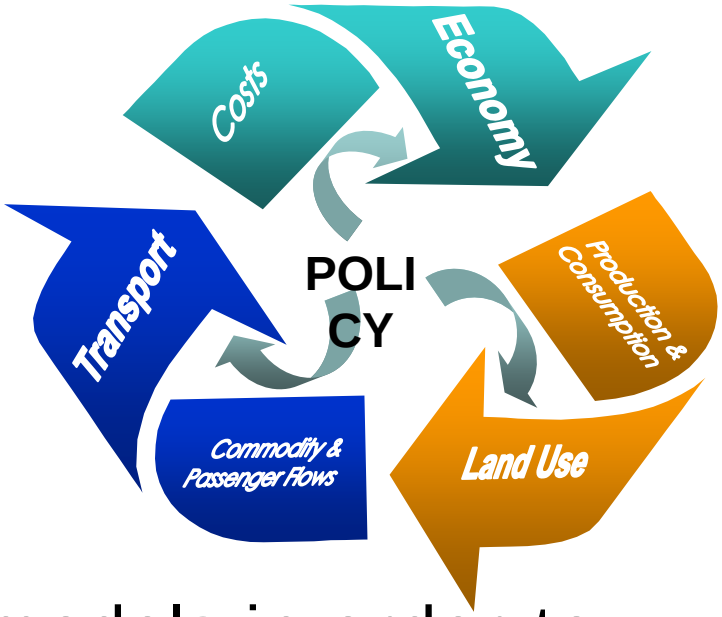
The Current State of the TLUMIP Models

Presentation to the 4th Oregon Symposium
on Integrating Land Use and Transportation Models
November 16, 2005

Tara Weidner, PB Consult Inc.

The Goal…



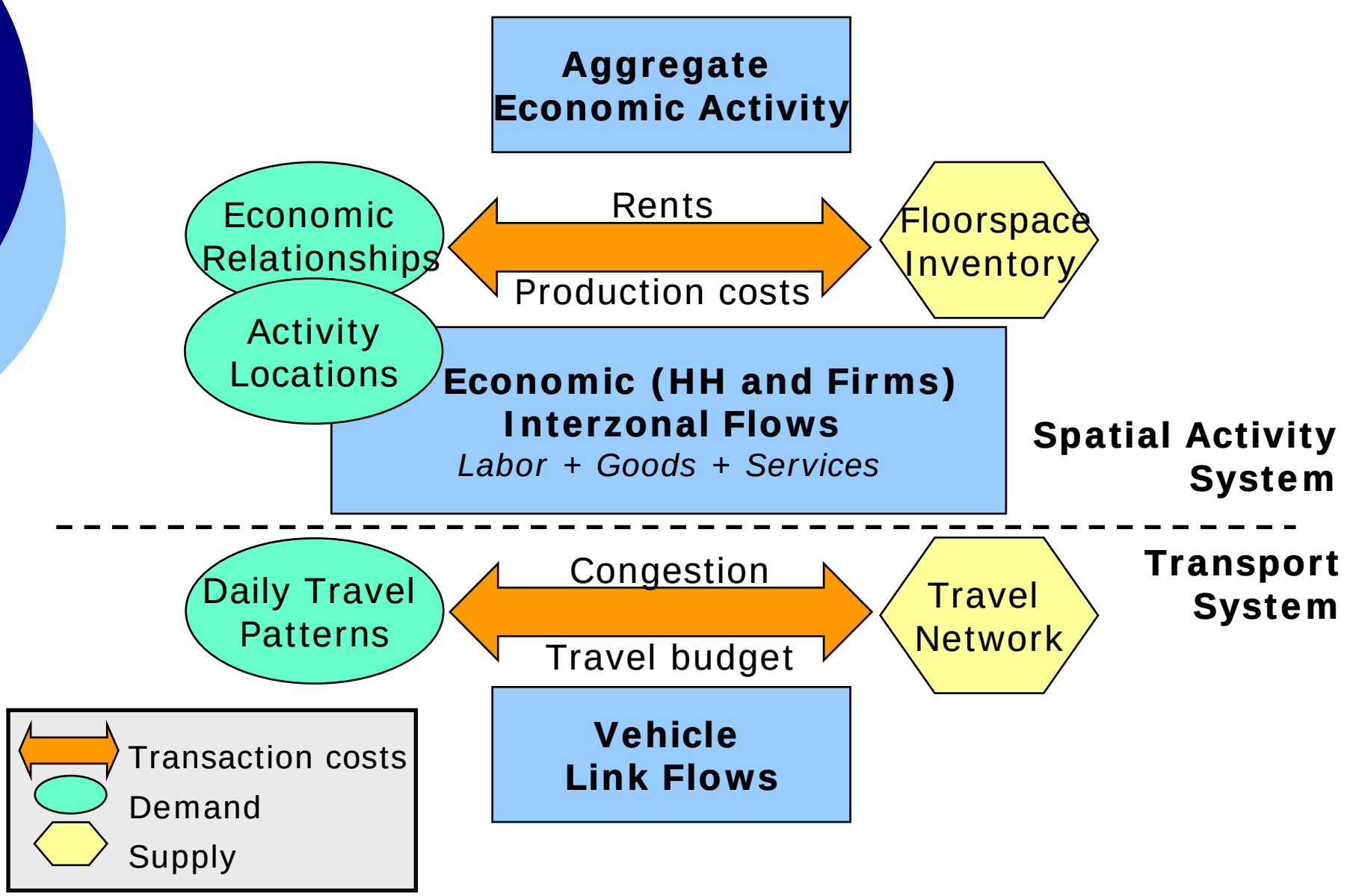
Build and apply the latest models in order to…

- understand and predict the cumulative effect of Economic- land use – transport

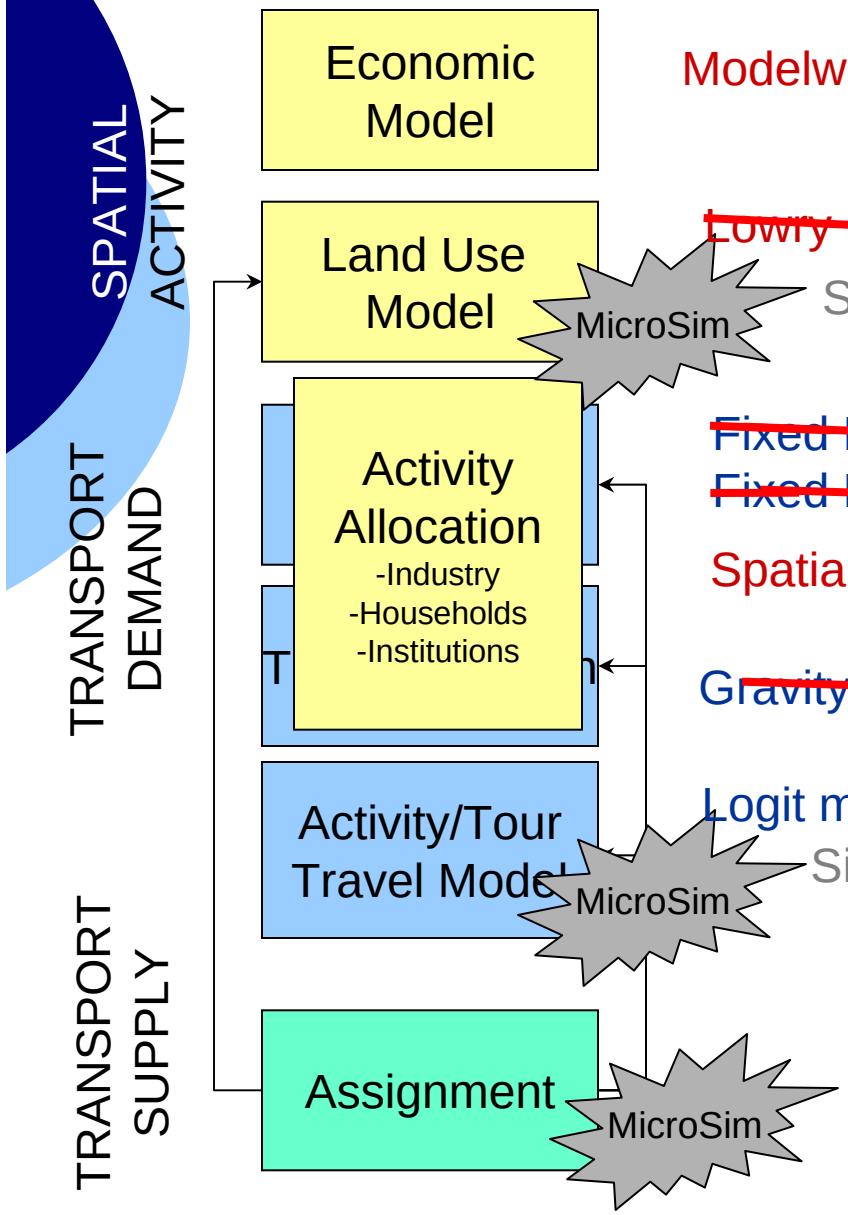
Use these models to provide data that will…

- help state/MPOs meet new state/federal mandates
- participate in statewide investment/policy decisions

Economic-Land Use-Transport System



Integrated Land Use-Transport Model



Modelwide Totals (emp/pop, industry production$)

~~Lowry model, or~~ market-based model with prices

Simulate development actions on each parcel

~~Fixed Land Use (trips/LU)~~

~~Fixed Households (trips/HH)~~

Spatial Input-Output Model (activity relationships in $)

Gravity model (~~zone size &~~ distance)

Logit mode choice , daily pattern, destination choice

Simulate daily trip pattern for each person

Feedback-Price Signals

Short term:

Impacts Trip OD, mode, trip frequency

Long Term:

Impacts land use pattern/location choice

Simulate movement of individual vehicles

The Path…

Application-driven research

Model Development Applications

Oregon1 Model

- TRANUS/Oregon (2000)
- UrbanSim (1998)

- WV Forum (2001)
- East/Central OR Fwy (2001)
- Bridge Options Study (2002)
- Newburg-Dundee (2004)
- OTP (2005)

Oregon2 Transitional Model

- Assembled (2004-2005)
- Calibrated (forthcoming 2006)

- TBD (2007)

Full Oregon2 Model

Why the Transitional Model

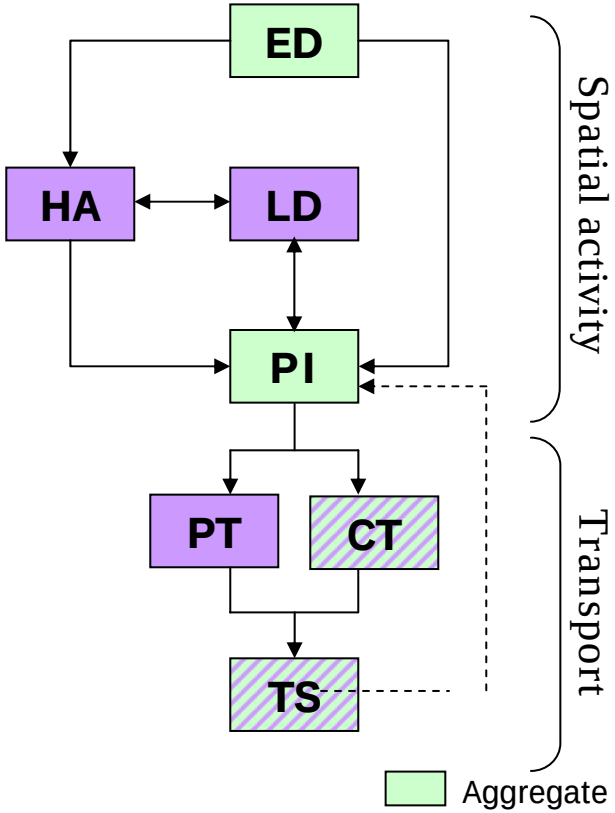
- Data issues
  - Base-year built form (land use/floorspace)
  - Limited data for Households (HA) calibration
- Get working model
  - Shorter development time
  - Less calibration demands
  - Need to refine distributed computing strategy

The State of TLUMIP…

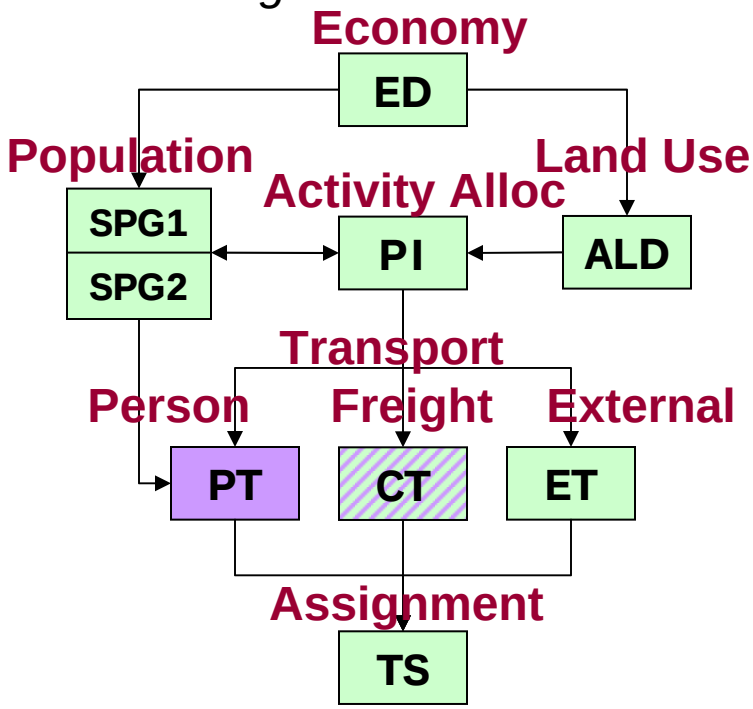
- Oregon2 Transitional Model
  - Compared to Oregon1/Oregon2
  - Model Flows
  - Current efforts
- Other activities
  - Model Applications
  - MPO-Statewide model integration
  - Update of Oregon2 specification

Oregon2 Transitional Model -- simplification of full Oregon2

Original Oregon2 Model

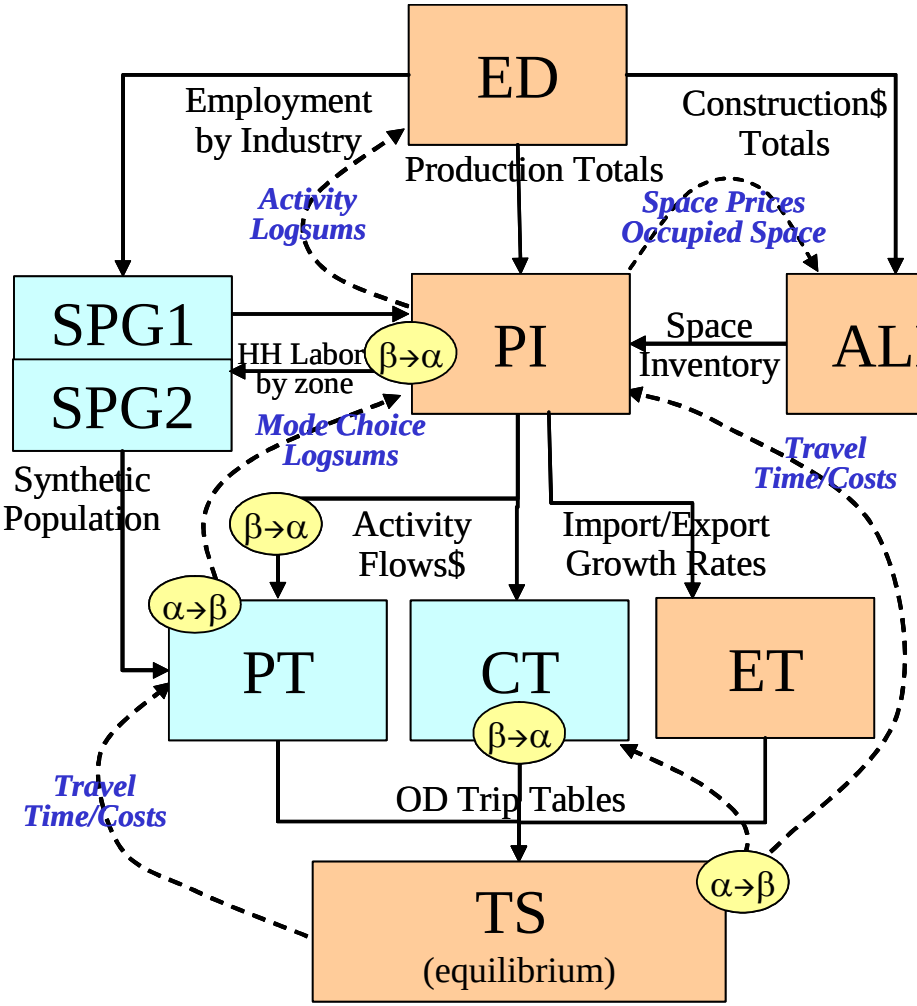


Current Oregon2 Transitional Model



- Replaced HA, LD with aggregate treatment: SPG, ALD
- Move household functionality to PI and PT
- Simplified Economic (ED) and Assignment (TS) modules
- Added External Transport module (ET)

Oregon2TM Model structure

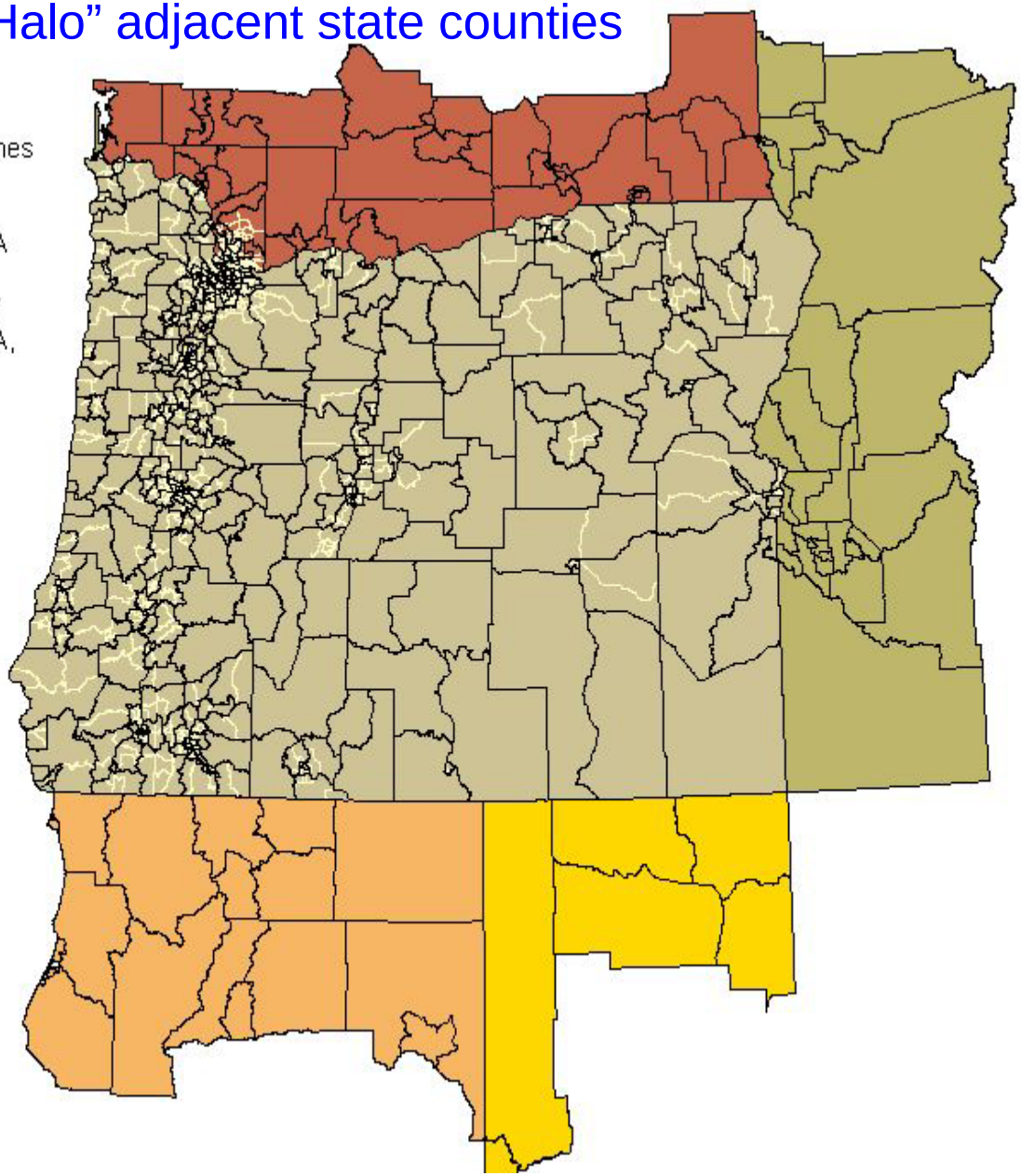


ED-Regional Economics & Demographics
ALD-Aggregate Land Development
SPG1-Synthetic Population Synthesizer (sample)
PI-Production Allocations & Interactions
SPG2-Synthetic Population Synthesizer (locate)
PT-Personal Travel (auto/transit)
CT-Commercial Transport (truck)
ET-External Transport (auto/truck)
TS-Transport Supply (assignment)

Aggregate/Equilibrium
Micro-simulation
α→β Alpha-Beta Zone Conversion
Next Time Period Feedback

Oregon2 model coverage and zones

36 Oregon and 39 “Halo” adjacent state counties



2,950 alphazones
519 betazones

Oregon2TM: Advantages over Oregon1

General

- More detailed geographic coverage
  - Zones (2950 vs. 125 in Oregon1)
  - Transport network (40,000 links vs. 2,000 in Oregon1)
- More detailed model categories
  - Industries (25 + 14 white-collar vs. 12 in Oregon1)
  - Goods (42 vs. 12 in Oregon1), services, labor occupations
  - Floorspace types (19 vs. 2 in Oregon1)
  - HHs by HHsize & income group (18 vs. 3 in Oregon1)
  - Truck weight configurations (5 vs. 3 in Oregon1)
- 1-Year time increments (5-years in Oregon1)
- Distributed-application framework
- Software flexibility

Oregon2TM: Advantages over Oregon1

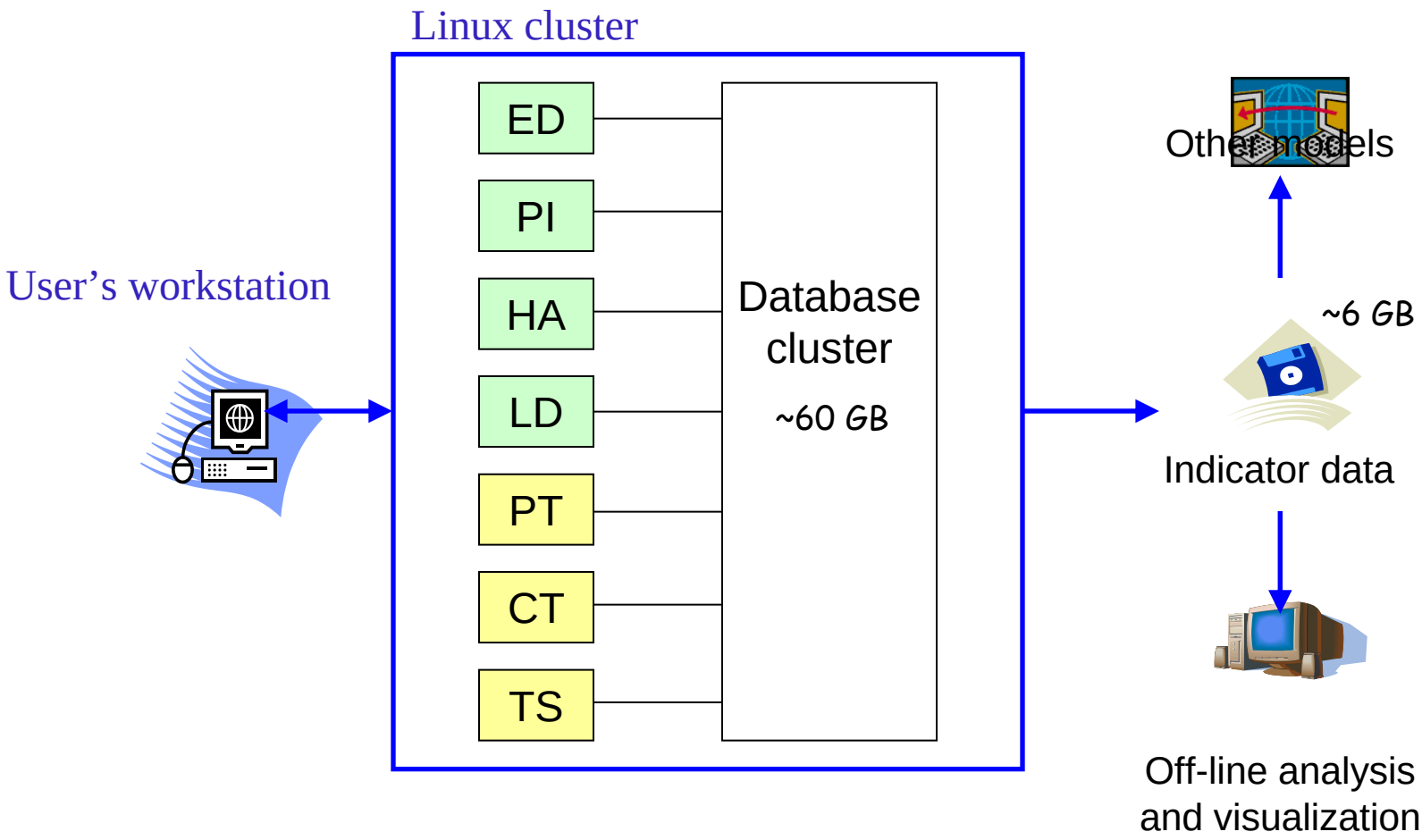
Spatial Activity Model

- Endogenous economic forecast (from exogenous national forecast)
- Explicit commodities with market-clearing prices
- Explicit treatment of labor and ability for consumer (rather than producer) to pay transport costs
- Zoning input (34 zoning codes)

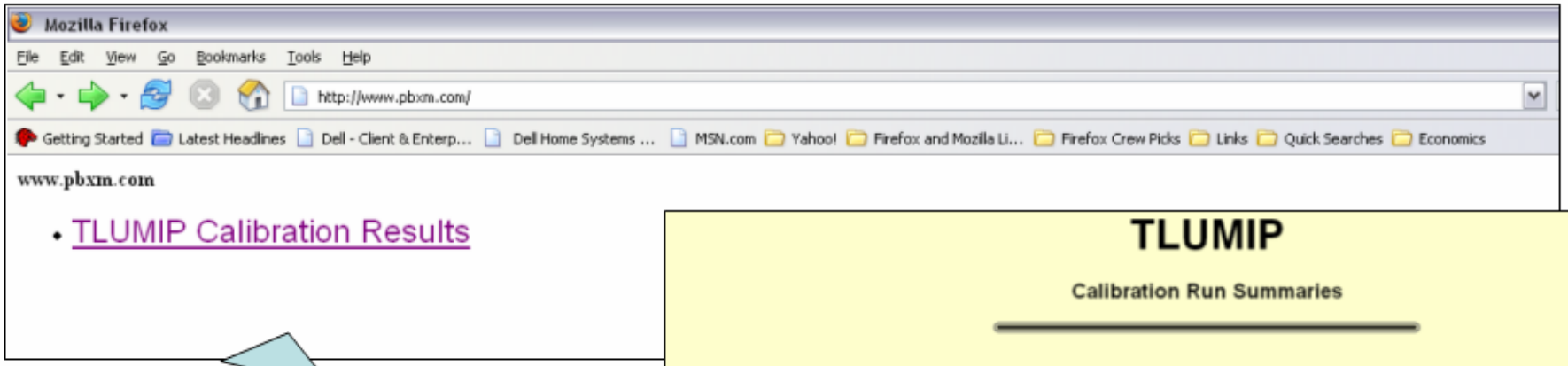
Transportation Models

- Micro-simulation
  - Activity- based daily travel for nearly 6 million people
  - Tour-based freight movement, with distribution centers
- Peak/Off-peak period Assignment

Oregon2TM status: Assembled and run remotely



Oregon2TM status: Calibration Website



To start:

- type in your browser: www.pbxm.com
(or http://204.134.52.35/)

- Click on: TLUMIP Calibration Results

This leads you to the **main page** with entries for each module, and a final entry to view files on the main computer cluster (e.g., log files, small input/output files; large files will take some time to view).

OVERVIEW

When you click on a module, you will see the following:

-(optional) Page listing measures of assessment, click to get the following:

-Left hand column **listing** tables/figures

-Right hand series of tables/figures.

The tables/figures/maps are typically one of the following types:

-**Table** comparing module outputs against targets, where available.

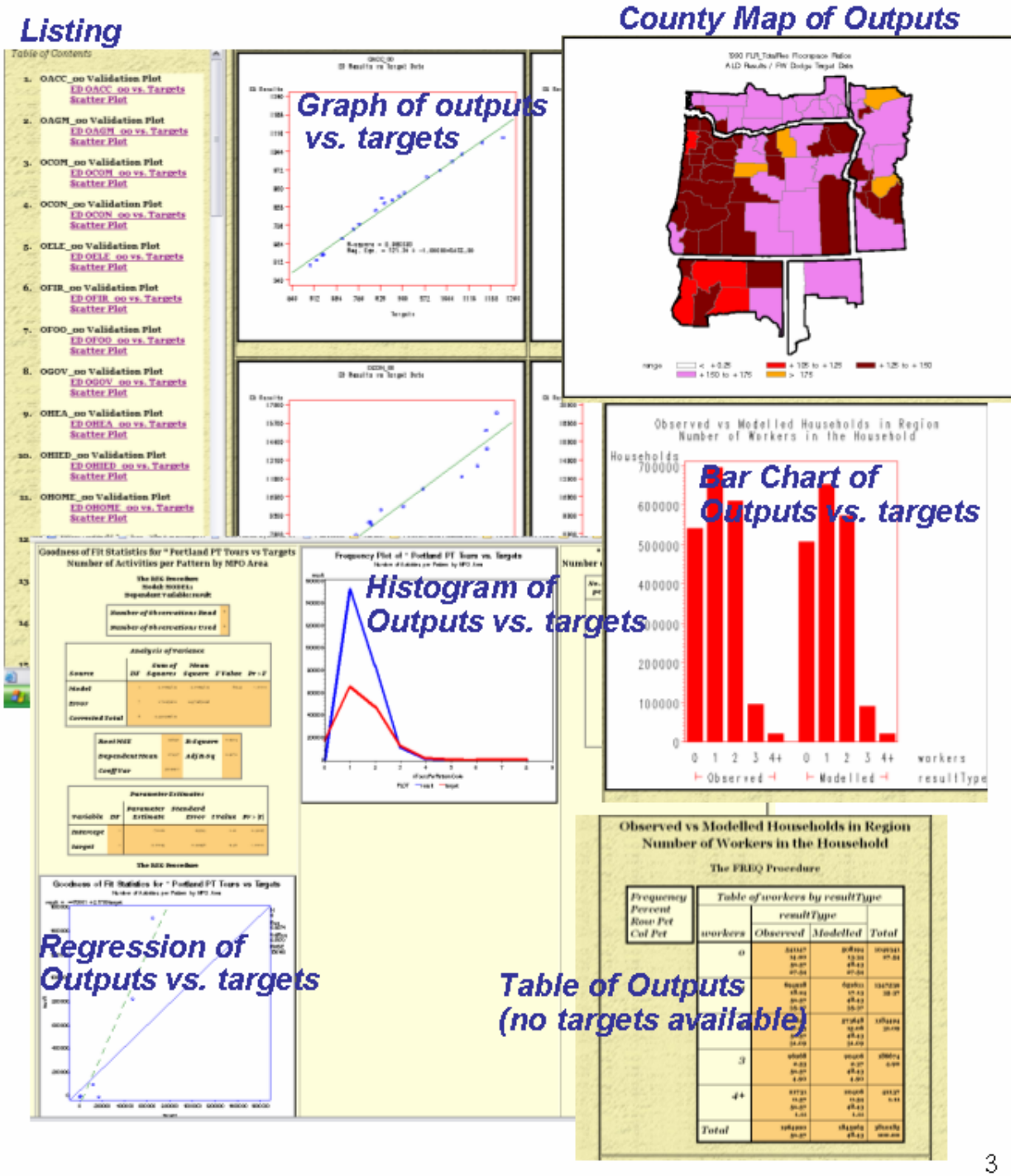
-**Graph** comparing of module outputs (y-axis) against targets (x-axis). Thus over predictions are above and under predictions below the 45 degree line.

-**Geographical map** displaying module results at either a state level (e.g., counties, PUMAs, etc.) or regional level (e.g., azones, bzones)

- **Regression** of module results against targets

- **Histogram** of module results against targets

Note: To show additional detail move mouse over top of graphed points.



Model Applications

- Oregon1
  - OTP completion during public review
  - OTIAIII Bridge efforts (state-level)

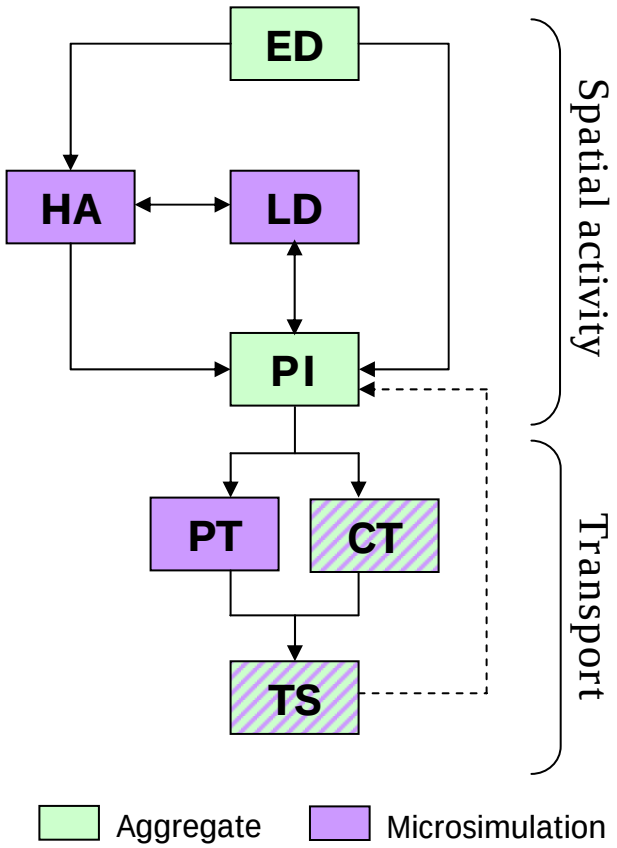
- Oregon2TM (start in late 2006/2007)
  - OTIAIII Bridge efforts (corridor analysis)
  - Metro 2040 update/New Look
  - Central-Eastern Oregon Livability Study
  - Other Possibilities
    - Alternative to the fuel tax
    - Intermodal freight

MPO-Statewide Interface

- Design Document (by mid-2005)
  - Goals/policy-level guidelines
  - Implementation level
    - Networks/Zones
    - Category definitions
    - Planned projects (level of detail)
    - Data to be shared (inputs/outputs)
    - Common reference scenario
    - Periodic updates
- MPO data for model review/calibration
- Collaborative ODOT-MPO Projects

Update Oregon2 Model Design

Original Oregon2 Model



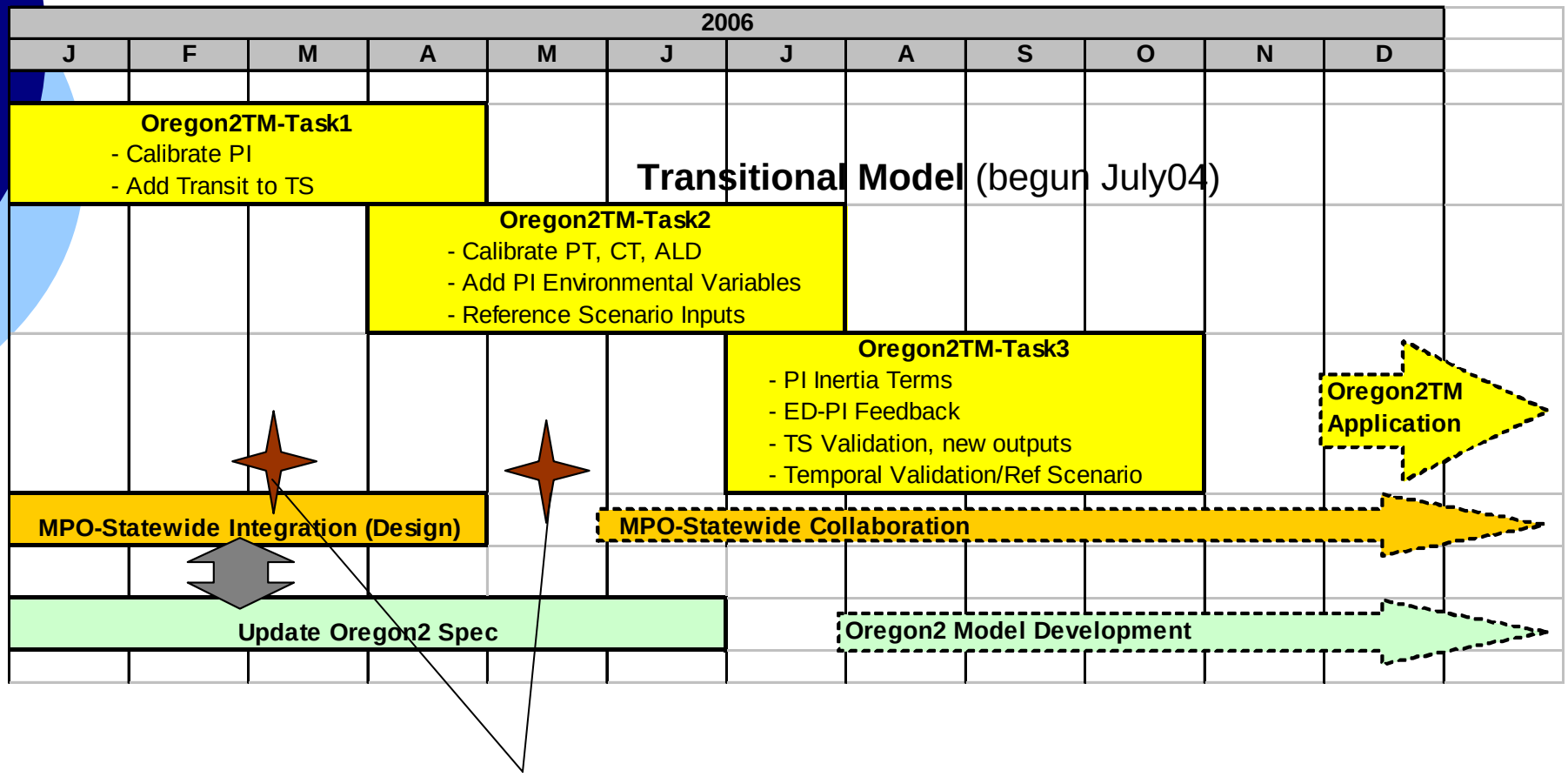
Update to incorporate…

- Lessons Learned to date
- Environmental/sustainability indicators
- Visualization/GIS
- MPO-Statewide Integration
- Oregon2TM implementation Architecture Review
- Latest theory/practice (Peer Review Panel)
- Learning from others

Ongoing Implementation Challenges

- staff training
- data requirements
- partnerships with PSU
- effort required to use the models
- managing expectations with staff/team resources
- contracting!!

TLUMIP Next 12 months…



Peer Review Panel Meetings
(previously June02, July03, Aug05)