

Products of



SHRP 2

STRATEGIC HIGHWAY RESEARCH PROGRAM

Safety Research



The second Strategic Highway Research Program (SHRP 2) focuses for a short time on a small number of large problems that confront transportation agencies: congestion, crashes, and the need to rebuild aging infrastructure. The mission is to strategically advance innovative ways to plan, renew, operate, and improve safety on the nation's highways. To achieve this, research focuses on four related areas, including driving behavior, highway capacity, travel time reliability, and rapid renewal methods.

Driver behavior has been identified as the primary cause of most crashes. To understand how to prevent collisions and reduce their severity, SHRP 2 is conducting the largest study yet undertaken to collect objective data about the driving experience in real world conditions. The intent is to determine what risks are associated with the relationship of a driver's performance to roadway and vehicle design and to traffic conditions so that effective countermeasures can be developed. Sophisticated and inconspicuous equipment is collecting data on the day-to-day driving of more than 3000 participants in six study sites around the country. The ultimate outcome of this research will be felt in lives saved and injuries prevented for decades to come. Several products of the research will be more immediately useful and they are described in this document.

Data to Improve Highway Safety

Objective data on how drivers interact with and adapt to their vehicles, the traffic environment, roadway characteristics, and environmental conditions are needed to significantly improve highway safety. These products of SHRP 2 Safety research comprise the largest database of driving behavior ever collected.

Database of Driving Behavior

More than a petabyte of data on drivers, driving behavior, and vehicles. Data covers crashes, near crashes, and noneventful driving.

Focused data sets, including trip data, crash and incident data, and reduced or de-identified data sets accessible to a wider array of analysts.

Highway safety practitioners will be able to look at highway safety in new ways and answer questions for which no data previously existed. Risks, especially of lane departure and intersection collisions, associated with particular crash factors will be quantifiable and crash surrogates will allow safety countermeasures to be developed and tested more quickly and safely.

Data collection will continue at six sites into 2013. Initial subsets of data will become available in early 2012. (Projects S06 and S07)

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Database of Roadway Characteristics

A GIS database of roadway features and characteristics linked to the database of driving behavior.

Data sets related to road type, geometry, shoulders, safety furniture, signage, and pavement markings.

Driving behaviors will be correlated with particular highway design features, providing foundational information that highway and traffic engineers can use to design safer roads. The roadway information database also provides a model for developing linked data sets for asset management purposes.

Data collection will continue at six sites into 2013. Initial subsets of data will become available in mid 2012. (Project S04)

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Tools for Data Analysis

Research protocols, management approaches, crash surrogates, and high-priority questions developed for the SHRP 2 naturalistic driving study will be useful resources for future work.

Data Analysis Methods for NDS Data

High-priority roadway safety questions compiled from national safety experts and categorized for analysis

Sample work plans for analyzing crash likelihood of lane departure, intersections, driver distraction, driver fatigue, and driver impairment due to alcohol

Methods for determining the statistical relationship of surrogate measures of collisions (conflicts, critical incidents, near-collisions, or roadside encroachment) with actual collisions

Plans for addressing the highest-priority research questions related to driver behavior and infrastructure characteristics will be valuable in analyzing NDS data to develop new safety measures. Methodology studies will provide useful background for future analyses.

Research complete. Report S2-S02-RW: *Integration of Analysis Methods and Development of Analysis Plan* (Project S02) will be available online in 2012.

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Reports from four methodology studies available online mid 2012 (Project @01)(listed on page 4)

Naturalistic Driving Study Analyses

The first four analyses of the NDS and roadway databases will study methods to reduce crashes

- 1) on rural 2-lane 55-mph curves,
- 2) on congested freeways,
- 3) by left-turning vehicles at signalized intersections, and
- 4) by inattentive and distracted drivers

Each analysis should lead to specific roadway and/or vehicle methods to reduce crashes, injuries, and fatalities in the situations studied.

Analysis begins in 2012, initial results will be available in late 2012 and final reports will be online in 2014. (Project S08)

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PRODUCT**IMPACT ON PRACTICE****STATUS OF RESEARCH PRODUCT****Advancing the State of the Art**

The scale of the SHRP 2 naturalistic driving study required development of new approaches to study design and advances in data collection.

SHRP 2 Site Observer

Prototype video-based data collection system that automatically captures vehicle trajectories and records objective measures of conflict.

This new system is a research and evaluation tool that relates conflicts to crashes at specific points of interest, which can support a wide range of future safety improvement projects.

Research complete. Report S2-S09-RW: *Site-Based Video System Design and Development* will be available online in 2012. (Project S09)

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Design of the SHRP 2 Naturalistic Driving Study

Participant recruitment plan

Informed consent and data protection procedures

Driver assessment tests

Data acquisition system capabilities

Quality control and project management

Details of how this large-scale naturalistic study is being conducted provide a model for similar studies, such as those being developed in Canada and Europe, and background information useful to those with reason to analyze data collected in the study.

Research complete. Report S2-S05-RW: *Design of the In-Vehicle Driving Behavior and Crash Risk Study* is available online and as an e-book for iPad, Kindle, and Google. (Project S05)

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Naturalistic Driving Study Facts

Six data collection sites: Erie County, New York; Seattle, Washington; Central Pennsylvania; Central Indiana; Tampa Bay, Florida; and Durham, North Carolina

Onboard data collectors include four video cameras, velocity and acceleration sensors, a GPS system, forward radar, a light sensor, lane-fidelity tracker, and eyes-forward monitor

As of January 2012, about 1500 instrumented cars are on the road; about 3000 drivers will participate over the course of the three-year study

Research Question Crash Categories: Road departure; intersection; rear-end crashes; crashes involving pedestrians, animals, pedal cyclists, and objects; head-on; lane-changing, merging; backing; general driver behavior; new and near-future vehicles

SHRP 2 Safety Publications Now Available

Roadway Measurement System Evaluation (SHRP 2 Research Report S2-S03-RW-01)

Design of the In-Vehicle Driving Behavior and Crash Risk Study (SHRP 2 Report S2-S05-RR-1)

Project Brief: A Foundation for Safer Driving: A Summary of Research Preliminary to the SHRP 2 Naturalistic Driving Study

Project Brief: Design of the In-Vehicle Driving Behavior and Crash Risk Study: The SHRP 2 Naturalistic Driving Study

REPORTS FROM THE FOUR METHODOLOGY STUDIES IN SAFETY PROJECT S01

Development of Analysis Methods Using Recent Data (Report S2-S01A-RW), available online in mid 2012

Analysis of Existing Data: Prospective Views on Methodological Paradigms (Report S2-S01B-RW), available online in mid 2012

A Multivariate Analysis of Crash and Naturalistic Event Data in Relation to Highway Factors

Using the GIS Framework (Report S2-S01C-RW), available online in mid 2012

Evaluation of Data Needs, Crash Surrogates, and Analysis Methods to Address Lane Departure Research Questions Using Naturalistic Driving Study Data (Report S2-S01E-RW), available online