



Caltrans Division of Research,  
Innovation and System Information

Research

Notes

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Project Title:  
Dynamic Ridesharing: Simulation of  
System-Level Travel Effects Using Agent-  
Based Demand and Supply Models in the  
Sacramento Region

Task Number: 2977

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## Dynamic Ridesharing in the Sacramento Region

A Simulation of System-Level Travel Effects Using Agent-Based  
Demand and Supply Models.

### WHAT IS THE NEED?

It is widely recognized that new vehicle and fuel technology is necessary, but not sufficient, to meet greenhouse gas (GHG) reduction goals for the U.S. and California. Dynamic ridesharing services (DRSs) hold significant potential:

1. To reduce vehicle miles traveled (VMT) and associated GHGs,
2. To enhance the efficiency of our current transportation system (i.e., reduce congestion and increase person throughput), and
3. To improve transportation access to a broad spectrum of socioeconomic groups (low income, disabled, and elderly) in different geographic contexts (city, suburban, and rural).

However, very little research examines the complex behavioral and system-level effects of dynamic ridesharing services.

### WHAT ARE WE DOING?

The research team will integrate two disaggregate agent-based models, the Sacramento activity-based travel demand model (SACSIM) and the dynamic assignment model (MATSim), to simulate DRSs and evaluate their travel, environmental, and equity effects.



DRISI provides solutions and  
knowledge that improves  
California's transportation system

**Task 1. Literature Review (Months 1-6).** Conduct a review of the available and relevant empirical and modeling literature on dynamic ridesharing.

**Task 2. Data Preparation (Months 2-6).**

- Convert network links and nodes from SACSIM network for MATSim.
- Modify SACSIM travel activity data prepared for DynusT (2014, 2014) for use in MATSim.
- Modify and expand feedback and convergence processes developed for DynusT for use in MATSim and DRS. Modify and/or develop MATSim modules specific to DRS.

**Task 3. Simulate Scenarios (Months 6-10).** We plan to simulate peer-to-peer ridesharing and taxi-sharing scenarios in a future SACSIM horizon year (likely 2030).

- Specify scenarios and optimization parameters in MATSim for dynamic ridesharing scenarios.
- Simulate dynamic ridesharing scenarios and conduct sensitivity analyses of key parameters and evaluate results.
- Test and correct any problems with the simulations.

**Task 4. Draft Final Report (Months 9-15).**

## WHAT IS OUR GOAL?

The goal of this study is to represent the wider range of potential travel behavior effects from a regional system application of DRSs, including auto ownership, trip generation and destination, mode, and route choice. The study will also simulate the decision to use DRS, based on monetary and time costs, with individual values of time/money from California survey data.

## WHAT IS THE BENEFIT?

Ridesharing is an emerging technology that has the potential of combatting some of the big issues in transportation today such as GHG emissions and congested corridors. In order for this tool to be more effectively implemented to help solve these problems, Planners and Policy-Makers require more knowledge of how individuals use DRSs and what the broader implication is of DRS on transportation systems.

## WHAT IS THE PROGRESS TO DATE?

This project was executed in late October and will be convening a kickoff meeting between interested stakeholders in early- to mid-December.