Oregon Freight Plan Analysis Using the Statewide Integrated Model

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Presentation Highlights

- Describe Freight Plan analysis
- Brief overview of the Statewide Integrated Model (SWIM2)
- Contribution of analysis to planning process

Good Models Answer Questions...

- Models are designed to evaluate specific types of questions
- Imperative to have a clear understanding of the questions being asked
- Match information needs to the right modeling tool in the toolbox.
- Models do not provide “data,” data inputs are processed and provide “information,” analysts interpret information to tell “story”

Description of Freight Plan Analysis

Oregon Freight Plan

- First statewide freight plan
- Scope of analysis was well matched to SWIM2 model
- ODOT modeling staff served role as internal consultants

Freight Plan Analysis Purpose

- Forecast range of likely economic conditions to gain understanding of effects on freight movement
  - Illustrate variation in statewide and regional activity and commodity flows
  - Provide information to support development of freight strategies
Analytical Approach

- Plan for freight flows given an uncertain economic future
- Use scenarios to evaluate range of possible futures

**Reference:**
- "business-as-usual" (2.0%*)
- Optimistic: more economic growth (2.7%*)
- Pessimistic: less economic growth (1.2%*)

**High Transportation Costs:**
- Pessimistic scenario with 3-fold increase in variable operating costs

* Compound Annual Growth Rates

Oregon StateWide Integrated Model (SWIM2) as Forecast Tool

- SWIM is dynamic
  - Integrates the dynamic interactions of land use, the economy and transportation infrastructure
- SWIM1 used successfully on several statewide analyses
  - Proved its value repeatedly
  - Generated support for SWIM2 development
- SWIM2 has greater spatial acuity
  - More detailed inputs and components
  - Can evaluate more policy options
Contribution of Analysis to Planning Process

Modeling Analysis Provided Information

- Source of descriptive data used to frame discussion
  - Described economic conditions
  - Illustrated regional differences
  - Revealed patterns of activity
- Use model scenarios to address risk
  - Facilitates planning despite many unknowns
- Helped identify core issues
- Reduced perception of bias
Conclusions

- Models are powerful tools
  - Effectiveness is determined by how they are used
  - Effective when the right tool is used
  - Good source of descriptive data
- Using them for long range planning takes time and forethought (both in development and use)
- Planners and modelers must work together to realize the full potential of using these tools
- The extra time used for analysis pays off in the end with a more productive outcome and smoother process

For more information...

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Oregon Freight Plan:
http://www.oregon.gov/ODOT/TRANSPORTATION/FREIGHT/PAPA/
All Models Are Beautiful, but are they Super?

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Presented to the Cascadia Collaborative
October 21, 2011

Why do we have models?

- To stimulate the brains of modelers?
- To annoy planners?
- To confound the public at meetings?

What is a model?

\[ T_c = 2 \times \sqrt{\alpha(1-\frac{L}{T_c})^2 + \beta} \]

- A series of mathematical equations that represent choices and behaviors
- An isolated representation of a real world process
- A tool to explore assumptions – one of many tools in a planner’s toolkit
- A reality check on judgment and intuition
- NOT a crystal ball

Why do we have models?

- Federal and State requirements
- Consistency across multiple projects
- To be objective in planning future projects

What do models do?

- Test policy applications in a defensible and replicable environment
- Compare possible futures to current reality
- Standardized data outputs
- Try to make sense of the travel choices we all make every day
What kinds of questions do models answer?

- What is the effect of increasing highway capacity on congestion?
- How many people will ride a new light rail line?
- What population segments will benefit most from bus system improvements?
- Can we reduce greenhouse gas emissions with pricing policies?

Types of models

- 4 Step
  - How congested will our highway be in 30 years? What if we add two additional lanes? How will different land use scenarios impact congestion?
- Activity Based
  - If we toll the highway, what are the equity impacts on highway users? Who will be affected by the toll, and how will they change their travel choices?
- Integrated Transport Land Use
  - How will the highway congestion affect where people choose to live and work in 30 years? If we add additional lanes, will there be more urban sprawl? How will congestion delay impact our freight economy?

Modeling Process

- Data (Household survey, Trip Diary, Demographics)
- Statistics: Find relationships in the data
- Math: Codify relationships in equations
- Model Output: $P_{s,t} = \sum_{a \in A} e^{\lambda_{a,s,t}}$

Model Outputs

- Model output is usually raw data in the form of text files or matrices that must be processed to make sense
- The data ‘tells a story,’ and it’s up to the user to find that story
What is a good model?

A good model…

- Accurately models base year conditions
- Shows reasonable responses for future year conditions
- Answers the relevant policy questions

What are potential problems with models?

- Inadequate data
- Quality Control
- Validation Errors
- Optimism Bias
- Freight

Conclusion

Models are powerful tools for the planning process
- It is important to understand the strengths and weaknesses of the tool
- New technology allows us to develop powerful new kinds of models
- New models are well-suited for planning applications
**Washington State Bicycle & Pedestrian Documentation Project**

WA/OR APA Conference  
October 2011

Tessa Greegor  
Cascade Bicycle Club

### Why count bicyclists and pedestrians?

- Documenting bicycling and walking trends
- Determining where people are biking and walking, and why
- Travel demand models
- Calculating multimodal level of service
- Conducting safety analyses
- Funding nonmotorized projects
- Framing policy
- Supporting advocacy efforts

### Why count bicyclists and pedestrians?

- Current data collection is inadequate...
- Census – Journey To Work (ACS)
- National Household Travel Survey
- Constraints:
  - Only documents commute trips (15% of all trips nationally)
  - Doesn’t capture multimodal trips
  - Covers a limited population sample
  - Lacks route information

### Presentation Overview

- Why Count?
- Washington State Documentation Project
  - Goals
  - Process Overview
  - Summary
  - Lessons Learned
- Future Count Expansion

### Washington State Documentation Project Overview

- Modeled after the National Bicycle and Pedestrian Documentation Project
- Annual, statewide non-motorized count using volunteers
- Started in 2008 (4 years)
- Conducted in fall
- AM/PM peak periods (7-9 am, 4-6 pm)

### Washington State Documentation Project Goals

- Track trends in bicycling and walking at key locations around the state
- Begin to address non-motorized data needs
- Inform non-motorized planning and funding decisions
- Better understand non-motorized travel patterns

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American Communities Survey Question:

How did this person usually get to work LAST WEEK? If this person usually used more than one method of transportation during the trip, mark the box of the one used for most of the distance.
Collaborative Approach

• Who’s involved in the Counts?
  – Volunteers – local residents
  – Washington State DOT
  – Cascade Bicycle Club (contractor)
  – RTPO’s
  – Municipalities
  – Advocacy groups
  – Bicycle and pedestrian advocates

Pros/Cons of Collaborative Approach

• Pros: Local jurisdiction involvement
  – Opportunity for local engagement
  – Ability to select locally significant count locations
  – More ownership of count process and data
  – Higher volunteer coverage
  – Provides an opportunity to train local volunteers, reducing count errors or inconsistencies
  – Help to establish nonmotorized data collection efforts within local jurisdictions

• Potential Cons
  – Opportunity for scope creep
  – Changes to locations

Process

City Selection

32 count cities in 2011

Location Selection

250 count locations in 2011

Background Data Collection

• Type of Facility
• Type of Setting
• Scenic Quality
• Surrounding Land Uses
• Key Destinations
• Quality of connecting facilities
• Quality of Overall Network
• Traffic Volumes/Speeds
• Crossings/Intersection Density
• Crossing and Intersection Traffic
• Crossing and Intersection Protection
• Condition
• Topography
Volunteer Process

- Initial “call for volunteers”
- Volunteers sign-up via online website
- Confirm shift/send materials via e-mail
- Volunteers conduct counts
- Online data entry or return count form via fax, e-mail, or mail for manual data entry

Data Collection

- Screenline & Intersection Counts
- Note direction of travel only
  - Simplifies data collection, entry, and volunteer training
- Tally bicyclists, pedestrians and “other”

Data Collection

- 2-hour, peak period count (7-9 am, 4-6 pm)
- Based on a 13-hour count, 5-7 pm may be more appropriate for some locations

Volunteer Count Strengths

- Cost effective
  - 2010: 386 2-hour counts conducted
  - Approximately 772 volunteer hours worth of data collection in 3 days
- Community engagement
- Volunteer opportunity
- Communicate the importance of bike/ped data collection to the public

Volunteer Count Challenges

- Short-term counts
- Shift cancellations
- Human error/data entry error
- Counting methodology discrepancies
- Catering to different needs/requests
- Data return
- Location discrepancy year to year
Lessons Learned

- Benefits outweigh the negatives
  - Cost effective
  - Capture large amounts of data in a short period of time
  - Strengthen partnerships among agencies, cities, advocacy groups etc.
  - Most challenges can be addressed through experience

Lessons Learned

- Data
  - Higher volumes in the PM
  - Subject to a number of factors on any given day
- Outreach
  - Early and often
  - Target specific communities
  - Partner with established agencies/groups
- Volunteers
  - Online tools AND human interaction
  - Two volunteers per shift

Future Count Expansion

- Background Report analysis
- Technologies suitable for WA State
  - Spokane Case Study
- Data Sharing
- Expansion at Regional and Local levels

Contact Information

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Resources
WSDOT Bicycle & Pedestrian Documentation Site
http://www.wsdot.wa.gov/ValueCount.htm

Cascade Bicycle Club
http://cascade.org/home/
The National Bicycle and Pedestrian Documentation Project

What is NBPD?
- Annual national bicycle and pedestrian count and survey effort
- Fulfills need for in-depth analysis of why people bike and walk
- Objectives
  - Consistent data collection
  - National database
  - Research
- A pro bono effort by Alta Planning + Design with support from ITE

The Need for NBPD
- Lack of consistent data
- Lack of support for non-motorized funding
- Measuring, monitoring, forecasting and modeling bicycle and pedestrian travel

NBPD Resources
- Count Forms
- Intercept Surveys
- Training Materials
- Recommended Count Dates
- Extrapolation Worksheet

Consistent Count Methodology
NBPD Methodology: Screenline Counts
- Screenline Counts
  - Count everyone who passes

Other Methodologies: Intersection Counts
- Intersection Counts
  - Count all movements at intersection
  (This shows 2 movements)

Example Forms
Consistent Dates and Times

- 2nd week of September (primary count dates)
  - January, May, July supplemental dates
- 1 weekday and 1 weekend day
  - Weekday, 7-9AM, 5-7PM (primary)
  - Saturday, 12-2PM (primary)

To date...

- Over 100 organizations and agencies have submitted data
- Over 600 count locations
- NBPD methodology has been applied in numerous planning projects, including:
  - Caltrans Seamless Travel
  - NTPP Summary Reports
  - Vancouver, Washington
  - Metro Intertowns

Who is Counting?

- Cities
  - Arlington, VA
  - Lincoln, NE
  - Portland, OR
  - San Francisco, CA
- Regional
  - Boston MPO
  - San Francisco MPO
  - Mid-Ohio Regional Planning Commission
  - Portland Metro
- State
  - Washington
  - Colorado

How are agencies using NBPD?

- Performance measures to evaluate progress towards walking and bicycling goals

How are agencies using NBPD?

- Before and after counts to measure usage and justify projects

How are agencies using NBPD?

- Grant applications
  - "Trail Count 2008 data supported efforts to secure $1,377,000 in grant funding."
  - City of San Jose website
Seasonal Variation

NBPD Lessons Learned
• Counts can serve a variety of purposes
  – Estimation
  – What influences usage/causal relationships
  – Monitoring
  – Grant funding

NBPD Lessons Learned
• Variability is key issue for bike counts
  – Daily variability decreases when count volumes are larger and weather is dry
  – While there is daily variability, annual data shows clear trends by hour, day and month
• Weather is the main cause of variability
  – Temperature is the most predictive, reflective of seasonal trends
  – Precipitation has a clear impact, though it depends on the amount of rain/snow.

Questions?

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Purpose of the Oregon Freight Plan

The purpose of the Oregon Freight Plan is to improve freight connections to local, tribal, state, regional, national and global markets in order to increase trade-related jobs and income for Oregon workers and businesses.

Oregon Freight Plan and the OTP

Oregon Transportation Commission
OGDOT Staff
Freight Plan Steering Committee
Policy and Process Working Group
Freight and the Economy Working Group

OFP Organizational Roles

Strong Economic Link

- Oregon’s top industries are highly tied to freight.
- Many Oregon industries are highly dependent on exports.
- One in every six Oregon jobs tied to freight transportation.
- Substantial amount of Oregon’s jobs dependent on Oregon’s port system.
- Much of Oregon’s production and distribution of goods occurs in the Portland Metro area and Willamette Valley.
- Freight reliance is seen in:
  - Consumers: access to stores
  - Production: agricultural and natural resources (from outside of Willamette Valley)

Anticipated increases in population, GSP and employment will fuel demand for increased freight moving into, out of, and within Oregon

Oregon Freight Demand

Anticipated increases in population, GSP and employment will fuel demand for increased freight moving into, out of, and within Oregon

<table>
<thead>
<tr>
<th>Freight Ton and Value (Inward, Outward, and Intermodal)</th>
<th>2002</th>
<th>2010</th>
<th>2035</th>
<th>2002 to 2035 % Growth</th>
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</thead>
<tbody>
<tr>
<td>Weight (millions of tons)</td>
<td>347</td>
<td>403</td>
<td>691</td>
<td>88%</td>
</tr>
<tr>
<td>Value (billions of $)</td>
<td>213</td>
<td>253</td>
<td>854</td>
<td>181%</td>
</tr>
</tbody>
</table>

Increased freight demand requires additional capacity, congestion reduction measures, improved connectivity between modes and between production locations and intermodal facilities.
**Multimodal Corridor Development**
- SWIM model runs to identify corridors carrying high value or high tonnage of goods

**OFP Freight System**
- Oregon's freight network is centered around four primary multimodal corridors

**Value of the tool**
- Calculate the changes on infrastructure, modes, and economy
- Assess how different freight policies, programs, and strategies would serve the needs of the State, shippers, carriers, and communities under different possible future conditions
- Better assess the robustness of freight strategies

THANK YOU – QUESTIONS?