

*Preliminary Draft for Review*

**Summary of the Peer Review Panel  
and Modeling Steering Group Workshop,  
30 September-2 October 1996**

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

Prepared for

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A joint meeting of the Peer Review Panel and the Modeling Steering Group was held on 30 September through 2 October, 1996, at the ODOT offices in Salem. This was the first meeting of the Peer Review Panel, and the first opportunity for either group to formally interact with the Consultant and ODOT staff about this project. During the course of the two-day workshop, the proposed approach to Phase II of the project was presented and discussed at length. A series of recommendations were developed from the workshop. The Consultant will address these recommendations over the next two to three weeks.

The major discussion items discussed during the workshop are summarized in this paper, along with Peer Review Panel comments and recommendations. The material is summarized by subject area rather than chronological order.

The initial workshop agenda is shown in Figure 1. The workshop did follow the agenda in a broad sense, beginning with a review of the proposed approach by the Consultant on the first afternoon. Some of the Panelists noted prior to the meeting that some aspects of the proposal were unclear, or that the linkage between certain model components needed clarification. The objective of ensuring that all attendees clearly understood the proposed approach was met by the end of the first afternoon.

The second day was devoted to examining and discussing each component of the modeling framework (transport, land use, and socioeconomic models). The approach presented the previous afternoon included a significant departure from the original Statement of Proposal, in that it incorporated an existing land use-transportation modeling package (TRANUS) into the framework. TRANUS is quite similar to MEPLAN, which together represent the state-of-the-art in integrated land use-transport modeling (although they have not been applied in the United States). Doug Hunt, a Peer Review Panelist, began the second day with an excellent presentation on the general structure of the modeling approach embodied in MEPLAN, and contrasted it with TRANUS. Based on his presentation, participants were better equipped to discuss the Consultant proposal.

The remainder of the second day was occupied by lively discussions of the various major components. Several Panelists made significant contributions and suggestions, which are summarized below. The workshop ended on the third morning, following a presentation by the Consultants that summarized the concerns and recommendations they heard during the workshop. The participants jointly agreed upon a series of products that the Consultant will prepare in advance of the next meeting. The Peer Review Panel agreed to meet next on 16-17 December in Salem.

The major discussion items are discussed in each of the following sections. A list of the participants is included at the end of the document.

## **1. Project Schedule**

Several Panelists expressed their concern that the project schedule was too short. Bill Upton explained that the schedule was tied to the biannual funding structure of the Oregon state government, and that the project had to be completed by that time. The Consultant recommendations were geared towards accommodating the work within that schedule. An important consideration in the selection of TRANUS for the first generation model was the fact that it would reduce the amount of software development required in this project. Bill Upton will look into the possibility of extending the contract and report back to the Panel at the next meeting.

AGENDA: The goal of the meeting is to reach consensus on the proposed modeling approach for Phases II and III. The primary emphasis will be on the Phase II work plan. This will be the first meeting of the Peer Review Panel, as well as the first chance for most participants to provide feedback on the proposed approach to the study team. This project is a rather far-reaching and complex undertaking, and we realize there will be many questions from the group. We've designed the sessions to allow for Q&A, and the agenda is fluid enough to allow for changes.

----- Monday, 30 Sep 96 -----

The ODOT staff will introduce attendees from each of the four groups attending the meeting: ODOT staff, the Peer Review Panel, the Modeling Steering Group, and the consultants. This will be followed by a discussion by Bill Upton on the TLUMIP goals and objectives and progress to date. The consulting team will follow with an overview of the proposed approach. Both of these presentations will begin with a talk by the primary speaker identified below, and will include ample time for questions and answers. Note that on Monday the Q&A sessions will be designed to clarify what the consultants have proposed; questions about the wisdom or utility of the proposal will be taken on Tuesday. The objective for Monday will be to ensure that everyone has a clear understanding of what has been proposed.

- 1:00pm - 1:30pm: Welcome and Introductions (Upton/Norris)
- 1:30pm - 2:00pm: Background on ODOT's modeling efforts and the Transportation and Land Use Modeling Integration Program (Upton/Davidson)
- 2:00pm - 3:30pm: Overview of the proposed scope of work for Phase II (Donnelly/Waddell)
- 3:30pm - 3:45pm: Break
- 3:45pm - 5:00pm: Overview of the proposed scope of work for Phase III (Donnelly/Waddell/Seskin)

----- Tuesday, 1 Oct 96 -----

The Tuesday sessions will be used to examine each of the major components of the proposed approach in detail. Each discussion will be led by three attendees, drawn from all four groups in attendance. During these discussions we wish to obtain comments and feedback on the proposed modeling approach from the Peer Review Panel and Modeling Steering Group. Changes to the approach can and should be made during these sessions.

- 8:30am - 10:30am: Discussion of the overall modeling approach (Davidson/Shunk/Lawton)
- 10:30am - 10:45am: Break
- 10:45am - 12:30pm: Discussion of the interim economic model (Batten/Gregor/Griffiths)
- 12:30pm - 1:30pm: Lunch (on your own)
- 1:30pm - 3:00pm: Discussion of the land use modeling component (Waddell/Hunt/Gregor)
- 3:00pm - 3:15pm: Break
- 3:15pm - 5:30pm: Discussion of the transport modeling component (Donnelly/Koppelman/Lawton)

----- Wednesday, 2 Oct 96 -----

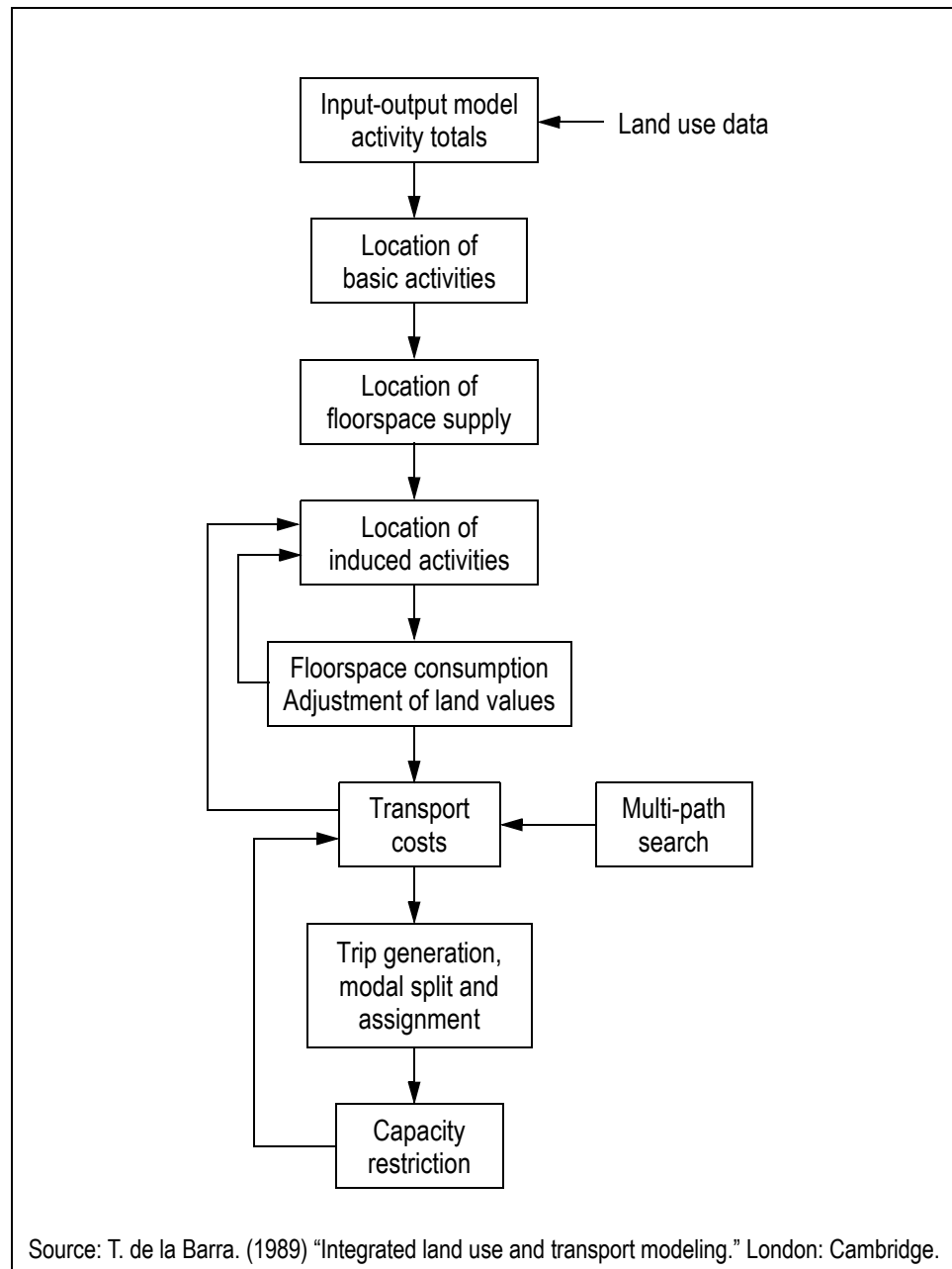
The last morning will be devoted to summarizing the recommendations presented earlier in the workshop. The consultant will review how these changes will be incorporated into the work plan or otherwise addressed in the project. The last session will be devoted to assembling groups to further examine any loose ends and to provide additional comments on specific topical areas. The schedule for the remaining Peer Review Panel meetings will be hammered out, as well as any other administrative matters relating to the contract.

- 8:30am - 9:45am: Review of important findings and decisions from the Tuesday sessions (Donnelly/Waddell/Upton)
- 9:45am - 10:00am: Break
- 10:00am - 11:00am: Teaming assignments and administrative matters (Upton/Donnelly/Davidson)
- 11:00am - 11:15am: Wrap-up (Upton/Gregor)

**Figure 1: Workshop agenda**

## 2. Overall Approach

The overall approach presented in the Recommendations paper suggested using a combination of the existing TRANUS package and software written for this project by the Consultant. The state-wide land use and transport models would be implemented within TRANUS, with the possibility of some elements being replaced by software written during this contract. The overall structure of the TRANUS model is shown in Figure 2. The socioeconomic model and the prototype metropol-



**Figure 2: TRANUS calculation sequence**

itan land use model would be implemented using standard SQL (structured query language) and custom written software. The structure of the prototype land use model, described in detail in a working paper distributed to the participants prior to the meeting, is shown in Figure 3.

A geographic information system (GIS) would form the backplane upon which these components would be integrated. The Consultant recommended the use of ArcView 3.0 to fill this function, based on a variety of criteria presented in the Recommendations paper. The role of the GIS in integrating the various model components is illustrated in Figure 4 (from Figure 7, page 32 in the Recommendations paper). There was very little discussion on this item; the participants agreed with the recommendations as stated. It was noted that the pivotal role of GIS put forth in the original Statement of Proposal was somewhat reduced because of the adoption of the TRANUS framework for the statewide model.

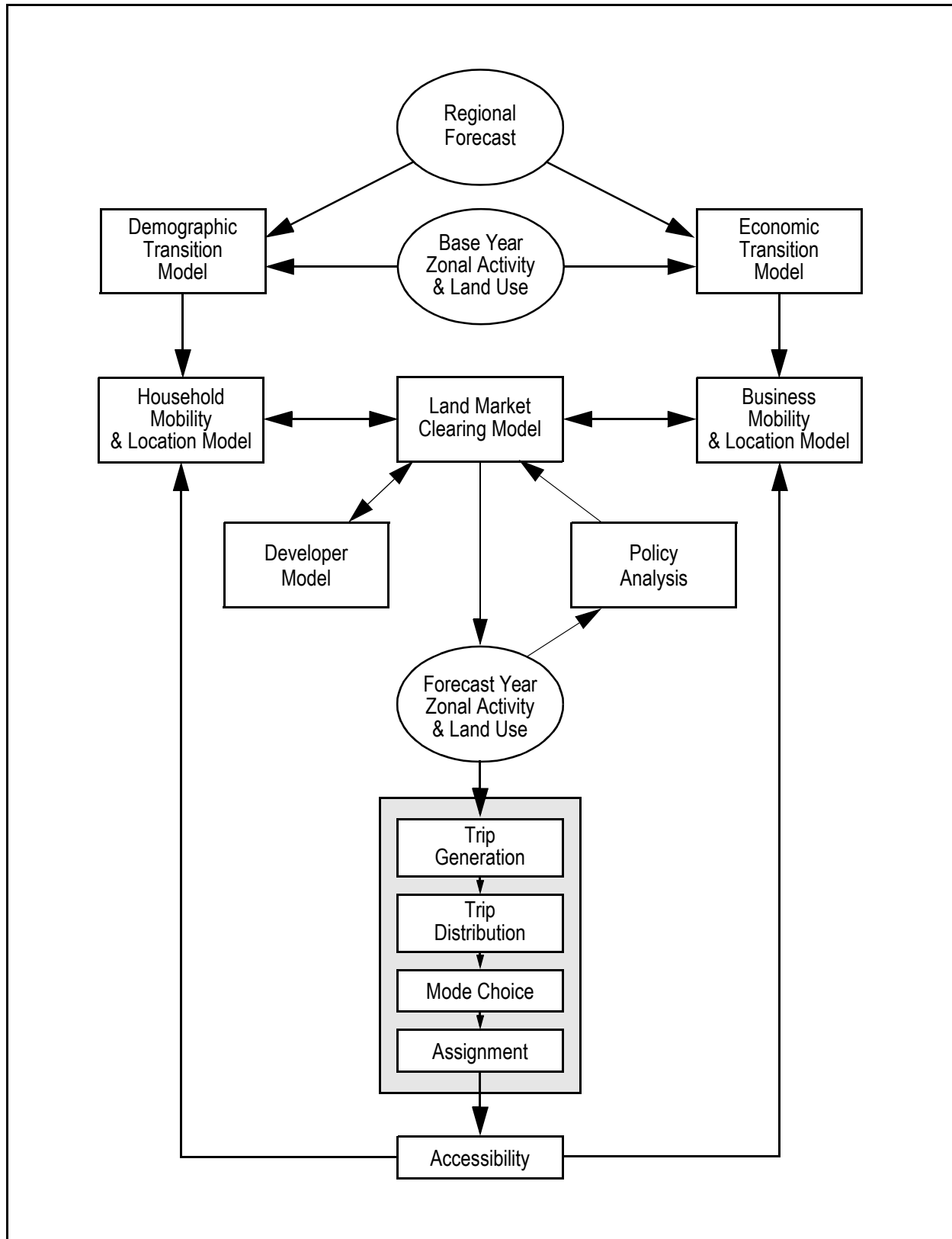
The Peer Review Panel endorsed the overall approach outlined by the Consultant. Several members commented that they felt the approach was thoughtful and well-researched. Significant concerns voiced by the participants was the choice of TRANUS versus MEPLAN, the integration of this approach with the urban models, and data availability. These concerns are discussed in the following sections. The scoring of the transportation modeling packages (Table 5, page 30 of the Recommendations paper) was questioned by one Panelist, who felt that the integrated land use-transport models were not scored fairly. The Consultant sustained the criticism, noting that the scoring was based on information available at the time the recommendations were prepared; additional information now available suggests that their scores would be higher. The disparity between the MEPLAN and TRANUS scores will be re-examined in light of current information.

## **2.1 Choosing Between MEPLAN and TRANUS**

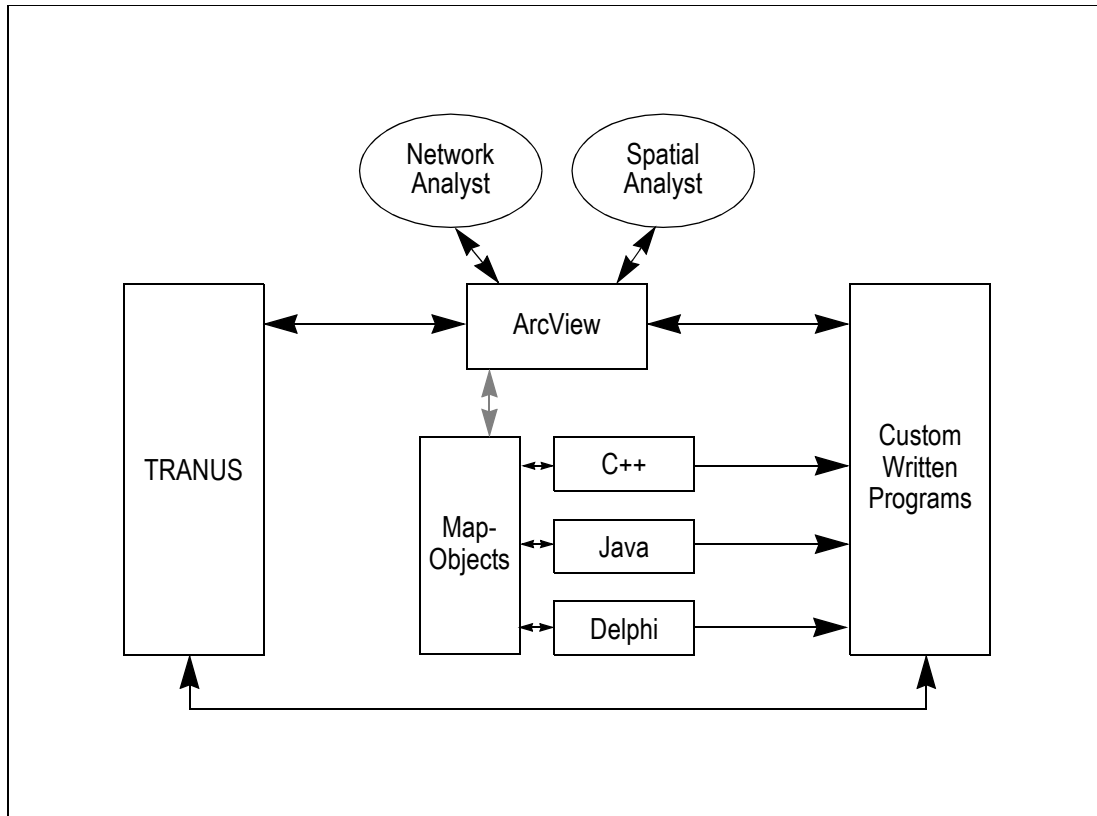
Several differences between MEPLAN and TRANUS were pointed out during these discussions:

1. The TRANUS model includes the scaling of the utilities in the destination and location choice models, which are implemented as nested multinomial logit models. The scaling of such functions, it was argued, renders something other than a true logit function. It is not known what the resulting function is, much less how to calibrate it.
2. The TRANUS model employs a combined model of transport mode and route choice, whereas MEPLAN implements them separately in the traditional sequential fashion. There is some question as to whether existing data and experience are sufficient to develop a combined model.
3. The MEPLAN suite consists of modules which interact using data in text files, which make it easy to replace modules so long as the data streams remain the same. TRANUS, on the other hand, stores its intermediate and final results in binary files. While programs to access these binary data can be developed, concern was raised about the ease of building and maintaining a linkage with them and the software components developed by the Consultant.

It was noted that the final decision to use TRANUS had not been made; the recommendations posed by the Consultants were merely that. It was agreed upon by all that a detailed assessment of the two packages should be quickly completed. The Consultant will prepare written recommendations for review by the ODOT and Peer Review Panel within the next month. In any case, the issue



**Figure 3: Structure of the prototype urban land use model**



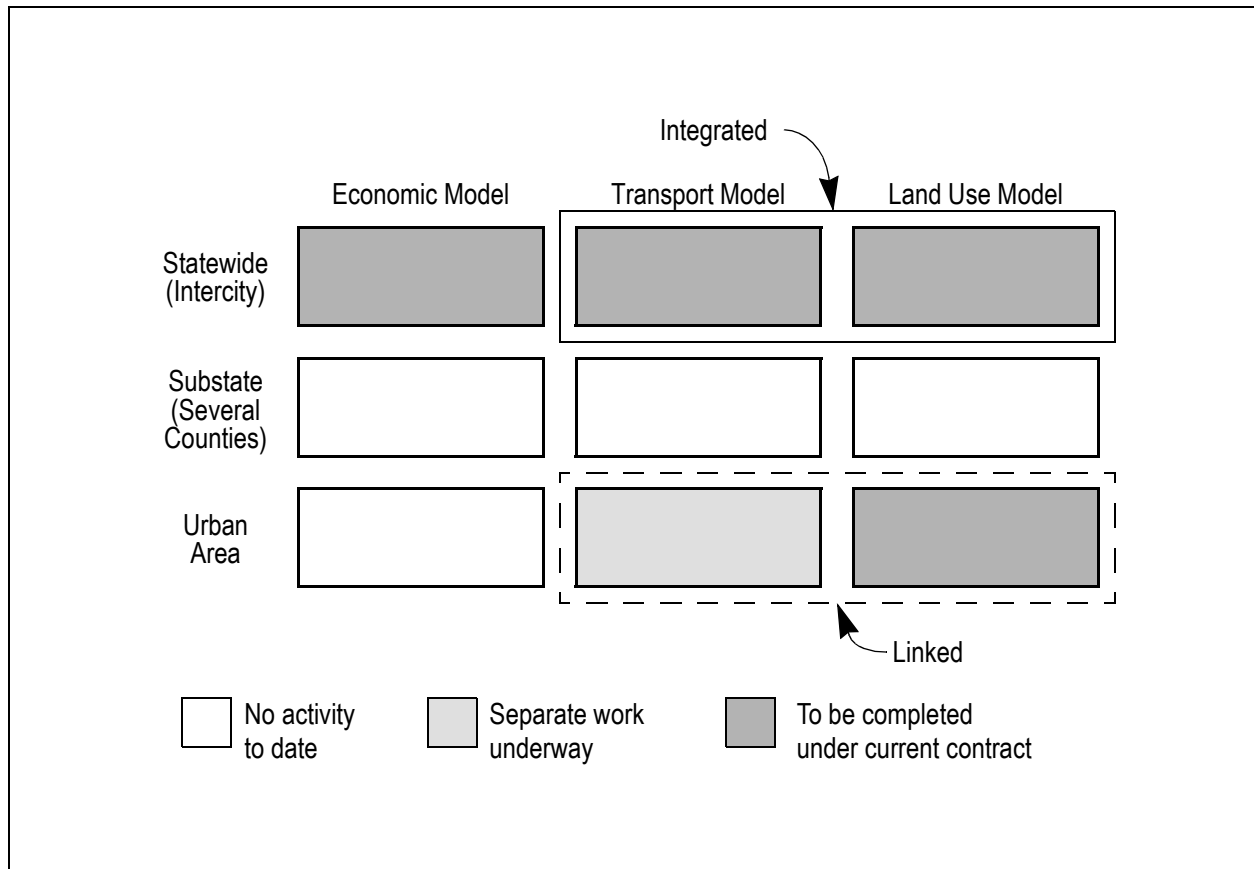
**Figure 4: Statewide model software implementation**

is whether MEPLAN might be more appropriate than TRANUS; choosing between one or the other will not affect the overall structure proposed by the Consultant and ratified by the Peer Review Panel.

## 2.2 Integration with Urban and Substate Models

A fair amount of confusion was evident as to how the statewide model would interact with the urban and substate models. The statewide model, as proposed, will deal with intercity flows of passengers and freight. There are also several urban transport models in use in Oregon, and the ODOT has recently expended commendable effort in establishing uniform procedures for their application and in staff training. A substate model would fall between the two, although work has not begun on such. A model for the Willamette Valley was oft-cited as a candidate substate modeling area.

The work in this project is aimed at developing a first generation statewide modeling capability, as well as a prototype metropolitan land use model, as shown in Figure 5. While the development of substate modeling capabilities will not be undertaken in this contract, the design of the statewide model must be flexible enough to accommodate such when it is carried out. A schematic representation of the integration between the various modeling elements was presented in the meeting, and is shown in Figure 6. It is envisioned that only a limited amount of interaction between the statewide and urban elements will be attempted during Phase II. As shown in the Figure, the inter-



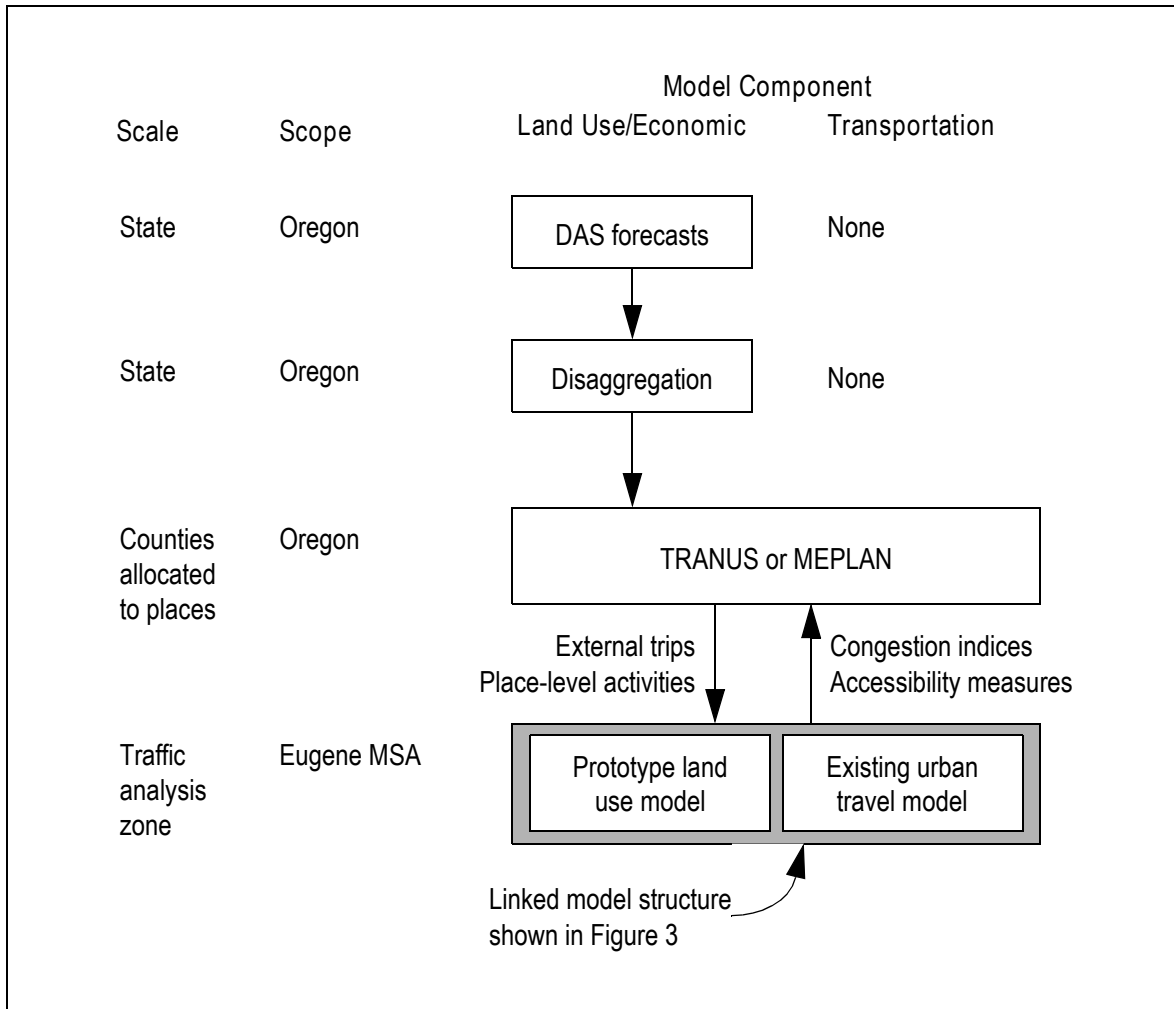
**Figure 5: Principal TLUMIP components**

action is primarily achieved through a feedback linkage rather than true integration of the various modeling components.

It was noted that the expansion of the urban growth boundaries, and their likely impact on the areas surrounding them, are frequent policy issues that the statewide model could inform policy-makers. Several Panelists stated that the model should be designed such that land use and growth management policies could be tested.

### 2.3 Spatial Representation

A detailed description of a hierarchal spatial representation of networks and socioeconomic activities was presented in the Recommendations paper. There was little discussion of the network representation issues, other than to note the importance of laying the foundation for a truly multimodal network. The proposal to develop forecasts at the county level, which would be synthetically allocated to activity nodes within the counties, generated a lengthy discussion. The primary impetus for developing such a scheme was to avoid the time and cost associated with defining traditional traffic analysis zones. The Panel did not dismiss the idea of the activity nodes in lieu of traffic analysis zones, but did not buy into the county level forecasting/activity node allocation concept recommended by the Consultant. Rather, the Panel recommended a process whereby the synthetic allocation from county to named places within the county would be carried



**Figure 6: Spatial hierarchy of modeling approach**

out once, with all subsequent modeling carried out directly at the activity node level. The Consultant is presently investigating the feasibility of doing so, and will report the advantages and disadvantages of both approaches in a technical memorandum.

Another issue associated with the use of activity nodes concerns their scalability. While acknowledging their utility when modeling intercity flows (e.g., in a statewide modeling context), the question of how the transition from activity nodes to more familiar zones at the substate level would occur went unanswered. In urban models, zones are typically Census blocks or aggregations of them. At the substate level, each zone might correspond to a Census tract or to parcel-level data. The transition from that level of detail to a single point representation of a town or village in the statewide model would be abrupt. A better method of achieving a scalable definition of geography was not identified during the meeting. One candidate method was to subdivide counties into Census tracts. Census tracts, however, are often not structured in a way that makes them amenable to transport modeling. The Panel felt that the Consultant should devote more attention to developing a credible hierarchal definition of socioeconomic activity that would be applicable

at all three levels of spatial aggregation (urban, substate, and statewide).

### **3. Socioeconomic Modeling**

The structure of an integrated land use-transport model requires an explicit representation of the state economy, in the form of an input-output matrix. The relationship between producers and consumers expressed in the matrix lies at the heart of the MEPLAN and TRANUS models. The Panel was reminded by several members that disabling this component of the model would disrupt the internal structure and consistency of the overall modeling process, and may preclude its successful application. There was agreement that this would be an undesirable outcome. Using TRANUS or MEPLAN for the implementation of the statewide model will require more emphasis on the development of the economic model, which was specified as an interim model in the current Scope of Work. This change in approach will be reflected in the Consultant's revision of the Phase II work program and schedule.

Ongoing work by the Department of Administrative Services (DAS) to develop twenty-year economic forecasts was reviewed. Their process includes the development of forecasts for the state as a whole using macroeconomic and cohort component models. These forecasts were then allocated to counties using trend data and input from county planners and elected officials. The Scope of Work calls for the Consultant to develop a formal allocation process for allocating the state-level forecasts to the county level. This was to be accomplished using an allocation model based on historical data. The adoption of the TRANUS or MEPLAN framework obviates the need for the synthetic allocation process, but places different data requirements on the study team.

A considerable discussion centered around the wisdom and necessity of constraining the statewide model to the DAS county-level forecasts. A great deal of concern was expressed that doing so would result in flawed or skewed modeling results. It was argued by several Panelists that the statewide model must be used for informing public policy, and as such should be capable of testing the transportation implications of various economic plans and forecasts. The Panel recommended that the DAS forecasts should therefore be one of several scenarios which might be examined using the model, not an artificial constraint upon it.

### **4. Land Use Modeling**

The Panel discussed and endorsed the notion that the land use modeling structure incorporated within MEPLAN or TRANUS would be adequate for the statewide model. The primary mechanisms by which land use affects transportation at the statewide level will be the growth and migration of population between named places within the state and the level of economic interaction between them. It was pointed out that the Portland metropolitan area would need to be treated as a special case, in that the development of models based upon county-level trends (or the synthetic allocation of them to smaller places) would fail to capture the dynamics at work in the Portland-Vancouver region.

The Consultant asserted that the structure of the TRANUS model, while adequate for statewide or regional modeling, would be inappropriate for use in urban areas. The MEPLAN and TRANUS models fail to incorporate the decisions of land developers, a key influence in urban development patterns. Because they are aggregate models, MEPLAN and TRANUS also fail to account for differences in preferences and perceptions of various subgroups of the population. The disaggregate

modeling approach proposed by the Consultant accounts for these and other important dynamics in the urban land market, and was presented as the recommended approach for the prototype urban land use model.

A lively debate ensued in which the expediency of using a single modeling approach—TRANUS or MEPLAN—for both statewide and urban modeling was suggested by several Panelists. While acknowledging the attractiveness of a single, unified modeling approach, a consensus was reached which endorsed the original proposal. A number of concerns led to this conclusion. At the heart of the matter was the direction in which the urban transport models are moving, which is towards disaggregate modeling techniques. The Consultant's approach was accepted as being consistent with that direction, as well as with contemporary activity-based travel forecasting under development in Oregon and elsewhere in the U.S. Because the prototype urban land use model will include linkages to the existing transport models, a structure which isolates them (as shown in Figure 3) was seen as advantageous.

Regardless of the land use modeling approach employed, the notion that developers drive land use was noted by several Panelists, who asked that the relationship be made more explicit in the model specification. Moreover, the appropriateness of a single location model was questioned by two Panelists. A sole proprietor can decide where to locate based on personal taste and local knowledge. The decision for large retail chains such as WalMart, by contrast, are made in distant corporate offices by planners using sophisticated market delineation and coverage models. The ability to represent these different behaviors was seen as necessary for the development of a robust business location model.

The Panel also noted that elasticity tests would be needed to determine whether the urban trip distribution models are consistent with the proposed urban land use model. The lack of consistency between the urban land use and transport models concerned several Panelists, although it was acknowledged that this was a longer term issue than could be solved in this project.

## **5. The Next Steps**

The Panel, ODOT, and the Consultant agreed that three papers need to be prepared for the next Peer Review Meeting: a detailed model specification and supporting work plan (including schedule and staffing), a paper describing current available data and a plan for acquiring needed data, and a paper identifying the five or so "top priority" policy issues that the model should address. Several Panelists noted that the Consultant needs to be quite explicit about what aspects of travel behavior will be modeled and which will not. The meeting adjourned shortly after agreeing upon these action items. The next meeting is tentatively slated for 16-17 December 1996 in Salem. Final details will be sent to Panelists and posted on the TLUMIP home page.

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