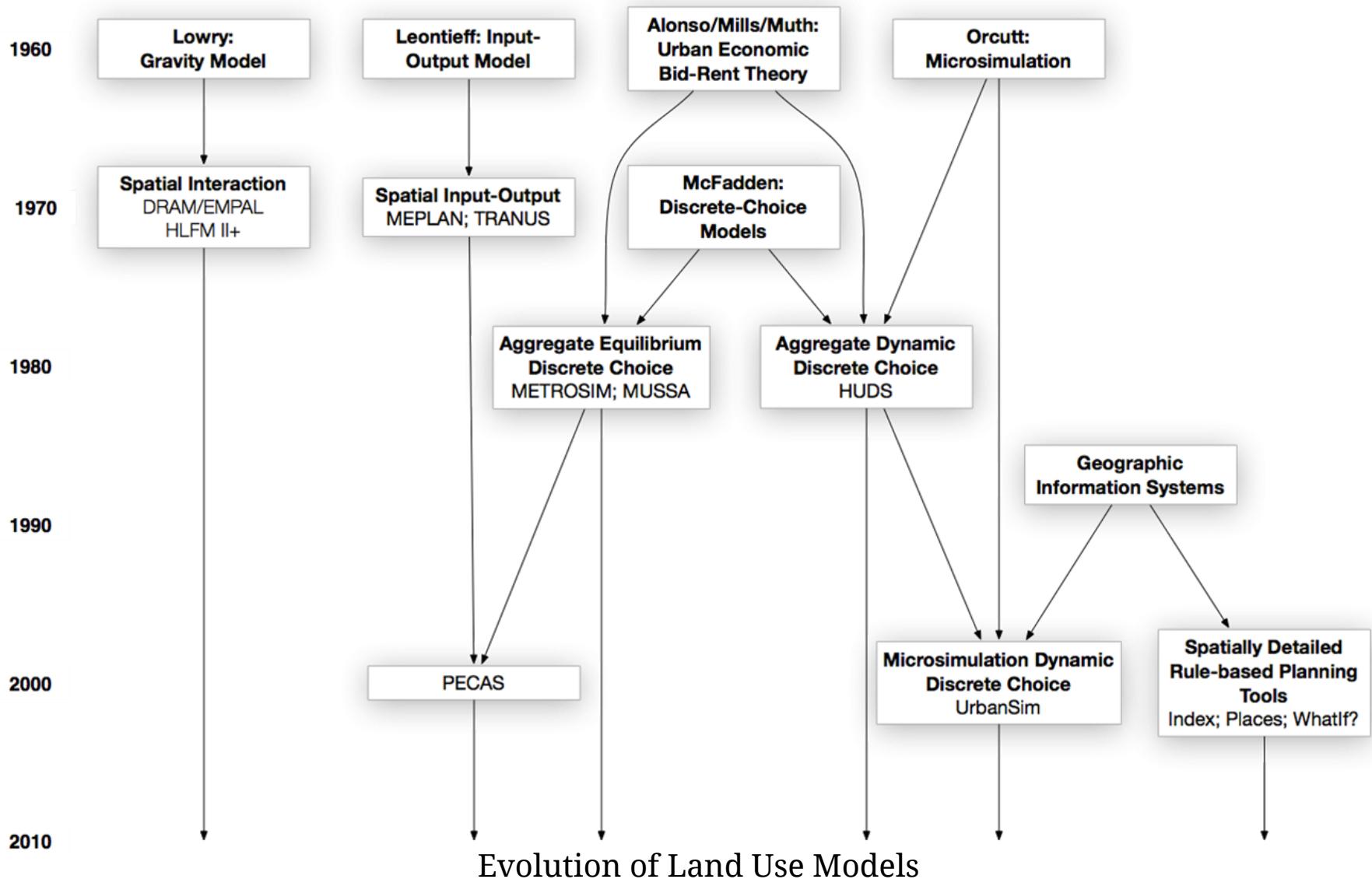
- **Land-Use Models** predict a region's future spatial distribution of households and employment
- **Objectives:** anticipating direct and indirect impacts of policies/planns/public investment
- **Tools:** UrbanSim, DRAM/EPAL, MetroScope, CubeLand, ...
- Primarily driving by base year conditions, scenario inputs, and model assumptions
- Limited by the quality of inputs and model assumptions

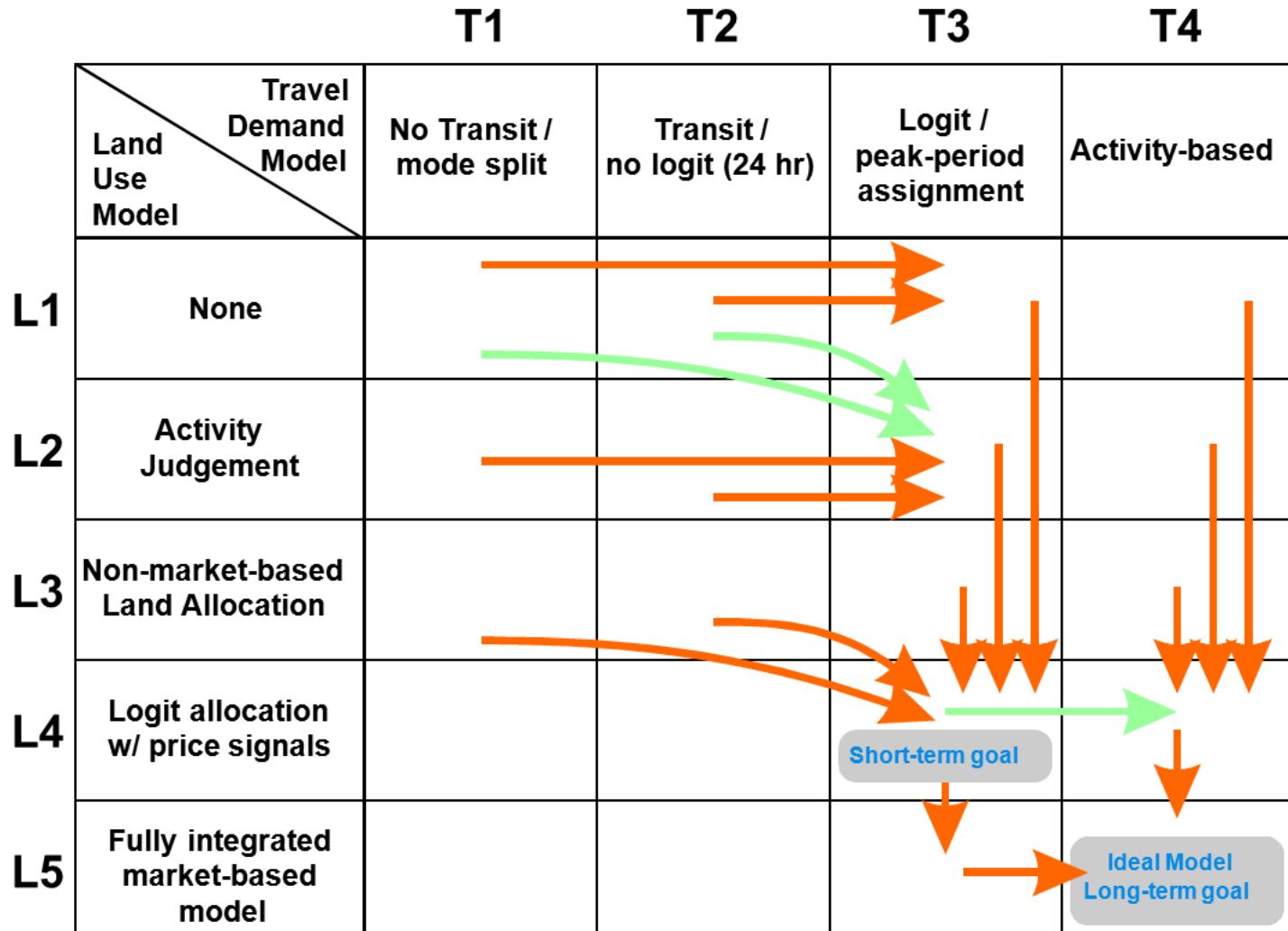


Source: [Waddell, 2005](#)



Computer Models in Plan and Policy -making Process (Source: Waddell, 2011)





Evolution of Land Use Models (Source: Hunt et al, 2005)

## Alaska



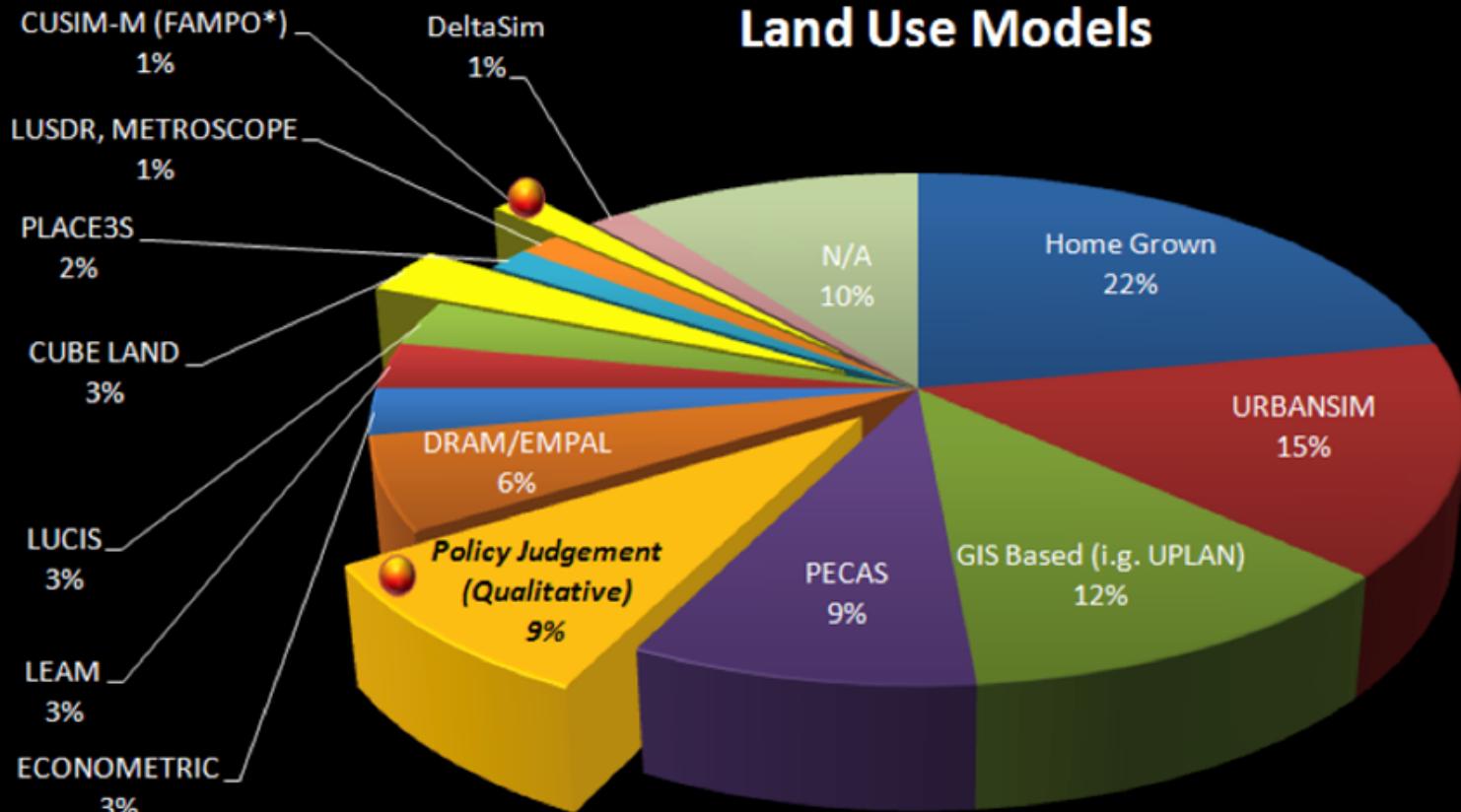
## Hawaii



## FAMPO 2009 National TMA/MPO Modeling Activity Survey Respondents



## Land Use Models



N=68 (who answered that they do Land Use Modeling)

\* FAMPO CUSIM-M can be a part of HOME GROWN category

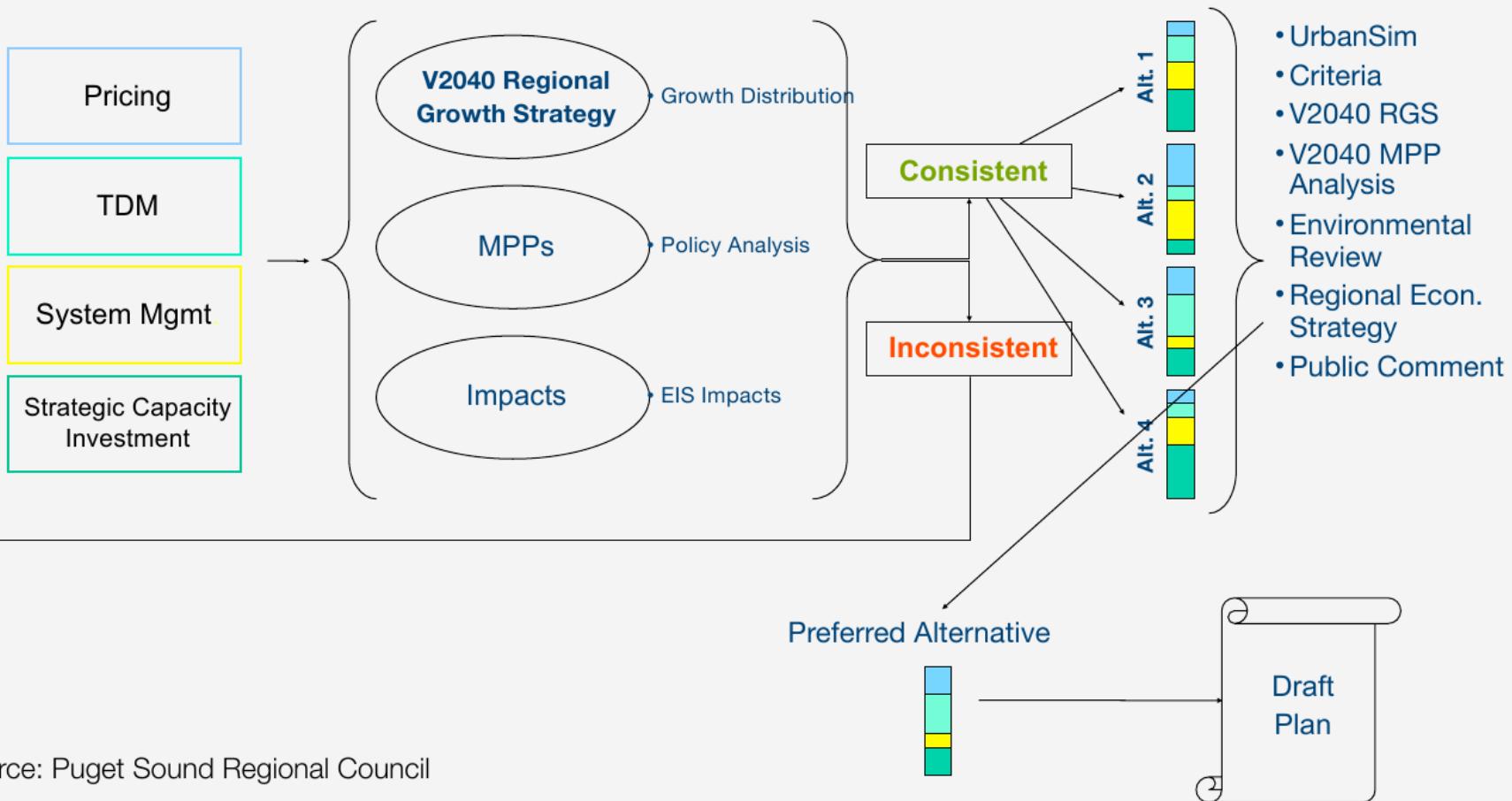
\*\* Policy Judgment through consensus (INDEX, Community Viz, Chip Game)

Status of Land Use Models Applications

## Transportation Concepts & Strategies

### Screening

### Alternatives Analysis

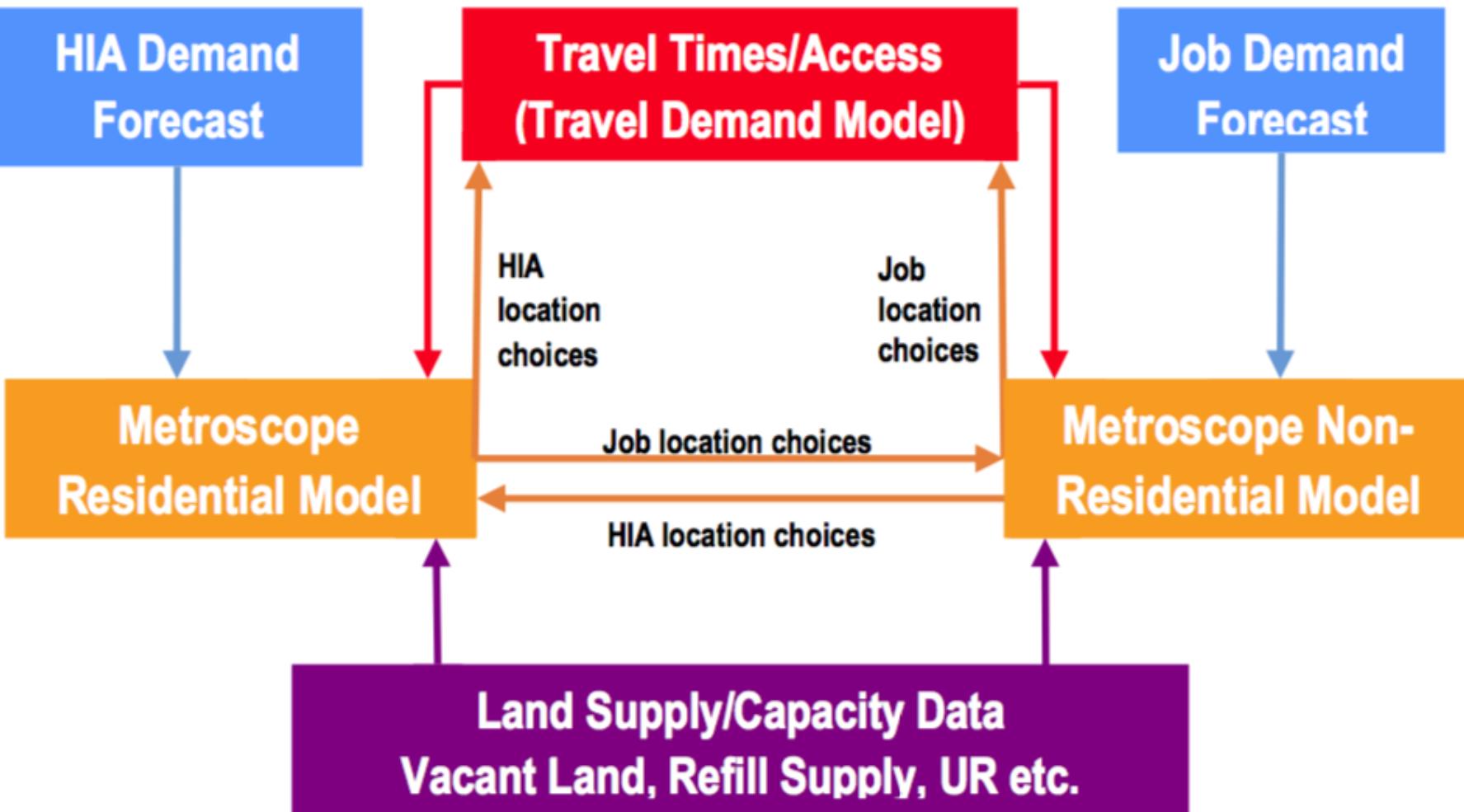


Source: Puget Sound Regional Council

Connect Visioning and Land Use Modeling (Puget Sound Regional Council)

# Metro's Objectives of Applying Land Use Models

Metro is responsible for **growth planning under Oregon law** and **transportation planning under federal law** for three urban counties in the Portland region. Analytic support for those two processes requires forecasts of how much growth is likely to occur within the region's Urban Growth Boundary (UGB) and where such growth is likely to occur at smaller-scale geographies. The small-geography growth forecasts support transportation planning as inputs to transport system performance forecasting.



MetroScope Model Structure

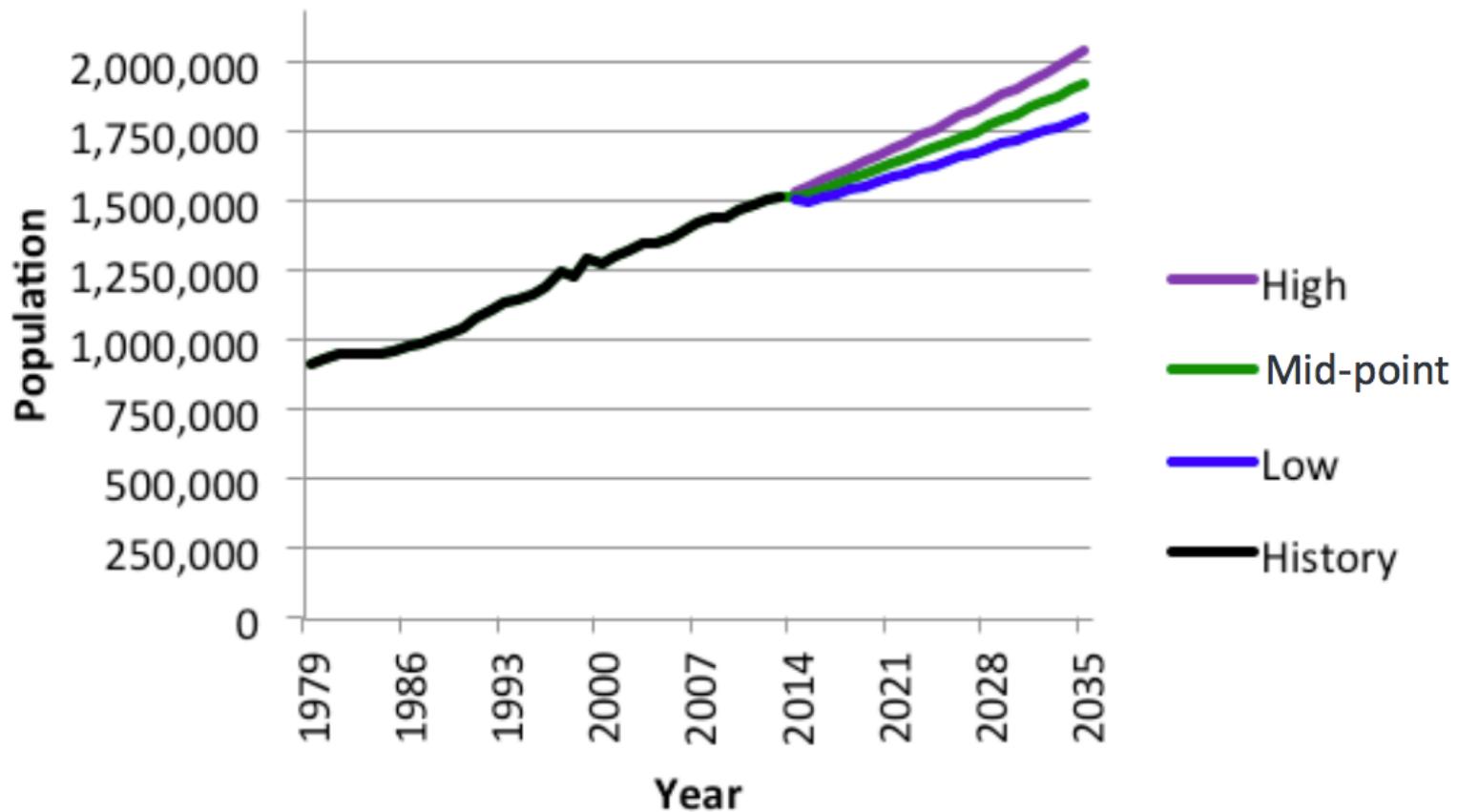


Figure 4 Population history and forecast for Metro UGB 1979 - 2035

Population trend and forecasts

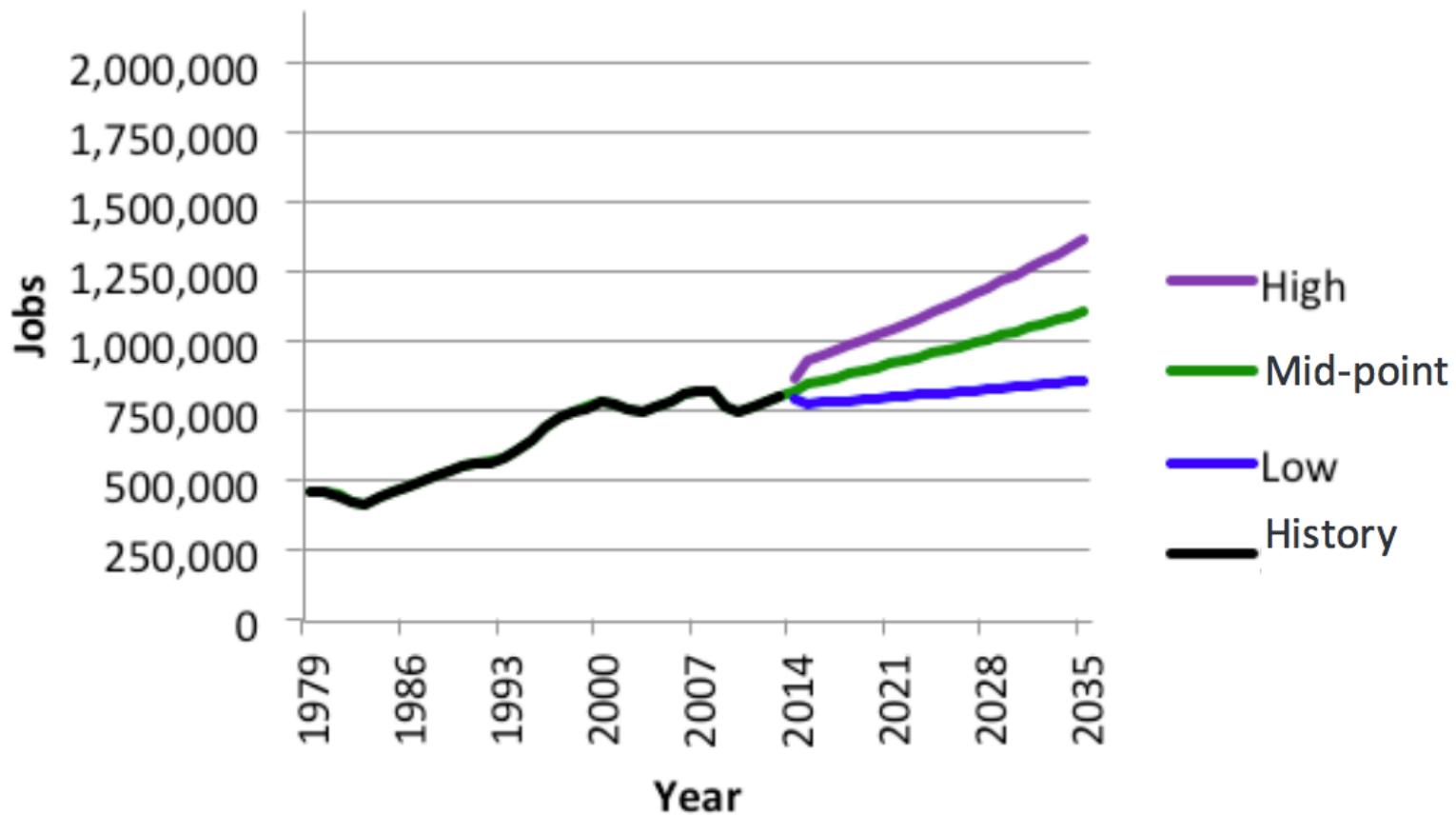


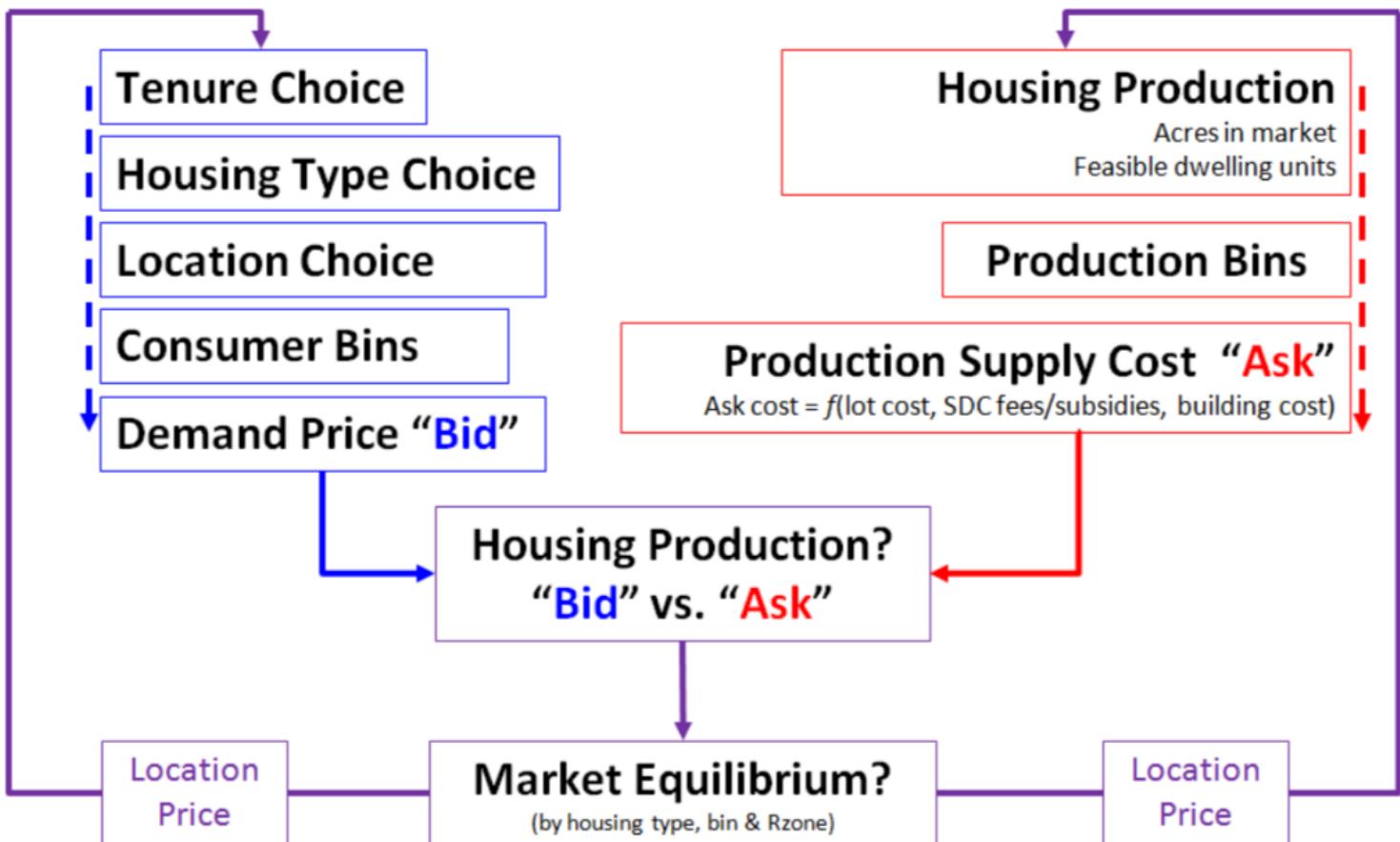
Figure 5 Employment history and forecast for Metro UGB, 1979-2035

Employment trend and forecasts

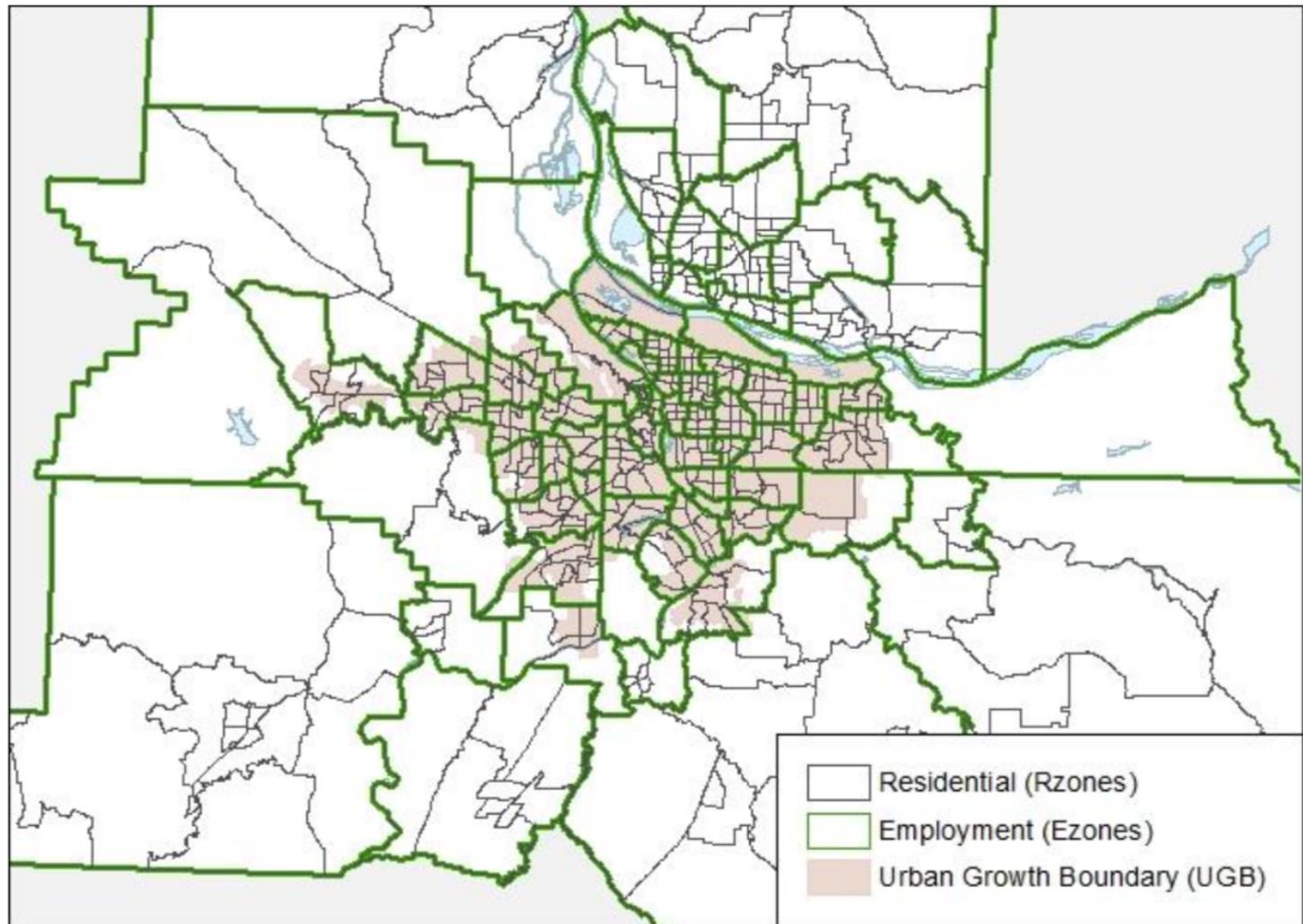
# Buildable Land Inventory

- 2015 Urban Growth Report page 17-18
- 2015 Urban Growth Report Appendix 2 Buildable Land Inventory Methods
- 2015 Urban Growth Report Appendix 3 Buildable land inventory results

Figure 3: Residential (blue) and Nonresidential (Red) Submodels, showing their main Modules



Residential modules of MetroScope

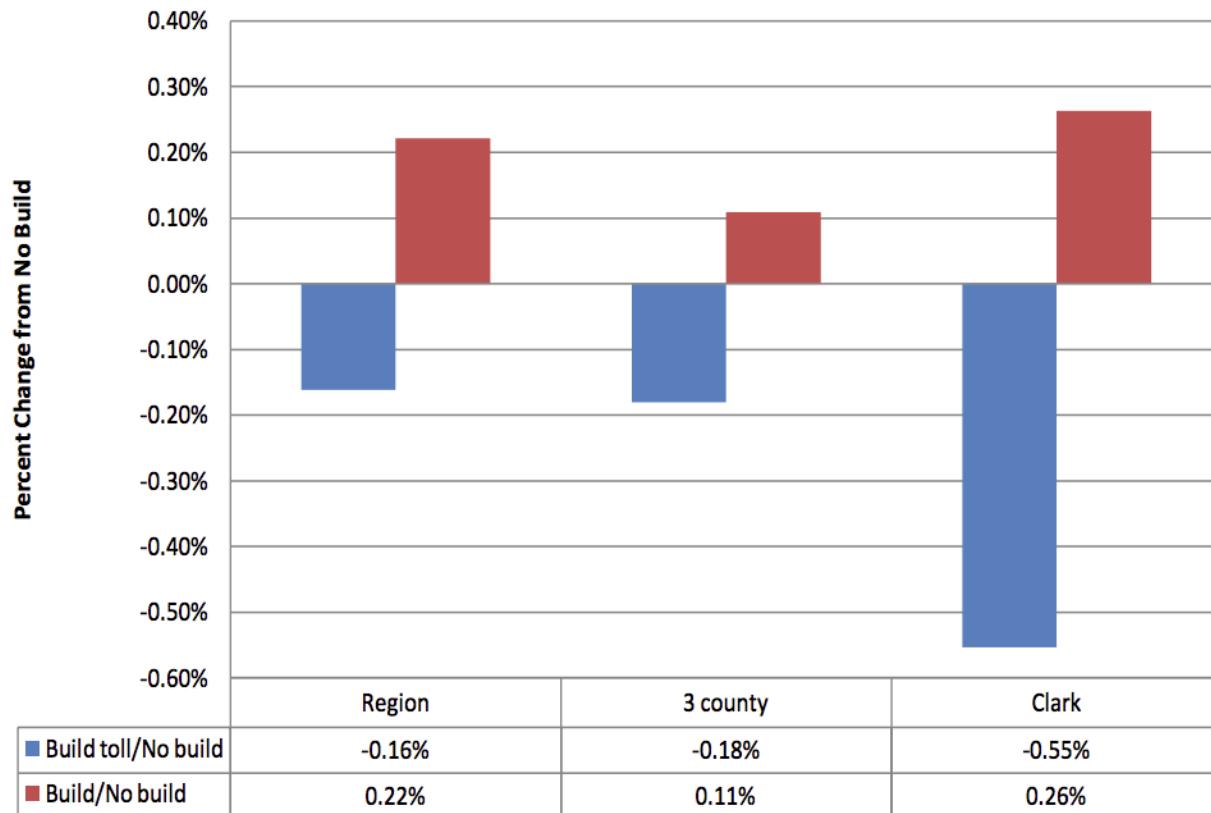


MetroScope Geographies

# MetroScope Population and Employment Forecasts

Appendix 1a: Population and employment forecast for the Portland-Vancouver-Hillsboro metropolitan statistical area

## **Percent Change In Per HH VMT Compared to No Build Option - Build With Toll (1053) and Build Without Toll (1063)**



Columbia River Crossing Study with MetroScope (Source: Sonny Conder, et al, 2010)

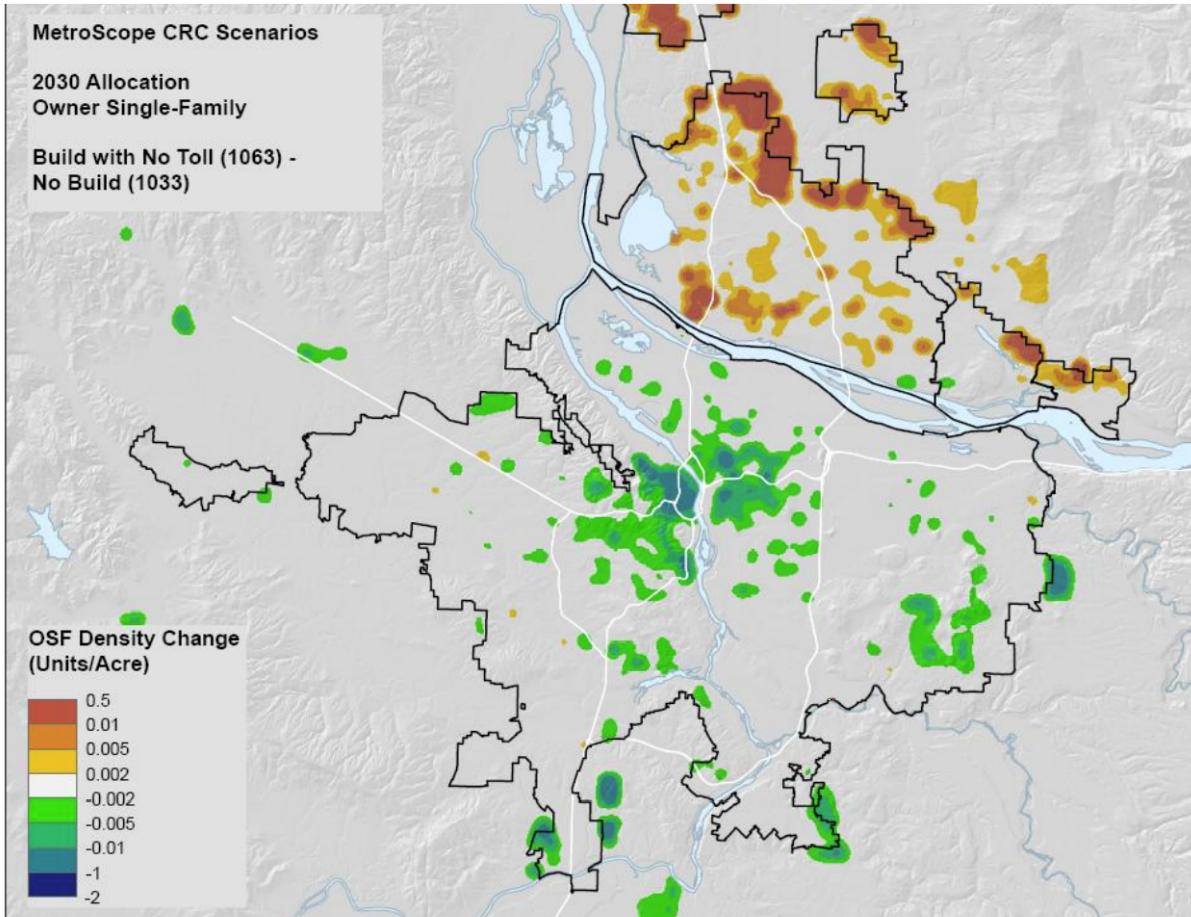


Figure 10: Compared to no build, the build without toll option clearly shifts osf allocation from Oregon central city locations northward to the edge of the Clark County Growth Management Area.

Columbia River Crossing Study with MetroScope (Source: Sonny Conder, et al, 2010)

# How good/bad are the forecasts

- A post-mortem analysis of the Land-Use-Transportation-Air-Quality (LUTRAQ) forecasts