Integrated Regional Model Vision Phase
Expert Panel Meeting #2: Executive Summary
Meeting Date/Time: April 20th, 2004, 8:30 AM – 4:30 PM
Meeting Location: DRCOG Offices, 4500 Cherry Creek Drive South

I. Executive Summary

The following report summarizes the results of the second Integrated Regional Model (IRM) Vision Phase Peer Review Panel, funded in part by the Transportation Model Improvement Program (TMIP), which is sponsored by the Federal Highway Administration (FHWA). The one-day panel meeting was hosted jointly by the Denver Regional Council of Governments (DRCOG), the Regional Transportation District (RTD), and the Colorado Department of Transportation (CDOT) and was held at the DRCOG offices at 4500 Cherry Creek Drive South in Denver on April 20th, 2004. Participants included staff from the three above agencies, a panel of modeling experts from across North America, and consultants under contract to support the IRM project. The purpose of the meeting was to receive specific recommendations from the expert panel concerning model elements to be implemented in the up-coming IRM Update Phase.

This peer review session was the second of two to be held for the IRM Vision Phase. Its discussions were focused on technical details of recent advances in implemented travel and socio-economic forecasting models, and on the primary planning initiatives that regional policy makers have told the project team that they would like the modeling system to better support.

Jeff May, Erik Sabina, Simon Montagu, Jeff Romine, and Greg Erhardt of DRCOG facilitated the peer review meeting. Participants in the Peer Review Panel included transportation model experts from BMI-SG, KLK Consulting, the Portland METRO Planning Department, the University of Toronto, the North Central Texas Council of Governments, Environmental Defense, and the FHWA. Key consultants also participated from pbConsult.

II. Project Background

Near-Term Goals: The Integrated Regional Model Project

DRCOG, working cooperatively with CDOT and RTD (the principal transit provider for the Denver metropolitan area), is presently conducting the early phases of the Integrated Regional Model (IRM) Project. The IRM Project is a multi-stage effort, scheduled to be completed by 2005, whose purpose is to replace the existing land use and travel models in the region with a state-of-the-art, fully-integrated modeling system. The IRM Project was initiated following the completion in 2001 of the Travel Behavior Inventory Project, a comprehensive, 1.5 million dollar travel/activity/demographic survey of the

metropolitan area, which provided the basic data necessary for the conduct of the IRM project.

The IRM project has been designed to take place in three phases:

- The Model Refresh Phase. In this phase the travel model will be shifted to the TransCAD software platform (from the existing MinUTP platform), and will incorporate at the same time a variety of other improvements. This project will put the Denver Regional Model on a more solid foundation while subsequent IRM project phases are conducted.
- The Model Vision Phase. This phase, now almost complete, will result in a "blueprint" for an entirely new modeling system, encompassing travel forecasting, land use, data management, and other elements. The Vision Phase project team will incorporate into its design effort advice from the Peer Review Panel, as well as from local policy and technical experts, and the consultant team under contract for the project.
- The Model Update Phase. In this phase, the Vision Phase's model blueprint will be implemented. Preliminary work on this phase already is underway: the project team has selected UrbanSim as the new land use model platform, and is now working with the University of Washington on implementation concepts for the Denver area.

Substantial project funding already is under contract. The project team is seeking additional funding, with the expectation that the total amount available will be adequate to develop a cutting-edge model, but will fall somewhat short of the total necessary to fund all improvements likely to be considered desirable by project participants.

Past Modeling: The Existing Denver Regional Model

Travel demand forecasting in the Denver area has been, for the past 15 years, conducted using a MinUTP-based model, with the following basic characteristics:

- An allocation-type land use model, built in-house, which assigns future development to TAZs based on desirability scores for each TAZ. These scores are in turn based on a variety of characteristics such as proximity to highway and rapid transit facilities, highway congestion, proximity to open space (for household allocation), etc.
- A cross-classification trip generation model, which generates home-based work, home-based non-work, non-home based, internal-external, and commercial trips, with the household trip rates stratified by income and household size.
- A gravity model-based trip distribution system.
- A multinomial logit mode choice model, with transit separated into walk-access and drive-access models, but not nested by sub-mode (such as rail versus bus, etc.)
- A ten-period time of day model.
- A static user equilibrium highway assignment system.

This model may be classified as "state of the practice" for major metropolitan areas during the late 1990s. However, it tends to be insensitive to many development and transportation market and policy initiatives currently being pursued in the region. To effectively support the planning of those initiatives, DRCOG feels that it must make significant improvements in the regional modeling system, employing the latest advances in modeling research and practice.

Present Modeling: The Refreshed Model

The product of the IRM Refresh Phase, now nearing completion, will be a significantly improved regional model, to be used while the next generation model is being developed. The refreshed model will include the following improvements:

- A TransCAD-based model, replacing the old MinUTP-based model.
- New trip generation, trip distribution and other parameters, derived from the Travel Behavior Inventory Project's survey of households and travel in the region.
- A new parking cost model, and a new areatype model.
- A mode choice model re-calibrated against the recent survey data.
- Calibration to match speed study data recently acquired by DRCOG.

In addition to providing more accurate results, this model should greatly enhance DRCOG's ability to support regional planning and policy analysis, as the data management and presentation capabilities of TransCAD are greatly superior to old DOS-based software such as MinUTP.

New Modeling: Expectations for the Updated Model

The project team's philosophy throughout the Vision Phase has been that all model elements and all possible improvement approaches are "on the table". The panels will help us to assess the feasibility of all desired improvements, to prioritize them, and to select those to be included in the project, given the inevitable funding constraints. It is not yet possible to say with certainty what elements will be included in the new model. However, the project team's current expectations include:

- A land use model which predicts development patterns based on fundamental microeconomic principals: of all available land use modeling systems, UrbanSim best satisfied this requirement, in the judgment of the project team.
- More fully-developed integration between land use and travel model elements.
- A richer depiction of household characteristics, probably based on the "synthetic population" method, which in turn will support richer sets of independent variables in various choice models.
- A more realistic trip generation and trip distribution system than the existing model (which uses separate-purpose, cross-classification trip generation and a gravity model), most probably based on a tour-generation system and a destination choice model.
- A nested logit mode choice model to replace the current multinomial logit model.

- A variety of other model improvements such as better toll analysis capability, improved travel time-of-day evaluation (possibly including a time-of-day choice model), better estimation of transit demand details such as park&ride lot demand, and possibly some activity modeling elements, such as enriching the model choice model inputs with an auto availability model coupled with an intra-household trip interaction model and a trip duration element (which would permit the mode choice option set to be conditioned on the actual auto availability for any given trip.)

These and other possible improvements will be evaluated and decided upon during the Vision Phase.

III. Local IRM Panels: Technical and Policy Panel Recommendations

In addition to the institution of the Peer Review Panel, DRCOG, RTD, and CDOT also have convened two panels composed of transportation and planning professionals from the DRCOG region and adjacent regions. Both the Policy and Technical panels are composed of customers of DRCOG's planning and data analysis work. The panels include representatives of DRCOG member governments, regional transportation, planning, and environmental agencies, as well as representatives of environmental groups and private sector companies.

During the first round of panel meetings, in the fall of 2003, the local panels met first, so that the expert panel's discussions could be informed by the planning priorities developed by the local panels. In the second round of meetings, in the Spring of 2004, the expert panel met before the local panels, so that the expert panel's recommendations could be available for review and comment by the local panels. The local Technical Panel meeting was held on May 7th, 2004, and the local Policy Panel meeting on May 21st, 2004.

The primary purpose of the local panel meetings was to prioritize the top ten planning issues (identified by the local panels in the fall), to serve as a guide to the project team in prioritizing model improvements during Update Phase RFP writing and consultant contracting.

The top ten issues, in priority order, were:

1. Effects of development patterns on travel behavior
2. Sensitivity to price and behavioral changes
3. Effects of transportation system and system condition
4. Need for improved validity and reliability
5. Ability to evaluate policy initiatives
6. Better analysis of freight movement
7. Ability to show environmental effects
8. Modeling low-share alternatives
9. Better ability to evaluate effects on specific sub-groups

10. Reflect non-system policy changes (TDM, ITS)

IV. Peer Review Panel - Presentation Summaries

Approximately one half of the meeting was devoted to presentation of advanced modeling concepts and their effects by pbConsult and DRCOG staff. The other half of the meeting was devoted to peer review panelists reactions to these concepts, and to their formulation of recommended approaches.

Presentation: Overview and Ten Key Modeling Outcomes – Jeff May

- Review of meeting agenda and panel charge
- List ten key outcomes (see above section)
- Desire to move from four-step model to more realistic model forms
- Sensitivity to price and behavioral changes
- Panel charge: advice on approach and necessary resources, what to definitely include/exclude, staging advice.
- Should a robust data "backbone" and GIS be the basis for model integration?
- Reporting capabilities are critical: information to public and policy-makers.

Presentation: Technical background on advanced modeling techniques – Bill Davidson and Peter Vovsha, pbConsult

Overview of advanced modeling in current practice – Bill Davidson

- Where we've been and where we're going
- Reiterate DRCOG and project team's desire to advance beyond four-step model.
- Value of this project reaches beyond the DRCOG region.
- Four-step to tour-based models has been an evolutionary process: design based on Portland METRO work, successively extended in San Francisco, New York, and Columbus, OH.
- Main features: begins by modeling activities, travel in tours, with fully disaggregate demographic information as input.
- Includes intra-household interactions, time-space constraints, tour duration.

Presentation of advanced modeling considerations – Peter Vovsha

- Tour (activity pattern) generation
    - A pure activity approach generates all activities, then schedules, sequences, and locates them. This proved to be very difficult and has not been done successfully.
    - Simpler approach - integrated activity-travel pattern. First schedule and locate work. For additional activities, decide to add to the work tour, or implement them from home. Then model details of episodes.
- Scheduling
    - Microsimulation allows more temporal resolution, permits consideration of time budgets. Rule-based methods of activity scheduling.

    - Panel reaction – concern about using rule-based methods, as we don't observe the behavioral basis for such rules. Eric Miller is researching stated preference survey data to observe scheduling priorities.
    - Time-use concept – generate primary (e.g., work or school) and then schedule secondary activities (e.g. shopping or entertainment) based on residual time windows after primary activities are generated and scheduled.
- Preserve integrity between persons and between model steps
    - Logsums are normally used from lower to higher-level choices (ex: to show composite, multimodal accessibility for use in destination choice). Problem: extremely computationally intensive in a microsimulation framework.
    - Alternative: use outcomes from previous model iterations, such as total time spent traveling.
    - Panel reaction: regarding time budgets, transit users can, for example, read while traveling, reducing the need to do this as a separate activity. We always show travel time as a negative, but it can have positive utility in some circumstances. Example: commuter rail travel time may be positive. Walk/bike can also be positive in some environments.
    - Consultant response: potentially distinguish between usable and unusable travel time.
- Location, Scheduling, and Tours - Available time-windows can be used as a variable in destination choice.
- Intra-HH Interactions - this can happen at several levels:
    - coordinating daily activity patterns
    - joint non-mandatory activities
    - ride-sharing for mandatory activities
    - escorting children (no purpose other than escort)
    - allocated maintenance tasks
- Integration of mode choices, time-of-day behavior, and car allocation - how do HH members interact in this way?
- Integration of travel and land use models:
    - Old - iterated two separate models.
    - New -- join via activity simulation. LU development location factors and constraints feed to activity simulation based on activity preferences.

Presentation of model design options – Peter Vovsha

- Potential staging definitions
    - Stage 1 comparable to San Francisco or Portland models
    - Stage 2 comparable to New York models
    - Stage 3 comparable to Columbus models
    - Stage 4 is the best we can do today, some elements of Atlanta models
- Long term choices (2-4)
    - workplace location (& schedule)
    - school location (& schedule)
    - auto ownership

- Coordinated DAP (3-4)
    - coordinated DAP types for all HH members
    - mandatory tours
- Joint / allocated activity and travel (3-4)
    - Joint tours for shared non-mandatory activities
    - ride-sharing for mandatory activities
    - escorting children
    - maintenance tasks (generation by purpose, allocation to persons)
- Person pattern details (1-4)
    - Individual DAP
    - Conditional upon DAP type, mandatory tours and joint activity / travel
    - Allocated maintenance tasks (stops or individual tours)
    - Individual discretionary tours generated by purpose
    - Work / school based sub-tours generated by purpose
- Tour-level details (1-4) - Mode choice, time-of-day choice, and destination choice
- Stop / trip level details (1-4)
    - frequency of additional stops by half-tours
    - stop location
    - trip mode
    - trip departure time
- Highway / transit network simulation

Panel Comments

- What is the cost savings of doing all 4 stages at once versus doing it incrementally? Answer: Project team outlined four stages to allow chance to decide what the panel is comfortable with independently of time and cost constraint.
- Chair - Let's delay the discussion of cost until later. But if we did select #4, independent of dollars, can it be done? Answer: Yes, the only big data hole is HOV and toll data
- It would seem that the more disaggregate, the fewer barriers to transferability. To what degree can there be a faster approach to get to level 3 or 4 by adapting another region's model directly? Response: This is why we're here.

Presentation: Effects of proposed improvements on ten key outcomes – Erik Sabina

- Sensitivity to price and behavioral changes
    - Price - still issues here: how best to model marginal cost, how to model long-term cost decisions (such as buying a house)
    - Behavior – best improvements will be in this area
    - Energy – improvements through auto allocation and fleet mix prediction.
- Modeling low-share alternatives
    - Bike/ped – many improvements possible, including mode choice model
    - Work at home – may be possible, depending on data
    - Dial-a-ride – very difficult, research just beginning on this
- Effects of development patterns on travel behavior
    - Bike/ped modeling will help greatly

    - Variables explicitly describing land use mix may help
    - How to handle density?
    - Activity/tour modeling should handle all remaining induced demand issues.
- Effects of transportation system and system condition
    - On development – feed back transportation conditions to lu model
    - On pricing – this is primarily an outcome of location decisions
- Ability to evaluate policy initiatives
    - Better modeling of true decision-making units will help accuracy
    - Build intervention points into market-based model elements (UGB, etc.)
- Need for improved validity and reliability
    - Transit result improvement opportunities are strong
    - Better time of day and trip location should greatly improve highway results
- Reflect non-system policy changes (TDM, ITS) – still very challenging
- Ability to show environmental effects
    - Improved auto allocation and fleet mix will permit improvement
    - Tracking vehicles through trip permits better geographic distribution of emissions
- Better ability to evaluate effects on specific sub-groups – much more complete description of households will permit great improvement in this area.
- Better analysis of freight movement
    - Goods movement model not feasible at this time
    - Good commercial vehicle survey data will permit real improvement
    - Regional estimates of number of vehicles possible but problematic

Panel Comments

Staging issues:

- Alternatives presented are really 4 points in a continuum, instead of 4 discrete alternatives, they are not mutually exclusive
- Are there benefits to beginning at stage 1 or 2, and progressing to stage 3? What is the overhead associated with a staged approach? Answer: if you know you will go to stage 4, it is more efficient not to do a stage at a time. It is more difficult to estimate time and budget for Stage 4, as the techniques are newer.
- Going to stage 3, is what is the overhead associated with stepping through stages 1, 2. Answer: stages 1 and 2 are similar to each other, but very different from 3, so big jump between stage 2 and 3.
- Suggest we should just jump to stage 3 (several comments). Perhaps at a minimum do stage 3, and work towards stage 4. The quality of the DRCOG staff helps. Just jump right to stage 3.
- With stage 3, what five things do we say "now we can do these things better." How does the project press release read? Answer: better environmental justice analysis, more accurate results overall, better congestion evaluation, better sensitivity to price, better air quality analysis, overcomes errors, explore more options, and be sensitive to people's life style choices and changes.

- Someone should look at air quality estimates out of a tour-based model and compare it to estimates out of trip model. Are they more accurate? Does that help with policy analysis? We need to explain the benefits to get the resources.
- Don't go to far with this concern. They will do something, so the question is not whether or not to invest, but which investment to make.

Feasibility of direct model transfer:

- Possible to seek federal funding for a pilot project approach that would test the transferability of the model: just transfer the Columbus OH model straight across? Then use as a launch pad for further improvements? How long to simply transfer the Columbus model? Answer: Houston wants to simply reproduce MORPC for tour-based stage. Think they can do this in 6 months.
- Estimation of the MORPC model wasn't bad. Difficulties were in the application software again.
- Transfer without reinventing might be most cost-effective.
- If we transfer Columbus (MORPC), what additional inputs are needed? Answer: probably does not require any additional inputs.

Operational and speed issues

- Regarding possible need for large computing power, Portland Metro's early tests sampled destination zones to reduce choice set and so processing time, got pretty good results. Also, easy to run multiple machines in parallel.
- Similar approach taken in Columbus, OH.
- While sampling to reduce choice set is not truly behavioral, it is not realistic that we calculate utilities for everything. What are the soundest ways to reduce the choice set? Perhaps run a pre-model to eliminate unreasonable choices.
- This may be a framework to permit evaluation of marketing program effects (such as carpool matching programs.)
- DRCOG cares about the operational characteristics of the model. We want to produce models in a rapid fashion. If we don't do both model update and improve operations, we've failed! At present, consultants run model for many projects, and it is highly likely this will continue. This has implications for hardware.
- We develop base data and let cities and corridor studies use it. Is there anything that would "box out" our current customers? Or hurt their ability to participate? Answer from consultant: that's one area that's ripe for more development work. Contrast SF model--demand components run in 6 hours on 1 machine, but skim building and assignment take a long time. MORPC -- runs on 5 machines in 6 hours, have not spent as much time on user interfaces. In 5 years, it may run on 1 machine, whereas now it runs on 6.
- Also, will locals have to buy proprietary software to run it? Consultant: just TransCAD. Any special software developed for DRCOG would be open-source.

Risk issues

- Consultant didn't make specific recommendations, instead presented options. All are feasible.
- Question: doable by 2006? Answer: yes, given the available budget.
- What are the riskiest elements in terms of going over timeframe or budget? Answer: in the Columbus project, the biggest risk was developing the application

software.

- What info will guide us in managing this risk?
- Do we want to use this for RTP development for 2035 RTP done in 2006?
- DRCOG wants to move to a new model, and there are a lot of things appealing. We need to know risks. Will we pass AQ conformity. Will we pass a New Starts evaluation.
- Others are using tour-based models for New Starts (San Francisco, Columbus). FTA and FHWA endorse tour-based models.
- Has anyone re-calculated emissions budgets?
- New York is doing this.

Other issues:

- Notion of feedback is different. Here can still feed back travel times, but maybe consider re-scheduling or feeding back time budgets or something. Can we just re-iterate on a sub-set of households instead of all households?
- Please talk about validation of the Columbus model.
- The Columbus models matched tough ODOT criteria very well, with no "tweaking". Not enough other advanced models to compare between them.
- Compare to reality, not to 4-step model
- Transims pilot in Portland, started with trip based destination choice models and calibrated them to fit tours: worked pretty well. Easier to calibrate a tour based model.
- On outcomes, biggest risk is price sensitivity, listed as 1 on top 10 list. Toll roads are important. We're beginning to understand intra-household HOV better. People who physically make up a carpool. This is a problem. At some point we must spend a lot of attention on toll and HOV! This is an elephant in the living room!
- Future of managed lanes is incentives. We've got to be able to do this.
- Maybe freight matters more because 30% of NOX goes there. Need a balance technical approach, maybe go past level basic modeling on trucks.
- A similar fidelity match can be made on LU side (comparability of accuracy in land use versus transportation modeling.)
- What does the output from a stage 3 (Columbus) model look like? Answer: it looks like a 100% household survey sample, and can we data mine to create trip tables.
- So can draw from this to give to corridor studies.

Presentation: DRCOG Model Flow Chart – Greg Erhardt

Greg Erhardt presented DRCOG's vision of the IRM. This vision was developed as a flowchart of model steps, including both the land use and the travel models, and created independently for purposes of comparison with the consultant work.

Presentation: Data Integration – Simon Montagu

Simon Montagu discussed DRCOG's vision of a model data and programming structure.

Key points include:

- Use of an object-oriented data modeling and programming structure to streamline the implementation procedures, and minimize the computer process management overhead.
- Better data management and reduce the complexity of key modeling steps. Use an "object" focus on the data.
- Program "behavior" into the data where possible. What things can happen at the data level instead of the application level?
- Create data sets that have applications to other functions of DRCOG. Goal is to make the connection stronger--through data integration rather than step coupling.

Panel Comments

- Can you show an example of object modeling in a 4-step model? Answer: the pseudo-sample enumeration is the key to this...Can draw a fully composed household directly out of a database. Minimize the data processing in the application.

Socioeconomic Modeling – Jeff Romine

The current model is a home-grown version of DRAM-EMPAL. Key issues informing new model design are:

- Appropriate level of geography for local and regional decision-making.
- The need to model both revealed and stated choices
- Decisions are made today, based on yesterday, with outcomes tomorrow.

Goals for the modeling system include that it be:

- An economic theory-based, behavioral model
- A transparent and open model
- Sensitive to changes, such as policy, economic, and environmental
- Supportive of multiple users of results, many types, at many levels
- Simple, and modeling land use at the appropriate levels

Data access for users is critical!

Characteristics of UrbanSIM, the platform on which the new model will be built, include:

- Appropriate geographic scale – consistent with available data
- Based on discrete choice theory, resulting in partial equilibrium outcomes
- Economically-based ("follow the money")
    - Model appropriate agents making decisions, within defined choice sets
    - Simulate real decision-making

Policy Simulation – Jeff Romine

Jeff Romine presented DRCOG's approach to policy support modeling, growing out of the current Policy Options Model (2001) – a very simplified model. This model can't give "right" answer, but can give the direction and magnitude of effects. A little information is better than none. DRCOG wants to make it more user-friendly, and make it more comprehensive. It must provide information in real time! The next generation of

policy models must:

- Identify key policy issues
- Be influenced by behavioral choice relationships within the new full model
- Be built on a simple "model" structure to allow for changing policy information generation
- Permit easy input of data from full model scenarios

Panel Comments

Other socio-economic modeling experience:

- There is an inclination to move to UrbanSIM. Is there a best practice model we can transfer? Given a 2006 timeframe, what can we do in a short time?
- Salt Lake is most recent.
- First generation TLUMIP (Oregon) is in use. Second generation is in development. It takes a lot of time. Should we be looking at overall priorities--focus on LU and trucks, but maybe not transport?
- DRCOG - how long did it take Salt Lake and how much money? Answer: five or six years. Last 2 years much more active.
- Legal settlement that prompted the project included $150,000. They have it implemented, but are refining it before using it for planning purposes.
- The connection between LU and transport model is not tight enough. The approach to feeding accessibility back is not consistent with random utility theory. The way prices are included is somewhat ad-hoc.
- DRCOG - how long did it take Honolulu?
- The accuracy of the database is crucially important, and if it's not done well, it creates huge problems. If you don't include known events, it creates problems. Also, development constraints. **Database development is substantial.**
- It was difficult to validate the Honolulu model because of poor base data. The databases are 95% good, but the last 5% kills you. Can do a point database, but that point can be a zone centroid, and you can operate at different levels.
- Portland has a big Linux system, and shares some part time network administrators with the rest of the agency. There is a consensus that tour modeling with microsimulation is the next great thing. There is not the same consensus w.r.t. LU modeling. I'm not convinced that microsimulation on LU side is the way to go. It's a longer-term process than what we're looking at now.

Model structure comments:

- Keep same structure, but over time move to a greater level of geographic detail.
- For last 3 years Paul Waddell and DRCOG have been debating this same issue. About 6 months ago, Paul agreed to move up to TAZs. We'd rather have a greater level of disaggregation across race, income, etc, rather than exact geographic detail.
- I"m a big fan of microsimulation, but I have concerns about micro levels of geographic detail. I like the idea of a data model. However I'm concerned as to how the afternoon fits with the morning. The architecture of the MORPC model is different from UrbanSIM, so how to reconcile. You should ideally start from

the data.

- Object oriented structure follows physical objects, but have found limited benefits from this. Have found more benefits from building decision-making units into objects. These may be conceptual alternatives. Many objects are HH and persons.
- Code is structured in object-oriented framework. Computational overhead is not input/output, it's all math. In MORPC, half of it is in calculating utility functions.
- Tension between a way to compute versus a way to organize... Reconciling the data model with the procedural model is a challenge.
- When designing model systems, it's a compromise solution. In terms of integration, data management matters more. With more functionality it is more difficult to build a structural database.
- There really is no option zero (trip-based modeling), as there is really no point in bothering with trip-based models. So the true choices progressing 1 through 4. Or jumping through 3.
- The traditional 4-step models can't be polished much further.

Operational issue comments:

- How would DRCOG's membership use a LU model? Answer: Jeff Romine considers himself the regional economist. Provides locals with assistance and advice. Locals use estimates in economic development campaigns, assess growth impacts. Desire to increase credibility of forecast.
- How would they react if we don't give them the growth they want? Answer: we already tell them that, and we argue over it some.
- Some feel that decision-makers don't care as much about accuracy as about speed of result. Jim Ryan's (FTA) work showed that accuracy matters.
- How does DRCOG characterize current LU forecast? Answer: DRCOG - Mixture of policy and technical forecast. Look at it from a market perspective, which can put us at odds with policy people as to how to include those policy variables.
- At what point does policy affect forecast? Answer: DRCOG - at the beginning. Must have adopted policy both at regional and local level to be reflected in modeling.
- Are there any statewide policies such as housing that affect things?
- DRCOG - the only thing that matters is water and sewage capacities.
- Now looking at jobs-housing balance. We don't get many LU decisions coming down from state onto locals.

Interregional cooperation and other comments:

- DRCOG - originally developed budget for transport model, insufficient for a transportation / land use integrated model. Now got supplemental grant for LU modeling. Certainly all on parallel tracks.
- If we did both models together, it could be problematic if you inform LU model with advanced model you'll get different results than if you feed LU model with trip model. Maybe do travel model first, and follow with LU model.
- DRCOG - we have to write an RFP. PB has given us good stuff on how to design a tour-based model. Beyond that, how do we design the RFP.
- Quickly what would I do if I were in your shoes: - Let's talk to the feds - model

fidelity consistency issues, make it transparent for other users, real benefits? (accuracy, air quality, legal) -- it may keep you out of court. Review technical resource issues – salaries, staff, overall cost to run. Do we need a different tool for policy discussion support? Hardware operating system diversion.

- Maybe sub-regions of the country should coordinate and use economies of scale?
- MPOs have a responsibility to push the state of the practice. Can we pool resources? Need the dialog to include the core group of technical people, rather than just us on the peer review panel.
- Like the idea of grouping MPOs together. Lots of air quality analysis pressure--new SIPs due in 2007. Again, look into transferability.

V: Panel Caucus Recommendations

- The object-oriented data platform as an integration and efficiency tool is fundamental and DRCOG is encouraged to continue with it. It is important to conceptualizing what you need, & organizing data & as a useful operational environment.
- On socio-economic modeling, perhaps our panel is not right the right advisory group. We have not explored the issue enough to tell you whether or not to use UrbanSIM or something else. Spend more time assessing LU modeling options. This is a longer-term issue, given data problems associated with disaggregate land use modeling. DRCOG needs to make progress where possible, and put a plan together that is focused. Perhaps another advisory panel should be constituted, specifically for the land use issue. We don't feel that DRCOG will have an operational LU model by 2006. This issue is critical, but will take longer than the travel modeling effort.
- Freight modeling is important, and DRCOG should move forward with whatever data is available. Build in a freight component, and then enhance it later. It's very difficult to do freight at an MPO level, so look into doing it at a state level.
- Move forward with tour-based modeling, with population microsimulation and activity-based model as feasible. This is realistic within time and budget constraints. Jump straight to stage 3, and buy the work that's already being done: progressing through stages below that level is of no value. This could be a success story and help to build your credibility and show results for future work. Lead with the travel model to provide a base off of which to build the LU model.
- HOV and Toll is important. DRCOG is weak in data, so look elsewhere to supplement it.
- DRCOG should proceed on its own with this project, and not wait for others. But DRCOG should start talking to others to other regions to try to build a coalition, to leverage combined resources for model improvement.
- Adopt a three pronged approach on transportation, LU, and freight modeling. Move forward in parallel at whatever speed is appropriate for each element.
- Bicycle and pedestrian modeling: DRCOG should move forward on this issue, using, for example, develop pedestrian environment factors. Look into using GIS to determine what data we can quickly derive.
- The best advanced modeling practice does not address TDM and ITS well.

However, tour-based modeling puts you in a position to do a better job of it in the future. Start with a literature review. Start by building the data in your information system, and then worry about modeling it later.

- Expand the model area boundary to include the entire economic and air quality area.
- Begin at stage 3 (Columbus) quickly and easily, then move to freight and LU. Don't rule out Stage 4, but worry about the land use and freight first because those are more important.

Appendix A: Agenda

8:30 AM	Welcome and Introduction	Jeff May
8:45 AM	List top ten model outcome priorities	Jeff May
9:00 AM	Present draft model structure options	Peter Vovsha
10:45 AM	structure options effects on ten outcomes	Erik Sabina
11:15 AM	Panel discussion of PB proposal	
12:00 PM	Lunch	
12:30 PM	DRCOG modeling concept approaches	
	Draft model flowchart	Greg Erhardt
	UrbanSIM	Jeff Romine
	Data/Implementation Issues	Simon Montagu
2:00 PM	Panel discussion, questions	
3:00 PM	Panel separate caucus session	
3:30 PM	Panel presents recommendations	
4:00 PM	Next steps, and thanks	DRCOG

Appendix B: Attendees

Expert Panel Members:

- Frank Spielberg, Panel Chair - Principal, BMI-SG
- Keith Killough – President, KLK Consulting
- Keith Lawton – Director of Technical Services, Portland METRO Planning Department
- Eric Miller – Acting Chair, Department of Civil Engineering, University of Toronto
- Michael Morris – Transportation Director, North Central Texas Council of Governments
- Michael Replogle – Transportation Director, Environmental Defense

Project Consultants: Bill Davidson, Peter Vovsha, Joel Freedman, Rosella Picado – pbConsult

Project Team Members and Observers: Erik Sabina, Jeff Romine, Jeff May, Amanda Penner, Simon Montagu, Matthew Barry, Shahida Mirza, Lan Nguyen, Christine Dumas

– DRCOG; Brian Gardner – Federal Highway Administration; Lee Cryer – Regional Transportation District; William Johnson, Juan Robles – Colorado Department of Transportation; Mac Callision, Hui Liang Liu, City of Aurora; David Kurth - Parsons; Robert Yuhnke – Sierra Club.