Preliminary Draft for Review

Summary of the Peer Review Panel and Modeling Steering Group Meeting, 16-17 December 1996

Transportation and Land Use Model Integration Program
Phase I, Task 1.8

Prepared for

Transportation Development Branch
Oregon Department of Transportation
555 13th Street, NE
Salem, Oregon 97310

By

Parsons Brinckerhoff Quade & Douglas, Inc.
5801 Osuna Road, NE, Suite 220
Albuquerque, New Mexico 87109

And

Urban Analytics, Inc.
ECONorthwest
KJS Associates, Inc.

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The Peer Review Panel and Modeling Steering Group met in Portland, Oregon, on 16-17 December 1996 to review progress on the project. Detailed design issues were discussed at the meeting, relating both to the statewide (intercity) and metropolitan prototype models. The first discussion focused on the policy context that the modeling would be carried out within. There was considerable agreement that the prototype models could not embody all of the desired analytical capabilities desired by the Oregon DOT and other state agencies. Attention was turned to defining a set of important policy measures that could be accommodated within the prototype models. This discussion was applicable to both the statewide and metropolitan models. This group then turned its attention to a review of existing sources of data on intercity passenger travel. This was followed by a detailed discussion of the metropolitan land use model. The remainder of the time was occupied with discussions about the design of the statewide model. The key findings and discussion items from each session are described in this paper. A list of attendees may be found at the end of this document.

1. Policy Concerns

Sam Seskin reviewed his memo on policy concerns of the constituencies for this modeling effort. The memo was distributed to attendees prior to the meeting and is available from the TLUMIP Internet archive[1]. Within the broad classifications of ordinary, unusual, and curious (from a modeler's perspective), he lists as significant modeling issues:

Ordinary
- VMT and congestion
- Effects of new basic employment
- Sub-county distribution of households and employment
- Air quality

Unusual
- Land supply
- Detailed urban design
- Demographic shifts
- Pedestrian/transit oriented development effects
- Strip vs. nodal development of commercial land

Curious
- Retail development style
- Parking supply

Bill Upton offered the effects of changes in recreation and tourism as an additional concern, and Keith Lawton added freight flow modeling as another need. Valentine noted that rail must be included, at least for freight.

The state's Transportation Planning Rule (TPR) supplies standard benchmarks for monitoring some of these effects. Michael Wegener classified current issues of interest to European decision makers as (1) economic development, (2) equity, and (3) environment sustainability. Bill Upton noted that the State's proposed new air quality rules push us to explicitly treat all three.

1. All documents undergo internal reviews and revisions by ODOT staff and the consulting team. They are then available from http://www.odot.state.or.us/tdb/planning/modeling/index.html.

Michael Wegener also identified the need for explicit development of weights among various goals to enable thorough analysis, but Doug Hunt pointed out that in the typical North American decision environment this is left at the political level. Hunt suggested measuring traveler benefits to avoid TDM bias, and recommended using a "social discount rate" to account for timing of benefits.

Paul Waddell suggested organizing the list by time and space scales, whether input or output, and including how to measure. The discussion ended with the formulation of a matrix of feasible issues, an edited version of which is shown in Table 1. These policy measures define the subset of possible measures that the prototype models will be designed to address.

2. Inventory of Data Sources on Intercity Travel

A considerable amount of discussion was devoted in the last two peer review panel meetings to identifying suitable replacements for the 1995 American Traveler Survey (ATS95). It had been assumed that the ATS95 would be an important data element in model development, but discussions with the U.S. Department of Transportation revealed that the results would not be available in time for use in this study.

Maren Outwater examined the existing passenger travel data inventories and surveys available within Oregon. She prepared a written summary, which contains a large number of exhibits, which is available on the TLUMIP web page. Some of the principal sources are described below.

2.1 The 1994/5 Oregon HIS

Home interview travel surveys have been completed in the Portland region, for several metropolitan areas in the state, and for a limited number of households not included in the non-metropolitan areas. These surveys employed the same survey definitions, methodologies, and instruments. The only discernible difference between them appears to be in sample selection, which was inevitable due to the disparity in data sources and coverages. The Portland data were available for analysis prior to the meeting, while the others are in various stages of editing and geocoding. All of the data should be available in time to be used in this project.

Summaries of the Portland data were presented to the group. Maren Outwater reported that perhaps as many as 10 to 15 percent of all trips leave the urban area of origin. The exact number will depend on our definition of an intercity trip; some trips classified as internal-internal may qualify, whereas some trips between the small urban areas may not.

The most significant finding about these data surrounds the way in which internal-external trips are coded. The surveyors obtained and recorded the actual destination of all internal-external trips. It is thought that at least for Portland that even external-external trips made by members of a surveyed household were included in the data. The contractor did not, however, in all instances record the actual origin or destination of trips outside of the region in the digital survey files. Instead, they are simply coded to external stations. The consulting team will investigate the extent to which external trips are coded, and will determine the resources required to recode them for use in this study.

Table 1: Capabilities to address policy issues

Analysis issue	Applicable scale			Required data	Modeled response(s)[a]
	statewide	substate	local		
Effect of land supply on land use and location decisions	■	■	■	Zonal area, employment and housing by type, network travel times by mode, exogenous constraints on growth (non-movable businesses, urban growth boundaries)	Changes in residential and commercial land prices, changes in land consumption by category of use, migration of employment
Effect of congestion on land use and location decisions	□	■	■		Changes in zonal accessibility[b] and its indirect effect on residential and business location choice
Cumulative effects of retail location choice		□	■		Current and lagged changes in land prices and land use in the target and adjacent zones, increased infrastructure cost as a function of increased travel demand, changes in zonal accessibility[b] and destination choice
Effect of large commercial development on the periphery of the growth boundaries	□	■	■		
Effect of land supply on travel behavior	■	■	■	Employment and household supply by zone, network travel times and cost by mode, estimates of the elasticity of trip generation by trip purpose	Changes in trip generation as a function of zonal accessibility[b] and congestion[c], changes in destination choice as a function of changes in residential and business location choice
Effect of highway capacity increases on travel behavior[d]	■	■	■		Changes in trip generation and destination choice by trip purpose, changes in corridor and systemic network measures[e], changes in travel disutility by trip purpose and area (county, zone group, etc.).
Effect of network connectivity on travel behavior		□	■		Changes in trip generation and destination choice as a function of zonal accessibility[b], changes in network measures[e] for the study area.
Effect of parking supply on travel behavior		□	■	Total travel time and cost by mode, employment and household supply by zone, exogenous forecast of parking cost and supply by zone	Changes in mode choice as a function of parking cost at the destination, lagged residential and business location choices as a function of decreased accessibility and changes in land prices.

Table 1: Capabilities to address policy issues (Continued)

Analysis issue	Applicable scale			Required data	Modeled response(s)[a]
	statewide	substate	local		
Effect of urban form on mode choice		☐	■	Zonal area and density, parking cost and supply by zone, travel cost and time by mode	Changes in mode choice as a function of destination parking costs and differential travel times and costs, lagged changes in residential and business location choice and attendant changes in trip generation and destination choice.
Effect of rail investment on highway use	■	☐		Rail service and network attributes, rail passenger and freight origin-destination data by mode of access and trip purpose (persons) or commodity family (freight), zonal accessibility	Truck-rail diversion by commodity group as a function of current and lagged cost and travel time differentials, changes in unit transport cost by mode, passenger mode choice as a function of travel time and cost differential and changes in consumer surplus[f].
Effect of changes in the demographic composition of Oregon	■	■	☐	Changes in household composition by time period, estimates of trip generation elasticity by household type	Changes in trip generation by area and household type[g], changes in the demand for employment by businesses, inducement of migration of employment by industry.

a. Some measures of effectiveness will be applicable for all analyses, such as changes in consumer surplus (for persons) or aggregate changes in transport cost (for freight).
b. Zonal accessibility is a derived output of the travel model which is fed back into the land use model until user-defined equilibrium occurs; it is primarily a function of zonal density and the level of congestion on the network serving it.
c. These changes can be measured both in terms of changes for a single zone or group of zones, or systemwide using measures such as changes in vehicle miles and hour of travel by area, corridor, trip purpose, mode of transport, etc.
d. These effects are still not well understood; see TRB Special Report 245.
e. Includes but not limited to changes in vehicle miles and hours of travel by mode and trip purpose (under congested conditions and total) for the corridor under study, a buffer zone around it, and for the state or substate area as a whole.
f. Estimation of passenger patronage will not be possible using the Phase II model; exogenous estimates of modal shifts can be accommodated but not explicitly modeled in the statewide model.
g. Three household classifications based on income (low, medium, and high) have been specified for the statewide model, based upon data availability.

2.2 Roadside Interview Surveys (1994)

A number of roadside intercept surveys were completed by ODOT contractors in 1994 at certain locations in the state. ODOT is presently pulling these data together for the consulting team to evaluate. Based upon a review of the documentation, it would appear that sufficient detail is available to geocode the origin and destination to place names within Oregon. The lack of any data about the household characteristics of the tripmakers was discussed at length. It was generally concluded that this omission precluded the use of the data in model calibration, although the data could be profitably employed in model validation. The consultants agreed to present a more detailed review of the data at the next peer review panel meeting.

2.3 On-Board Survey of Intercity Bus and Rail Passengers (1994)

A stated preference survey of travel within intercity corridors was undertaken by ODOT. The consultant was still acquiring and reviewing these data. While the surveys themselves appear to be reasonably detailed and offer a great deal of preference data, two shortcomings were identified. The first relates to the sample size, which is around 600 intercity bus and rail passengers. While quite small in terms of the total number of intercity trips made, they did represent a large percentage of the patronage on the modes interviewed. The second shortcoming, noted by Frank Koppelman, was the lack of comparable survey data from users of other modes. While introducing some problems relating to the difference in time between the two surveys, he also noted that ODOT could administer the same survey to intercity automobile travelers in order to obtain enough cross-sectional data for model development.

2.4 Division of Tourism Survey (1994-5)

The Division of Tourism collected approximately 3,000 surveys from visitors to cultural and historic sites across the state. While not all of the raw survey data were available, enough pieces of information about it were available to determine its utility. Rick Donnelly discussed his assessment of the data, in which he concluded that the data were not useful in model development. Among the shortcomings in the data he described were (1) the lack of expansion factors or the ability to synthesize them, (2) an apparently non-random pattern of sample selection, and (3) it's small sample size relative to the estimated number of total tourism trips in the state. The panel agreed that the data, while adequate for its intended purpose, was not useful for model development. It as felt, however, that some of the marginal distributions in the survey data would be useful for model validation at the statewide level.

Rick Donnelly briefly discussed ongoing work in truck surveying at several locations within Oregon. The first survey had been completed the week prior at the Woodburn weigh station, located between Portland and Salem on I-5. The results of this survey, as well as surveys at five to six other locations in the state, will be complete by the next peer review meeting. The results of the survey will be distributed to panel members in advance of that time.

Dick Walker described a freight data collection and modeling effort being jointly directed by Portland Metro and the Port of Portland. Consultant proposals had been received, and interviews were slated for later the same week. The study will focus on four major areas:

1. An update of previous commodity projections for the Portland region,

2. The collection of origin-destination and commodity classification data from shippers and/or carriers,
3. A stated preference survey of shippers, and
4. The development of a freight model for the Portland area, which will work in tandem with the regional travel model maintained by Portland Metro.

Dick Walker and Bill Upton described the interaction between this study and ours, and reported that coordination between the two was already ongoing. Rick Donnelly noted that he eventually hoped to replace the Portland portion of the statewide model with the more detailed information available from the Portland freight model, but that would occur well beyond the time frame of this project.

3. Design of the Metropolitan Land Use Model

The discussion on the metropolitan land use models was based on the report distributed at the meeting on draft policy requirements, model specifications, and data. The discussion began with a summary by Paul Waddell of the policy requirements originating from federal, state, and local (Eugene) policies. This was followed by a summary of the structure of the proposed model specifications, and concluded with a review of the data requirements for the model and the data available from LCOG for applying the model to Eugene. Some of the key points of the discussion are summarized below.

Doug Hunt asked whether the model dynamics needed to be based on a five year increment. Michael Wegener clarified that the model dynamics should be dictated by the time frame of the processes being modeled. Travel behavior takes place over hourly or daily time schedules, whereas household relocations occur over a year, physical development of structures occurs over several years, and infrastructure projects may take decades to complete. After considerable discussion, a consensus seemed to emerge that a one year time frame might be the most appropriate for the residential and business relocations, but that this could reasonably be compromised to a tow-year time frame.

Since physical development of some structures takes several years, particularly large scale non-residential structures, Michael suggested that the new development could be represented appropriately even if the time frame of the model was based on one- or two-year time increments, by scheduling the physical development over a longer time frame, and accounting for the space as it becomes completed. Paul Waddell acknowledged the appropriateness of shorter time intervals, but raised the concern that the computational burden would be an exact multiple of the number of time intervals, and that shorter time intervals would require more data and thereby place more demands on users. The example of travel time estimates being based on runs of the travel models was discussed, although there appeared to be consensus that travel times were not likely to change too quickly, so it would not be a problem to use travel times based on five year increments in the travel models. Paul Waddell concluded by indicating that he would try to design the models to accommodate a user-specified time interval between one and five years.

Doug Hunt asked whether the logit formulation proposed for modeling business location was the most appropriate for certain sectors, such as retail. He suggested that alternative model formulations such as location-allocation might be more appropriate. Frank Koppelman and Michael

Wegener disagreed that logit models could not represent the behavior of businesses such as franchise restaurants, but noted that the models would need to include some measure of the proximity of competitors as well as the proximity and size of the potential market. Carl Batten suggested that it was a question of aggregation, since although an individual Mcdonalds might locate all of its stores with respect to each other's market areas, if the employment is aggregated into larger groupings such as all fast food restaurants, or even more (e.g. all retail), then this concern is not warranted.

Doug Hunt asked about the classification of employment, and whether it would be possible to represent, for example, different kinds of retail such as malls, strip shopping, and big-box retail outlets. Paul Waddell indicated that the employment will be classified by industry and establishment size at the regional level, and that this will be allocated using logit models into traffic zones and types of buildings (land use). The type of retail refers more to the type and configuration of the buildings, as well as their use by business establishments in the retail sector. If the land use data supported the separation of retail land uses into these three categories, and the calibration results warranted the distinction, then it would be possible to attempt to differentiate these kinds of retail.

In discussing the accessibility measures, the question of what travel impedance measure should be used was raised. Paul Waddell indicated that both highway and transit travel times and/or costs could be used, but that the most likely measure would be the logsum term from the mode split model, which would contain a weighted representation of the utility derived from all modes between individual zone pairs. It was agreed that this is probably the best measure to use, and adds consistency with the travel models. The only drawback that was noted its that it can be difficult to interpret. Someone suggested that they use the expected travel time to activities (e.g. shopping or work) as an easy to explain measure of accessibility. Michael Wegener suggested that the gravity formulation of the proposed accessibility measures should be changed to entropy based accessibility measures to be more consistent with the logit basis of the remainder of the models. Paul Waddell agreed to make the change.

Michael Wegener asked if the distance from prior location variable that had been included in an earlier draft of the residential location model specifications could be retained, since it is expected that households are more likely to move shorter distances rather than longer. Paul Waddell acknowledged that the variable had been dropped, and explained that the reason was that the implementation of the variable required a very substantial complication of the model as it is implemented in software, and that this would be evaluated as an extension of the model.

The land market clearing module was discussed, and someone suggested that an exponent term was needed on the price adjustment equation, as an estimated parameter to moderate the sensitivity of price adjustments.

There was an extended discussion on the proposed developer module, which indicated that this module needed further refinement in its specification and would be one of the more difficult to implement. Concern was raised about the use of land prices on the right-hand side of the developer land conversion equation as well as a Z vector of zonal attributes, since the price of the land should capture the zonal characteristics. It was suggested initially that the Z vector be eliminated, and prices remain in the equation as the principal determinants of development potential. Paul Waddell gave an example of two identically priced land parcels that vary significantly in their

location and characteristics (e.g. one at the edge of development and one in a more remote location). In such a case, Paul Waddell suggested, developers would be much more likely to develop the parcel at the edge of development, due to the characteristics of the parcel. Doug Hunt suggested a multiplicative form to the developer equation. Someone else suggested using a measure of the fragmentation of land. Paul Waddell attempted to summarize the discussion by describing the model as predicting the probability of land conversion to a particular use at a particular density as a profit maximizing decision made by developers, within the constraints of the land use plan, and based on expected profitability from each use, including leaving it in its current use. He indicated that more work would be done to refine the specification of this module. Someone noted that there is little useful research to build on in this area.

There was a discussion of the employment sectors used in the model, and suggestions were made to attempt to reconcile the sectors as closely as possible with those proposed for the statewide model. Rick Donnelly noted the use of the sectors in the statewide model was based more on commodity flows, and that the sectors should be based on other considerations in the land use model, but that they should be able to be aggregated from one to the other. In particular, the level of disaggregation of the manufacturing sector in the statewide model appears unnecessary for the metropolitan model. On the other hand, the suggestion was made that education be split out of services (or government) and further subdivided into elementary, secondary, and post-secondary. Wholesale should be separated from Manufacturing, and health services should be split from services. After some discussion it was agreed that school locations could be made exogenous to the model.

4. Design of the Statewide Land Use-Transportation Model

With the adoption of TRANUS as the platform upon which the prototype model will be developed, many of the larger architectural design issues are dictated by the capabilities of the software. The discussion of the statewide model therefore focused more on design issues within the TRANUS framework. The discussion began with a discussion of the economic sectors to be used in the model, as well as the exogenous projections of economic growth that will drive future projections. Rick Donnelly then reviewed a pair of lists of key model design elements (Tables 2 and 3). The basic components of the TRANUS model listed in Table 2 occupied the group for the remainder of the meeting.

4.1 Scenarios

TRANUS maintains scenarios hierarchically based on policy and year. It was proposed, and eventually agreed upon, to use the period 1990 to 1995 as the base period in the model. Five year increments will be used for forecasting, covering the years 2000 to 2020. The panel recommended starting with five-year increments, but collecting data and writing software flexibly to handle shorter interval if needed in the future.

Michael Wegener suggested “forecasting the past,” perhaps beginning the model in 1980 or 1985, in order to demonstrate the utility and robustness models. It was quickly acknowledged that data for those periods might not be available. He also noted that since the time interval must be commensurate with the cycle of change, shorter periods may be needed for the metropolitan models. Doug Hunt suggested running past the last forecast year (to 2025 or 2030) to check for cycling or convergence.

Table 2: Primary TRANUS components

Component	Description	Primary Attributes[a]	Defined in file...
Scenario	A year/policy combination; at least one scenario will exist for each time interval.	Identifier, previous scenario	tranus.ctl
Sectors	Groups of homogeneous social or economic activities into which all activities are divided; households may be divided by size or wealth, while businesses are typically classified by their primary activity.	Identifier, disutility and price elasticities, scaling factor	L1E
Zones	Polygons into which the study area is divided to represent locii of socioeconomic activity; analogous to traffic analysis zones in traditional models.	Identifier, level (first, second, or external)	Z1E
Modes	A set of operators that users of a particular category can combine in order to perform their trips.	Identifier, path-building parameters	P0E
Operators	A homogeneous grouping of means of transport by capacity and other characteristics, such as automobile, bus, train, etc.; analogous to mode of transport in traditional models.	Identifier, mode, type, occupancy rate, minimum and maximum wait times, penalty[b]	P0E
Link types	Functional classification by which links are classified.	Identifier, administrator, penalty[b], maintenance cost	P0E
Administrators	Defines the agency responsible for the infrastructure; used only for reporting purposes.[c]	Identifier	P0E

a. Identifiers consist of a non-zero number (or number-character combination for scenarios) and a short string of characters describing the category.
b. Used to represent non-modeled characteristics such as comfort, reliability, safety, etc.
c. A single administrator (e.g., the government) is often used in TRANUS applications.

4.2 Economic sectors

Carl Batten distributed a list of proposed sectors. Numerous manufacturing categories are needed because the average truck load, needed to convert weight to vehicles, varies widely among the manufacturing industries. We need to make sure that the statewide and metropolitan categories at least aggregate to a common grouping. Paul Waddell suggested using the same housing definitions in both models. Doug Hunt recommended merging finance and insurance with real estate, which is a common aggregation. Carl Batten proposed combining communications with utilities. A discussion of where land categories fit led to no conclusion.

Carl Batten discussed the input-output model. The matrix will be populated using IMPLAN. We discussed how to get manufacturing→wholesale→retail→household flows, and other multi-step flows, with no conclusion. Doug Hunt argued the need for exports by sector, but Carl Batten dis-

Table 3: Statewide model data requirements

Category	Variables	Defined in terms of...							Primary attributes	Defined in file...
		Scenario	Sectors	Zone	Mode	Operator	Link type	Administrator		
Socioeconomic variables	Base year socioeconomic data		x	x					Exogenous production and consumption, induced production, unit price, value added, attraction factor	L0E
	Exports		x	x					Amount	L0E
	Imports		x	x					Unit price, amount, attraction factor	L0E
	Restrictions on internal production		x	x					Minimum and maximum amounts	L0E
	Location utility function parameters		x						Price elasticities by zone level, scaling parameter	L1E
	Demand function parameters		x						Minimum and maximum inputs, elasticity of demand to price	L1E
	Demand substitutions		x						Logit dispersion and scaling parameters, penalty	L1E
	Attractors of exogenous demand		x						Attraction function weights (zone level, production, price, and excess capacity)	L1E
	Attractors for induced production		x						Attraction function weight (zone level)	L1E
	Global increments of exogenous production and consumption		x						Production and consumption increments, minimum and maximum restrictions	L2E
	Increments of exogenous demand, production, and external zone exports and imports		x	x					Increment	L2E
	Increments of endogenous location attractors, production restrictions, and value added to production		x	x					Increment	L2E

Table 4: Statewide model data requirements (Continued)

Category	Variables	Defined in terms of...							Primary attributes	Defined in file...
		Scenario	Sectors	Zone	Mode	Operator	Link type	Administrator		
Interface	Transport category		x						Time and volume conversion factors, directionality	F1E
	Intrazonal costs								Cost parameter by zone level	F1E
	Exogenous trips			x	x				Transport category, value, scaling factor	F1E
Transport supply and demand	Transit lines					x			Identifier, frequency	P0E
	Transport demand categories								Available modes, value of travel and waiting time	P0E
	Energy and operating costs					x			Fixed and variable operating cost, energy consumption	P0E
	Operating characteristics					x	x		Maximum speed, operating cost	P0E
	User charges (fares and tariffs)					x			Time and distance cost and factors, transfer costs and prohibitions	P0E
	Links	x					x		Endpoints, length, direction, capacity, transit lines, turn prohibitions	P1E
	Operator characteristics	x				x			Time factor, consolidation parameter	T1E
	Capacity restriction parameters	x					x		Speed-flow curve parameters	T1E
	Trip generation and mode split parameters	x							Elasticity, dispersion, and scaling factors	T1E

suaded him. Doug Hunt also suggested using retail→household value added as a seed for estimating shopping person-trips.

The economic model will attempt to match the Department of Administrative Services' statewide long-range forecasts by county, matched in the base to state totals. A calculation of additional attractors necessary to match at county levels would provide a useful check on the reasonableness of their forecasts.

Rick Donnelly proposed removing the Port of Portland from the input-output matrix, due to the large external-external flows it generates. After lengthy discussion, Doug Hunt concluded that the land use model should site jobs at the Port, and that all non-external flows should be handled internally. Rick Donnelly proposed a paired zone structure, whereby the Port would be modeled with both internal and external zones. Appropriate modal connectors would permit flows to pass between them. These connectors would have zero cost associated with their use, as in reality they represent the same location and activity.

4.3 Zones

Donnelly proposed using the two-tiered nested zoning allowed by TRANUS, with the first level a modeled area (Portland) or a Census-designated place (CDP), and the second level districts within Portland and other CDPs. Doug Hunt noted that scheme allows CDPs with no districts to function as either a "Portland" or a "port," and that TRANUS probably treats these two cases quite differently. Tomas de la Barra noted that logit scaling[2] may eliminate the need for nesting zones, but that each zone level gets one dispersion parameter in TRANUS. Doug Hunt suggested letting calibration determine nesting, and that splitting zones will likely require recalibration. The group concluded that the first attempt should be at one zone level. Rick Donnelly suggested the need for 300 zones, as there are 284 distinct named places within Oregon. Michael Wegener, Doug Hunt, and Tomas de la Barra reacted with alarm to that, and recommended only 50 to 100 zones. All agreed that Portland will be dealt with disaggregated to around 20 zones, with the rest of the state accounting for 50 to 100 more. The consulting team will investigate different zoning schemes that will allow a reasonable spatial representation with the least number of zones possible.

The effect of the urban growth boundaries is an important policy constraint in Oregon, and one which the model must be capable of handling. It was concluded that increasing the amount of developable land inside the urban growth boundary is preferable to changing zone boundaries.

The large amount of traffic between Vancouver, Washington, and Portland requires that we include Vancouver as one or more internal zones, despite data problems that will introduce. External zones will be aggregated with increasing distance and importance to maybe 25 zones, in an attempt to push the inevitable network aggregation edge effects into neighboring regions.

2. The concept of scaling the disutility function was discussed at the first peer review panel meeting, and subsequently engendered a great deal of email discussion among the group. A compilation of questions about the practice, which was proposed by de la Barra (see his paper at http://www.modelistica.com), is available on the TLUMIP web page. The peer review panel had recommended that logit scaling not be employed within the context of this project, or at least until the group had a much clearer understanding of the basis for and behavior of the method.

4.4 Modes and Operators

TRANUS uses the term *operators* to in a context normally called *modes* in traditional transport models. Rick Donnelly suggested the inclusion of private automobiles, intercity bus, and van-pools for passenger transport, and light truck, heavy truck, and container for freight. Rail, air, and marine models will be added in later phases of model development. The TRANUS term *modes* refers to groupings of operators. Rick Donnelly proposed using public, private, and freight, but Tomas de la Barra suggested collapsing those to simply passenger and freight modes, with passengers segmented by income and freight by value added if desired.

The group expressed concern over including locational changes while not the higher-elasticity mode changes. Doug Hunt's main concern was the lack of freight modes included, so the group recommended that we include a skeletal rail network but not calibrate traffic levels on it, providing additional credibility to our approach. Rick Donnelly relunctanlty agreed, stating that we could apply exogenously-specified fixed shares as a placeholder for freight models.

4.5 Travel Demand Categories

The economic sectors will be aggregated into categories representing commuting, business, recreation (residents), tourism (nonresidents), possibly shopping, and all other travel. Rick Donnelly suggested handling tourism external to TRANUS, but the ensuing discussion reached no conclusion. The group felt that these represented reasonable categories for passenger travel modeling.

The meeting ended with a discussion about network coding issues. Most of the network issues were either resolved at the previous meeting or are dictated by TRANUS. Tim Heier reported on the progress of a program he has developed which will generate a TRANUS network from an ESRI shapefile representation of the state roadways. The program aggregates arcs as appropriate to reduce the network size, generates zonal connectors, and performs network validity checks.

The group tentatively agreed to meet again during the last week of March or early April. Rick Donnelly will establish a meeting date acceptable to the panel and notify all parties of the next meeting place and location.

Workshop Participants

Group	Name	Organization	Phone	Email address
Peer Review Panel	Julie Dunbar	North Central Texas COG	817-640-3300	jdunbar@nctcog.dst.tx.us
	John D. Hunt	University of Calgary (Canada)	403-220-8793	jdhunt@acs.ucalgary.ca
	Frank Koppelman	Northwestern University	897-491-8794	f-koppelman@nwu.edu
	Michael Wegener	University of Dortmund (Germany)		mw@irpud1.Raumplanung.Uni-Dortmund.de
Modeling Steering Group	Keith Lawton	Portland METRO	503-797-1764	lawtonk@ix.netcom.com
	Bud Reiff	Lane COG	541-465-2454	breiff@lane.cog.or.us
	Theresa Valentine	State GIS Service Center	503-378-4163	Theresa.J.Valentine@state.or.us
	Dick Walker	Portland METRO	503-797-1765	walkerd@metro.dst.or.us
ODOT Staff	Sam Ayash	ODOT	503-986-4101	Sam.H.Ayash@state.or.us
	Brian Gregor	ODOT	503-986-4120	Brian.J.Gregor@state.or.us
	Kyle Hauger	ODOT	503-986-4116	Kyle.D.Hauger@state.or.us
	Von Hemmert	ODOT	503-986-4103	Von.E.Hemmert@state.or.us
	Bill Upton	ODOT	503-986-4106	William.J.Upton@state.or.us
Consultants	Carl Batten	ECO Northwest	503-222-6060	Batten@portland.econw.com
	Patrick Costinett	Parsons Brinckerhoff	206-382-5200	70753.2546@compuserve.com
	Rick Donnelly	Parsons Brinckerhoff	505-883-0055	Rick.Donnelly@worldnet.att.net
	Tim Heier	Parsons Brinckerhoff	415-243-4690	75210.3125@compuserve.com
	Maren Outwater	KJS Associates	206-646-6600	Outwater@oz.net
	Sam Seskin	Parsons Brinckerhoff	503-274-9554	Seskin@pbworld.com
	Paul Waddell	Urban Analytics	972-883-2088	Waddell@utdallas.edu
Invited Guests	Sonny Conder	Portland METRO	503-797-1592	ConderS@metro.dst.or.us
	Tomas de la Barra	Modelistica (Venezuela)		tomas@modelistica.com