SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

Metro Model:

Innovative Data Sources Inform Truck Tour Framework for Dynamic Portland Region

BACKGROUND AND CHALLENGE

Located in the Pacific Northwest, Metro serves as Portland, Oregon's metropolitan planning organization (MPO). As an international gateway and domestic freight hub, the region is particularly influenced by the dynamic trends affecting distribution and logistics. Thousands of Oregon companies depend on Portland's marine, rail, air, and road facilities for access to markets. The agency has spent thousands of staff hours in truck model maintenance, updates, and applications over the past 20 years.

As it was completing commodity flow forecasts for 2014, the MPO became increasingly interested in improving freight demand modeling capabilities. Metro's model at the time was limited in its ability to report responses to network conditions and costs. In addition, the model could only depict truck volumes on the network, but not the flow of goods by commodity type. Further, Metro found that the model's usability was limited as a tool to support regional policy evaluation. To address these limitations, Metro applied for and was awarded funding from the Strategic Highway Research Program 2 (SHRP2) C20 Implementation Assistance Program to develop a behavior-based freight model.

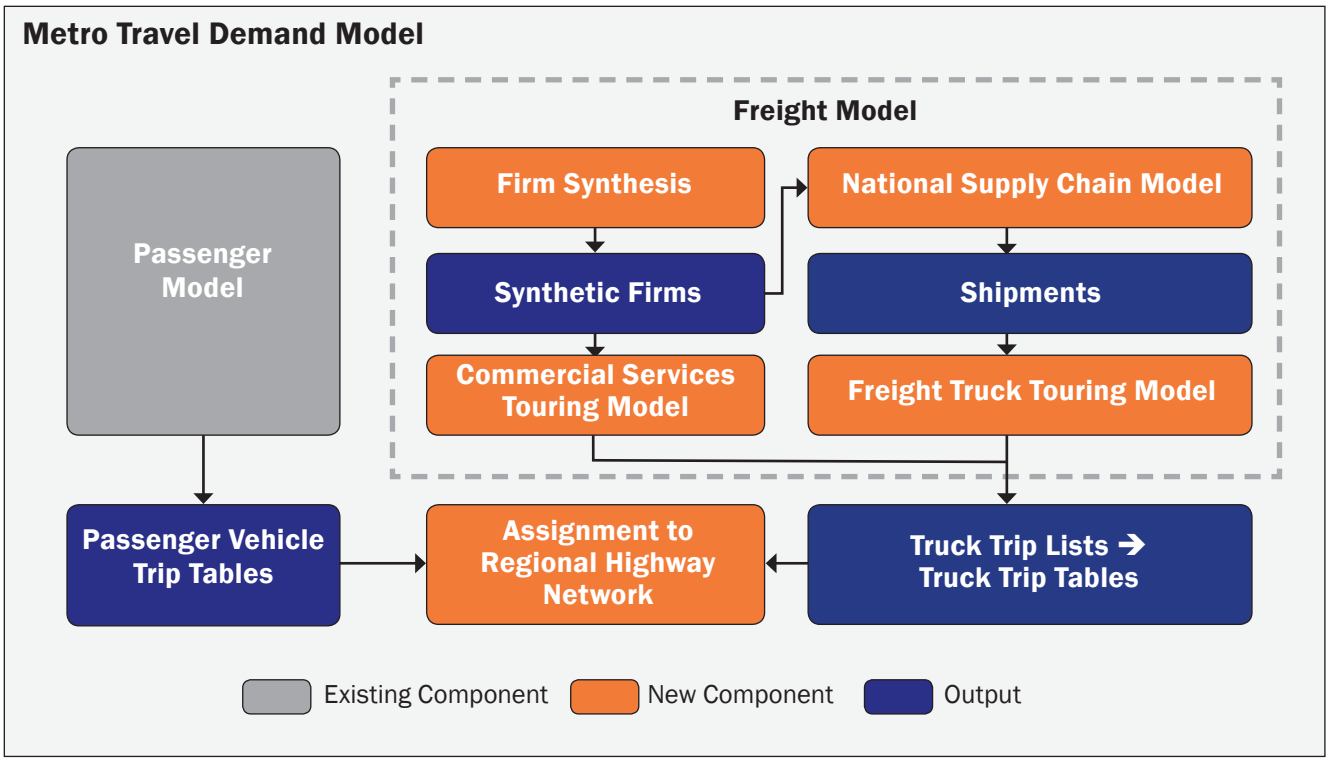
Project Type:	**Behavior-Based Freight Demand Model**
Grant Recipient Agency:	**Metro**
Location:	**Oregon**
Duration of Activity:	**2014 to 2017**
Budget:	**$741,000 ($350,000 from SHRP2 C20 and $391,000 in Metro matching funds)**

APPROACH

Research sponsored by the Federal Highway Administration (FHWA) and led by the Chicago Metropolitan Agency for Planning had produced and implemented an advanced freight behavior-based model in the Chicago region. In addition to SHRP2 C20 funding, Metro was able to secure local funds to design and conduct an establishment survey to collect behavioral freight data for the region. Major project objectives included developing a model that would:

- Help stakeholders evaluate regional economic policies.
- Depict a broad range of responses to network conditions and costs.
- Depict both truck volumes (by vehicle type) and flow of goods (by commodity type) on the network.
- Include freight trucks as well as service and parcel trucks.

An overview of the model and new model components developed for this project is shown in **Figure 1**.



Source: Metro

Figure 1. Diagram. Metro model design framework.

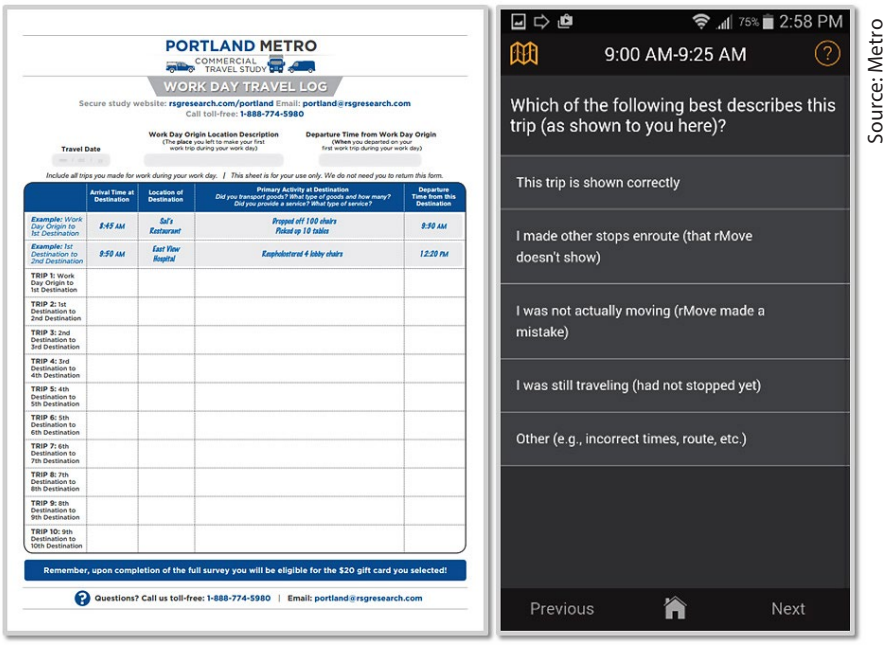
BENEFITS AND IMPACTS

Key elements that contributed to project outcomes and subsequent impacts include:

- Existing relationships with relevant freight stakeholders in the region.
- A series of five stakeholder meetings with potential users of the freight model to gain insights into their needs and challenges.
- Project staff with current experience developing behavior-based freight models for transportation agencies in the United States.
- A robust data collection effort, complete with a set of contingencies to address collection challenges.
- The existence of an advanced freight behavior-based model in the Chicago region on which to build.

Outputs generated by the project include:

- A behavior-based freight demand model for the region.
- An innovative method and approach to collecting freight behavior data through an establishment survey.
- New establishment survey data, vehicle system monitoring data, and global positioning system (GPS) data from businesses in the region. **Figure 2** shows examples of the data collection instruments used by the project team.



Source: Metro

Figure 2. Image. Example daily travel log (left) and smartphone application screenshot (right) used in the establishment survey.

Benefits

Benefits realized from this project include the ongoing use of the resources it created as well as the changes it may influence in stakeholder behavior. Specific outcomes are listed below:

Outcome	Evidence
Improved analysis capability.	The new freight model improves Metro's ability to analyze freight network issues, propose projects and mitigation measures, and conduct benefit-cost analyses.
Improved ability to address performance measurement.	The Metro Regional Transportation Plan lists freight reliability as a regional transportation performance target. The new model will assist Metro in estimating truck trips and truck hours of delay to help calculate freight reliability for the region.
Improved ability to support the development of regional economic policies.	Metro and its partners can use this model to answer questions related to regional economic policies. The model can focus on major regional export sectors, produce data to evaluate the economic costs of bottlenecks, and can help planners model freight-related impacts of commercial and industrial land use policies and plans.
Improved stakeholder awareness of the product.	Stakeholders in the region, as well as audiences nationwide, received presentations by the project team, expanding knowledge of the process and its product.

Impacts

Impact measures are the ultimate benefits of using a product. These are longer term, value-added impacts of the product related to saving time, money, and lives. Specific impacts of this project include:

Impact	Application
Improved decisionmaking.	This project improved the general availability of information regarding freight movements and investments in the Metro area, which gives decision-makers greater access to and awareness of freight information.
Greater understanding of truck movement in the metropolitan area.	Service vehicles (e.g., construction and parcel delivery vehicles) often account for a significant percentage of truck movement in urban areas. However, they are not typically accounted for in freight models and were not included in Metro's previous model. This project includes a component focusing on service vehicles and will allow planners to estimate the movement of these vehicles separately from typical freight vehicles (e.g., long-haul trucks).

Source: Metro FLKR

The Metro project team has identified several next steps it wishes to complete with its new model. This includes working with neighboring MPOs and the State to coordinate and integrate models. Also, several advancements were identified that may be pursued in the future, including:

- Conducting further research to identify time-sensitive shipments (e.g., certain factory and construction site deliveries, some food shipments) and modify the freight model to enable tracking them.
- Improving long-haul mode choice by introducing additional attributes on the supply chain network.
- Assigning additional modes to the local freight network (e.g., direct rail shipments to local businesses; trains into, out from, and through the region) to enable analysis of rail/highway conflicts.

PARTNERSHIPS

Metro – Led project.

Port of Portland – Provided stakeholder input.

Portland Freight Committee – Provided stakeholder input.

Oregon Department of Transportation – Provided stakeholder input.

Federal Highway Administration (FHWA) – Provided coordination support and guidance.

FOR MORE INFORMATION

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Learn more about the SHRP2 program, its Capacity focus area, and Freight Demand Modeling and Data Improvement (C20) products at www.fhwa.dot.gov/GoSHRP2/

SHRP2 SOLUTIONS

The second Strategic Highway Research Program (SHRP2) is a partnership of the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), and the Transportation Research Board (TRB). TRB completed the research, and now FHWA and AASHTO are jointly implementing the resulting SHRP2 Solutions that will help the transportation community enhance productivity, boost efficiency, increase safety, and improve the reliability of the Nation's highway system.

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