



U.S. Department of Transportation  
Federal Transit Administration



# Mobility on Demand (MOD) Sandbox Demonstration: Tri-County Metropolitan Transportation District of Oregon (TriMet) Open Trip Planner (OTP) Shared-Use Mobility Evaluation Report

## Background

Trip-planning is a core component of public transit agency user services; however, developing and operating a customized trip planning platform requires considerable resources that are beyond the budget of many public transit systems and may require external solutions that provide the functionality but can lack capacities for desired customization specific to unique urban environments. The OpenTripPlanner Shared-Use Mobility (OTP SUM) project is one of 11 Mobility on Demand Sandbox Demonstrations funded by the Federal Transit Administration and was implemented by the Tri-County Metropolitan Transportation District of Oregon (TriMet), a special district of the State of Oregon governed by a seven-member Board appointed by the Governor. TriMet serves a population of approximately 1.8 million in the 533 square miles of the urban portion of the three-county Portland metropolitan area. TriMet's key partners for the project were Conveyal, IBI Group, Cleared For Takeoff, Moovel, and Oregon Metro.

## Objectives

The objective of the project was to advance the development of online trip planning through an open-source platform, the OpenTripPlanner (OTP), which was extended to include shared mobility modes, pedestrian friendly routing, and real-time information on transit arrivals. The project also sought to improve upon an open source geocoder, known as Pelias, to lower the cost barriers for agencies to implement trip planning solutions. The OTP, initially released as an open source project by TriMet in 2009, was the first to introduce multiple modes in one trip with the original focus on incorporating biking and walking networks with public transit. An independent evaluation was conducted to assess the demonstration impacts and outcomes based on the OTP SUM project's goals and objectives.

## Findings and Conclusions

*The enhanced TriMet OTP incorporated shared mobility into trip planning that allowed users faster travel times, enhanced pedestrian routing, and provided valid results; the Pelias geocoder showed good performance compared to other geocoders.*

This report presents the results of an independent evaluation of the TriMet MOD Sandbox Demonstration, with lessons learned that potentially can help advance similar initiatives within other transit systems. The evaluation was guided by 11 hypotheses that explored the enhanced OTP's technical performance and the user response to several design and interface features, and tested the performance of Pelias with other leading geocoders for accuracy and comparability. Key findings of the evaluation include the following:

- **Incorporating shared mobility options into the OTP provided users with faster travel times.** These options were evaluated by randomly drawing origins/destination pairs from the property records dataset and running them through the TriMet OTP, which provided shared mobility options, and Google's trip planner, which provided transit-only options. On average, the results found that the shared mobility options tested were faster than the same trip when planned using public transit alone.
- **Pedestrian routing was enhanced.** The TriMet OTP was enhanced with improved sidewalk data and pedestrian routing, and the evaluation found effective routing performance to optimize pedestrian use of sidewalks and safe low-speed residential streets. Street segments were assessed for sidewalk data accuracy, which found that 96% of observations were correct. Overall, the sidewalk data and pedestrian attribute functionality performed very well.
- **Users found the OTP provided valid results.** A survey of TriMet riders asked them to test the enhanced OTP with trips of their own choosing and evaluate the validity of results and the user interface design. Users responded very favorably to the OTP, reporting that results from their searches were correct, and the user interface was highly rated, including high marks for the real-time information on transit activity and other information display. Overall, users considered the OTP to be a considerable improvement in design and function over the previous trip planner.
- **Pelias generally performed comparably to other geocoders.** Compared against Google Earth, MapBox, and ArcGIS geocoding using two address data sets and two approaches, Pelias performed very well with the property record data set but showed some accuracy and comparability limitations with the TriMet-supplied test dataset, generally due to factors such as unintentional misspellings. Overall, Pelias performed well, and the results broadly show that it provides the necessary level of accuracy and consistency for application in a consumer-facing trip planner.

## Benefits

The Tri-Met MOD Sandbox Demonstration project resulted in several lessons learned and innovations that advanced the trip planning state of practice, including improving existing open source geocoding with Pelias, enhancing the OTP design, and improving the quality and accuracy of pedestrian routing and real-time transit operations information. These advances can be further developed by other transit agencies and offer agencies a viable option for deploying customizable trip planning solutions that can meet user and regional needs. Adoption of the OTP has been strong, with implementation in dozens of cities and countries worldwide.

## Project Information

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