

## Microsimulating parcel-level land use and activity-based travel: Development of a prototype application in San Francisco

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### Abstract

This paper develops a prototype of an integrated microsimulation model system combining land use at a parcel level with activity-based travel in San Francisco, California. The paper describes the motivation for the model system, its design, data development, and preliminary application and testing. The land use model is implemented using UrbanSim and the Open Platform for Urban Simulation (OPUS), using parcels and buildings rather than zones or grid cells as spatial units of analysis. Measures of accessibility are derived from the San Francisco SF-CHAMP activity-based travel model, and the predicted locations of households and business establishments are used to update the micro-level inputs needed for the activity-based travel model. Data used in the model include business establishments linked to parcels over several years, and a panel of parcels that allow modeling of parcel development over time. This paper describes several advances that have not been previously integrated in an operational model system, including the use of parcels and buildings as units of location for consumers and developers of real estate, the use of business establishments to represent economic activity, and the interfacing of this microsimulation land use model with a microsimulation activity-based travel model. Computational performance and development effort were found to be modest, with land use model run times averaging one minute per year on a current desktop computer, and two to three minutes on a current laptop. By contrast, long run times of the travel model suggest that there may be a need to reconsider the level of complexity in the travel model for an integrated land use and transportation model system application to be broadly usable. The land use model is currently in refinement, being used to identify input data and model specification adjustments needed in order to bring it into operational use, which is planned over the next several months.

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