SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

Advanced Travel Analysis Tools for Integrated Travel Demand Modeling (C10/C04/C05/C16)

Enhanced models that better account for traveler behavior lead to more informed decisions about highway capacity needs

Challenge

Existing transportation planning models deal with average conditions and treat travel as a series of sequential decisions. As such, existing models have difficulty addressing a number of areas including:

- Feedback between supply, demand and land use;
- Variable road pricing, ramp metering, reversible lanes, variable speed limits, and other dynamic transportation management strategies;
- Policies affecting travel scheduling such as parking pricing, transit pricing and flexible work schedules, reversible lanes, high-occupancy vehicle (HOV) lanes, and high-occupancy toll (HOT) lanes; and
- Trip chains and joint trip making within a household

Addressing these areas requires greater spatial and temporal detail than is typically available with the traditional static, sequential approach. Decision makers also need a better understanding of the impact of operational improvements on highway capacity and reliability, as well as the effects of congestion, reliability, and pricing on travel demand.

Solution

The Bundle: Advanced Travel Analysis Tools (C10/C04/C05/C16)

The SHRP2 Capacity Advanced Travel Analysis Tools bundle provides approaches for developing integrated travel analysis models-that include traveler decision inputs-to better align the outcomes with real-world conditions. Frequent constraints for metropolitan travel forecasting models include limited feedback between supply and demand sides, limited inputs on traveler behavior related to pricing and congestion, and limited use and guidance about activity-based models and dynamic traffic assignment. Many transportation agencies already use some of these tools and tactics in their current business practices.

FHWA, AASHTO, and the Transportation Research Board (TRB) also promote various strategies and tactics through their respective programs and initiatives. To evaluate the success of the implementation effort, the implementation plan for this product will offer examples of performance measures that can be used to track progress and outcomes in making the Advanced Travel Analysis Tools bundle a nationally recognized, well-used, and effective resource.

Successful implementation of the Advanced Travel Analysis Tools bundle will involve a wide range of stakeholders-from TRB's research experience and in-depth knowledge of the SHRP2 products-to FHWA and AASHTO's leadership of implementation activities-to practitioners and decision makers in the public, academic, and private sectors.

The SHRP2 Advanced Travel Analysis Tools bundle includes four SHRP2 Capacity products:

- Partnership to Develop an Integrated, Advanced Travel Demand Model and a Fine-Grained, Time-Sensitive Network (C10)

What is the Advanced Travel Analysis Tools for Integrated Travel Demand Modeling bundle?

The Advanced Travel Analysis Tools bundle for integrated travel demand modeling aims to encourage more agencies to use advanced travel analysis tools and to support agencies leading the way in using these tools. These products were bundled together because of their technical and subject matter commonalities, as a result of an executive review committee consisting of American Association of State Highway and Transportation Officials (AASHTO) and Federal Highway Administration (FHWA) leaders.

Partnership to Develop an Integrated, Advanced Travel Demand Model and a Fine-Grained, Time-Sensitive Network (C10)

Improving our Understanding of How Highway Congestion and Price Affect Travel Demand (C04)

Understanding the Contribution of Operations, Technology, and Design to Meeting Highway Capacity Needs (C05)

The Effect of Smart Growth Policies on Travel Demand (C16)

CAPACITY

One of four SHRP2 focus areas, Capacity products help transportation organizations to systematically integrate environmental, economic, and community requirements into the analysis, planning, and design of new highway capacity.

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Visit: www.fhwa.dot.gov/GoSHRP2
Learn more about products, case studies, and implementation assistance.

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Partnership to Develop an Integrated, Advanced Travel Demand Model and a Fine-Grained, Time-Sensitive Network (C10)

The Integrated Dynamic Travel Model (C10) links travel behavior choices, such as departure time or route, with congested network conditions to better reflect real-world dynamics in the model. Planners can then more directly test the effects of various alternatives on congestion. This SHRP2 Solution advances existing modeling applications to include sensitivities for traffic shifts by time of day or route in response to capacity increases, operation actions, or management actions. It can also dynamically integrate travel-time reliability, greenhouse gas emissions, road pricing, mode shifts, and non-travel choices such as work/shop at home or flextime policies. The immediate benefit of the models is that they address the essential question of how travel behavior responds to network conditions and network conditions respond to behavior. The result is a dynamic model that better analyzes transportation alternatives and provides more precision to support transportation planning decisions. Ultimately, the benefit of more effective and precise modeling is more informed transportation planning.

Improving our Understanding of How Highway Congestion and Price Affect Travel Demand (C04)

Travel demand modeling systems can now reflect how travelers respond to congestion, travel time reliability, and pricing, so that decisions about operational improvements can be based on more realistic models. With better models, agencies better understand how operations projects can improve the function of their highway networks. This SHRP2 product provides mathematical descriptions of the full range of highway user behavioral responses to congestion, travel time reliability, and pricing; formatted for input to current and developing travel demand models.

Understanding the Contribution of Operations, Technology, and Design to Meeting Highway Capacity Needs (C05)

With the enhanced capability to measure the cost and effectiveness of traffic operations strategies, planners and decision makers can demonstrate whether a strategy solves a particular congestion problem and can more confidently act to improve the function of their highway networks. This SHRP2 product is a guide for modelers on how to compare the effectiveness of less complex operational strategies, such as intersection channelization, with more expensive and complex treatments, such as adding general purpose highway lanes.

The Effect of Smart Growth Policies on Travel Demand (C16)

This SHRP2 product provides planners with a rapid scenario assessment tool that allow them to estimate impacts of changes to the built environment, travel demand, and transportation supply and demand management policies on peak-hour transportation, as well as its effects on sprawl, energy reduction, active travel, and carbon footprints. The predictive tool allows a user to test different scenarios for land use, population growth, and transportation strategies, and provides 'sketch' – or high level estimates of system usage and regional accessibility across multiple transport modes, accidents by severity, fuel consumption and emissions, and peak hour operating conditions.

Benefits

SHRP2 has developed this linkage to better reflect behavior in the models so planners can more directly test the effects of various alternatives on congestion. Transportation agencies will be able to estimate travel demand in a way that integrates activities, networks, and the environment. These advanced models are sensitive to the reciprocal interplay of traveler behavior and transportation network conditions, including mode choice options. The models support more informed decisions about adding highway and transit capacity, enhancing traffic operations, introducing priced roads, and improving traveler information. An easy-to-use sketch planning tool for assessing land use/transportation interactions is also available.

How can you learn more?

Visit: www.fhwa.dot.gov/GoSHRP2

- Additional product information
- Information about how this product is being used in the field
- Contact information for peers who are familiar with this product
- Links to research reports

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About SHRP2 Implementation

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.