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The Merging of Travel Forecasting and Traffic Management Data and Models

A FHWA-sponsored Peer Exchange and CSISS Specialist Meeting
GPS and Time-Geography Applications for Activity Modeling and Microsimulation
Santa Barbara, CA October 10-11, 2005

Position Statement
My experience with travel forecasting in general and activity-based models in particular has led me to the conclusion that we are facing some fundamental data problems. It is not simply an issue of obtaining travel behavior data that is both richer and more accurate; rather, it is the belief that data and models that can address the forecasting of travel behavior tomorrow are the same constructs that are needed in addressing traffic management today.

The fields of travel forecasting and traffic operations have grown closer over the last decade, in large measure due to the increased availability of microsimulation software and the promise of real-time travel data. Several recent projects in each of the two traditional fields have supported this contention. My work with Ming Lee developing the REACT! web-based activity survey and in developing the TRACER GPS-based in-vehicle data logger (with James Marca and Craig Rindt) was conducted in parallel with the development of CARTESIUS, a multi-agent traffic management decision support system. The cross-fertilization was quite significant and led to two other projects, AUTONET and PTC.

AUTONET is an architecture for an interoperable information technology infrastructure that features a mobile, ad-hoc, dynamic, peer-to-peer network that integrates vehicles, information, and communication systems with a fixed transportation infrastructure to attain a comprehensive distributed transportation management system. The primary result thus far may be the realization that the technology of AUTONET is achievable but the application itself seems to neither satisfy the needs of forecasting nor management. This led to the development of the PTC project that addresses the problem of collecting, storing, and utilizing AUTONET-type data from each vehicle in a traffic network, where the data can be trusted by transportation system operators while simultaneously ensuring traveler privacy. To achieve this goal, each vehicle stores its own travel history, under the consent of the driver, by accepting authenticated information from roadside controllers (persistent traffic cookies, PTC) using short-range wireless communication. The authenticated data stored in each vehicle forms a distributed database of historical travel patterns. The central hypothesis of the project is that these historical travel patterns can be used to predict the movement of vehicles currently in the system, which can, in turn, be used for traffic management applications.

The gap between operations and planning data is shrinking and we should be planning for a future when spatial data is almost universally available from mobile service providers in ways analogous to how web click streams are converted into marketing data for businesses today.