Traffic Forecasting in a Visioning Workshop Setting

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Background

Visioning workshops have become a vital tool in regional planning. Unfortunately, traffic forecasting has played little role in these workshops even though traffic congestion is often viewed as a critical long-term issue. This creates the danger of a consensus forming in a workshop around a vision that traffic modelers later declare is unworkable from a traffic standpoint. A disconnect of this kind can lead to one of two undesirable outcomes: 1) the agency abandons the consensus vision, in which case the workshop participants rightly wonder whether their views are being taken seriously, or 2) the agency is stuck trying to implement the unworkable. One way to ensure that the consensus forms around a workable vision is to perform the traffic forecasts during the workshop and provide participants immediate feedback as to the likely consequences of their plans and allowing them to adjust their plans accordingly.

This approach was successfully used in a set of visioning workshops sponsored by the Council of Governments for San Luis Obispo County, California (SLOCOG), and later in a second set of workshops sponsored by the Sacramento Area Council of Governments (SACOG). As far as we know these were the first times that traffic forecasting was done in real time as part of a public workshop. The models and approach used in the two experiments were quite different and provide important lessons for agencies that may want to take an active role in visioning exercises.

General Requirements for Workshop Models

Travel demand models are typically designed to be used in a private, unhurried setting with ample opportunity to scrutinize inputs, analyze outputs, and if necessary perform additional model runs. Models are usually designed to accommodate detailed changes to networks or modeling parameters and to provide a rich assortment of potential outputs. In other words, their normal operating environment is completely unlike a public workshop.

The key requirement for a workshop model is that it produces sensible results fast; within fifteen minutes of receiving inputs from the participants. Anything longer than fifteen minutes will make for unreasonably long workshops and/or loss of interest by participants. Included in that fifteen minutes is whatever processing is needed to compute key indicators and report the results, which may take the form of printed reports or figures projected on a screen, plus time the operator needs to analyze the results and interpret them for the participants. There is not enough time to re-run the model if something goes wrong, so the inputs must be prepared correctly the first time. Moreover, the model must be robust enough to produce logical results for a wide range

of possible input values, since it is difficult to predict in advance what sort of proposals will arise during a public workshop.

Fortunately, the outputs needed from a workshop model are much simpler than those expected in a traditional model application. Public participants have neither the time nor the training to sort through long tables of subtle indicators; they much prefer results expressed in a few easily-understood numbers or figures. This greatly simplifies the modeling task because it allows a modeler to pick a few key indicators and then eliminate any model components that do not contribute to those outputs. For example, a workshop model might report the regional mode split but is unlikely to report patronage on individual transit lines, in which case there may be no need to run the transit assignment component of the model.

The SLOCOG and SACOG Visioning Workshops

The SLOCOG and SACOG workshops had goals and modeling approaches that differed substantially. In the case of SLOCOG there was a consensus on future roadway projects but not on land uses; the visioning workshops therefore focused on the type and location of future real estate developments. SLOCOG had a GIS program, PLACE^{3}S, which enabled them to make quick changes in land uses, and had recently developed a TransCAD model with a fairly short run time (seventeen minutes).

SACOG, on the other hand, had already achieved a broad consensus on future land uses through its award-winning Blueprint Project. It's new round of workshops were intended to create a consensus on future road and transit projects for its twenty-five year Metropolitan Transportation Plan (MTP). SACOG had a regional model that operated in a mixture of MINUTP and TP+ scripts with a typical run time of over eight hours.

The table below compares the two modeling situations:

Comparison of Features of SLOCOG and SACOG Workshop Models

Feature	San Luis Obispo COG	Sacramento Area COG
Inputs Changed	Land Uses	Road & Transit Networks
Global Constraint on Inputs	# of new DUs and Jobs	Total of Project Budgets
Modeling Software	TransCAD	Cube/Voyager
Processing Time (Original)	17 Minutes	8 Hours 35 Minutes
Processing Time (Workshop)	4 Minutes	15 Minutes
Modifications Made to Model	Fewer TAZs Fewer Periods	No feedback to Distribution Fewer Iterations Fewer Periods No Transit Assignment Some Parallel Processing Projects as Single Entities
Link to Land Use Software	Through Excel	Embedded/Automatic

SLOCOG had the easier modeling task since their original TransCAD model required only a few changes to fit within the run time constraints. The smallest downtown TAZ's were consolidated and only a single period (daily) was run. In fact, the run time was fast enough that a team of three modelers was able to service fifteen tables of participants, thus eliminating the need to bring in less skilled staff. Moreover, editing land uses (for SLOCOG) turned out to be easier than editing links (for SACOG) and less likely to cause error.

SACOG faced the daunting task of needing to reduce their model's run time by 97%. They had initially hoped to achieve much or all of this reduction through hardware and software improvements; specifically, updating the scripts to Cube/Voyager and then performing extensive parallel processing on a server farm. However, the software upgrade had only a minor impact on run time and the potential for parallel processing proved to be much more limited than originally thought. They therefore had to simplify the model by eliminating feedback to trip distribution, running fewer assignment iterations, foregoing transit assignment, and limiting roadway assignment to two periods (peak and off-peak) that were then processed in parallel.

SACOG also faced the difficulties inherent in trying to edit networks in a hurry. Attempting to add each project link-by-link was not practicable within the time constraints and would almost certainly have led to coding errors. This task was simplified by preparing a master file containing the existing road and transit networks along with a large number of potential projects; far more than could be included in the MTP. A GIS interface was developed that allowed the entire set of links for each proposed project to be modified simultaneously from a drop-down menu. For example, a proposed 6-lane expressway could be converted into a 4-lane arterial or eliminated altogether by checking the appropriate box on a menu. The option to edit the attributes of individual links was available, however in practice the participants tended to think in terms of entire projects rather than individual links and so this option was seldom used.

In each case certain constraints were placed on the participants to force them to face uncomfortable realities. In the SLOCOG workshops the participants were required to accommodate somewhere in the county the forecast number of new residents and jobs. The SACOG workshop participants were limited to the programmable portion of the MTP budget, with project costs based on actual estimates (if available) or on average unit costs.

Five separate software packages were used in the SLOCOG workshops. The land use data was edited in PLACE^{3}S which produced an output file readable in Excel. Excel macros were used to re-format the data into a file usable by TransCAD, which produced both graphical outputs and tabular indicators. These were combined into a Word file for printing and distribution to the participants at the originating table and into a PowerPoint presentation for discussion by all the tables. Most of the fifteen minute processing time was spent in transferring data from one

software package to another. This arrangement was cumbersome and fraught with risk of error which was only somewhat mitigated by extensive practice prior to the workshops.

In contrast, SACOG's operators only dealt with a single software package. The PLACE^{3}S land use program was modified to display and manipulate the Cube/Voyager networks and to prepare the files for Cube/Voyager runs. Cube/Voyager was then run within the PLACE^{3}S shell and the run's outputs were displayed using PLACE^{3}S' GIS functionality. This was a smoother arrangement than SLOCOG's and, by reducing the time needed for shuffling data, it enabled SACOG to devote nearly all of the fifteen minute time allotment to model run time.

Workshop Results

The traffic forecasts in the SLOCOG workshops were a real eye-opener to the participants who were not familiar with regional planning. Most apparently did not fully realize that location mattered. Prior to the workshop most of the dialogue on development in San Luis Obispo County centered on the number of units being proposed and their compatibility to the immediately adjacent land uses. People were surprised to find that the same number of jobs and dwelling units produced different levels of traffic congestion depending on where they were located in the county. Specifically, there was a tendency to concentrate residential developments in certain towns while turning other towns into employment centers. The traffic forecasts for groups that followed this pattern had much higher levels of congestion on the connecting highways than the groups that had a diversity of land uses within each town. This quickly led to a consensus on the need for a better local balance of land uses. In addition, participants wanted compact mixed-use development of a kind that is not even an allowable land use category under most general plans in the county.

The SACOG workshops revealed a major disconnect between the agency consensus and the public consensus. Specifically, public works agencies had spent years securing project approval and funding for projects that the public had relatively little interest in having constructed. At the same time the participants showed a strong desire for certain project types (toll roads, major urban bridges) that the agencies had thought were politically impossible.

In both cases the workshops attracted a lot of participants including many elected officials who got a new perspective on what the electorate wants.

Lessons Learned

The most obvious lesson is that it is indeed possible to do traffic forecasting in a visioning workshop and that doing so will influence the results in important ways.

Trying to perform complex technical tasks in a hurry in front of a live audience is inherently risky; *this is not for the fainthearted*. It is inadvisable to try this unless you have time for ample testing and practice beforehand and backups for all hardware components.

Modelers must accept from the outset that a workshop model has a different purpose than a conventional model and that some functionality will have to be sacrificed for speed. When deciding on how to modify a model it is best to start with the three or four key indicators that you plan to show workshop participants and then work backwards from those to determine the (relatively few) model components are really needed. Traffic forecasters love elaborate models so if you start with the existing model and ask them how to modify it you are more likely to get proposals for additions than subtractions.

In the SLOCOG workshops we found that much of the workshop time was spent inputting data that was similar at different tables. This process can be shortened by allowing participants to select from a menu of "starter sets" prepared prior to the workshop that allocate about half of the new development. Each starter set should represent a theme such as (for networks) "facilitate long-distance auto travel" or (for land uses) "infill within existing urban boundaries" and contain the most prominent proposals consistent with that theme. Participants are expected to delete unwanted projects from the starter set as well as add new ones, but giving them something to work from helps groups to reach consensus faster.

The final lesson is that visioning workshops are meaningless unless the agencies approach them with an open mind and a genuine willingness to respond to what people say. Both sets of workshops revealed public preferences that were in fundamental conflict with projects that agencies considered "done deals". The workshops were a success in that they brought such conflicts to light; it remains to be seen how much influence they will have on the projects that are actually implemented.

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