



SHRP2
STRATEGIC HIGHWAY RESEARCH PROGRAM

Accelerating solutions for highway safety, renewal, reliability, and capacity

Program Status Report

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AASHTO Research Advisory Committee Meeting

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TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

2nd Strategic Highway Research Program (SHRP 2)

- **Authorized in SAFETEA-LU and extensions**
- **\$223 million**
- **March 2006 to March 2015**
- **Administered by TRB**
- **MOU with FHWA and AASHTO**
- **Collaboration with NHTSA on Safety**

SHRP 2 Origin & Philosophy

- Needs identified by State DOT and industry leaders—driven by *customer-oriented goals*:
 - Make highways safer: revolutionary change
 - Fix highways: address epidemic of aging infrastructure
 - Reduce congestion: increase physical and operational capacity
- Success requires non-traditional approach:
 - Multiple disciplines
 - Collaboration with non-DOT stakeholders
 - Portfolio: from new knowledge to practical tools to allow existing innovations to be more widely used

Four Focus Areas

- **Safety**: fielding the largest-ever naturalistic driving study to reduce crashes and save lives through understanding driver behavior
- **Renewal**: making rapid, innovative construction possible for “ordinary” projects
- **Reliability**: Providing management and technical tools to reduce congestion through operations
- **Capacity**: Systematizing collaborative decision making to achieve better, faster project decisions

Stakeholder Involvement

- 3-tiered stakeholder governance structure:
 - Oversight Committee
 - 4 Technical Coordinating Committees
 - 50+ Expert Task Groups
- Since the beginning of the program:
 - More than 700 committee members
 - More than 400 contractors: private, academic, public
- State DOT involvement:
 - 40 states have participated in SHRP 2 committees
 - 37 states are involved with 119 field activities: pilots, development of specifications, data collection, etc.

Research to Implementation



Research Development Implementation

Research responds to known transportation challenges

A research product emerges and is refined through pilots and other activities

Potential implementation explored through knowledge transfer

Partner agencies select, prioritize, and prepare product for implementation

Product is marketed to users and integrated into standard practice

Research Program Status

- 131 contracts awarded; 51 complete
- 72% of contract work invoiced/paid
- 112 reports published or in production/review with many more still to be written
- 40 web tools, databases, software applications



Renewal: Strategic Rationale

- **Facilities are aging, users depend on them:**
 - Renew infrastructure quickly
 - Have minimal impact on users
 - Produce long-lasting facilities
- **We know how to do this—on special projects**
- **What keeps us from doing it consistently across the system?**
 - Lack of standard methods, specs
 - Lack of reliable performance/usage information
 - Human/institutional challenges
- **SHRP 2 seeks to overcome these obstacles**



Examples of Renewal Topics

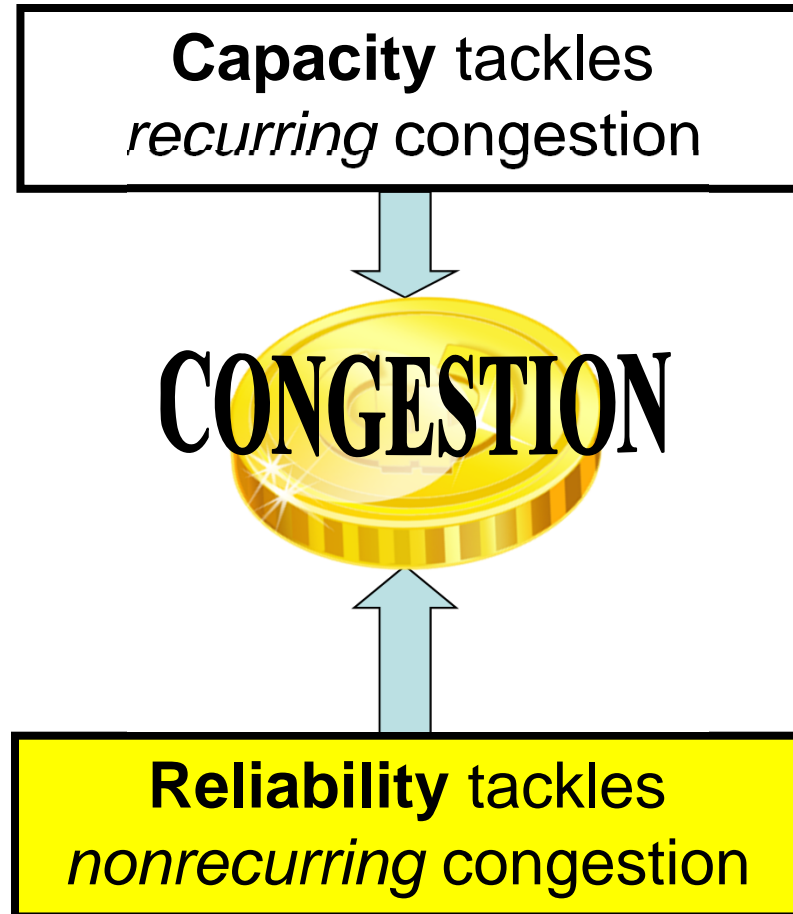
- 100-year bridges
- Composite and modular pavements: composite, modular, in-place
- High-speed non-destructive testing
- Utility location technologies
- Risk manual for innovative contracting
- Collaborating with utilities and railroads
- Reducing personnel fatigue

Renewal Research Highlights

- Pilots, demos, field tests for several products:
 - Utilities location products: VA, MD
 - Work Zone Impact and Strategies Estimator (WISE): FL, NY
 - Model specs/guidelines for precast concrete: Illinois Tollway
 - Web-tool for using existing pavement in place: WA
 - Risk management, bridge design, pavement technology: NY
- Public release of several web-based tools:
 - Geotechnical tool information and guidance: GeoTechTools
 - Renewal strategies for the design and construction of long-life pavements



Reliability & Capacity





Reliability Strategic Rationale

- **Non-recurring events account for more than half of congestion**
 - Impact of these events on users is reduced travel time reliability (TTR)
 - TTR is valuable to users
 - TTR is a good tool to measure performance and develop and target improvements
- **What do we need to effectively use TTR?**
 - Ways to measure and monitor TTR
 - Integration of TTR into modeling, planning, programming, and design.
 - Ops-oriented business practices, training



Reliability Project Themes

- Data, Metrics, Analysis and Decision Support
- Institutional Change, Human Behavior and Resource Needs
- Incorporating Reliability in Planning, Programming and Design

Reliability Research Highlights

- Pilots of tools to integrate travel time reliability (TTR) into agency activities: CA, MN, FL, WA
 - Data collection and monitoring programs
 - Performance measures for planning and programming
 - Costs/effectiveness of highway design features to improve TTR
 - Incorporation of non-recurrent congestion factors into the HCM
 - Improved economic analysis tools.
- Support for dissemination of SHRP 2 TTR work:
 - Knowledge transfer system about SHRP 2 Reliability products
 - Regional Operations Forums to provide education and training to transportation agencies on SHRP 2 Reliability products
 - An archive of SHRP 2 data for use by future researchers



Capacity Strategic Rationale

- **Sometimes you just need more highway**
- **Why don't we get it when we need it?**
 - **Multiple independent decision points that must collectively satisfy a range of goals: engineering, economic, environmental, community**
 - **Decisions to be “lost” or revisited, which can cause opposition and delay**
- **Facilitate and expedite key decisions: get the right information to the right people at the right time, avoid re-do loops**



Signature Product: TCAPP

- Transportation for Communities—Advancing Projects through Partnerships
- Web tool uses a systems approach to collaborative decision making:
 - Integrate mobility, economic, environmental, community goals
 - Ensure that the right people are at the table at the right time with the right information
 - Focus on decisions
 - Based on successful practices that others can replicate
- AASHTO nation-wide assessment complete



Capacity Research Highlights

- Pilots in SC, OR (statewide), Portland metro area, Charlottesville metro area test applications related to:
 - Greenhouse gases
 - Corridor planning and project development
 - Long-range planning and performance measurement
 - Environmental permitting and NEPA
- Hosting second international Freight Demand Modeling and Innovation Forum
 - Advance state of the practice in freight demand modeling and freight data
 - Particular focus on having public sector modeling better reflect private supply chain behavior.



Safety: Strategic Rationale

- **Driver behavior is key:**
 - Primary factor in two-thirds of crashes
 - Contributing factor in more than 90% of crashes
 - Hardest to study; the thing we know the least about
- **Opportunity: Naturalistic Driving Study (NDS):**
 - Miniaturized sensor technologies & increased computing capacity: can observe real-world driving
 - Method proven with 100 car study at VA Tech
 - Crash, pre-crash, near-crash, and “normal” driving data
- **SHRP 2 scales up NDS for more robust results**
 - 3100 drivers, 6 sites, all ages
 - Data to be available for other researchers for decades

SHRP 2 NDS Design Overview

- 3,100 primary drivers, all age/gender groups.
- 3,900 data years; 2.5M trip files
- 3 years of data collection (some participants for 1 year, some for 2 years)

- All light vehicle types

- Passenger Cars
- Minivans
- SUV
- Pickup Trucks
- Advanced technology vehicles

- 6 sites

- 12,500 center-line miles of roadway information
- Cell phone records, supplemental data



SHRP 2 NDS Data: Summary

- Driving data: from instrumentation
- Driver data: from questionnaires, tests
- Vehicle data: vehicle inspection
- Roadway data: mobile data collection van
- Crash data: detailed investigations
- “Context data”: (supplemental data) crash history, weather ...



Example Uses of NDS Data

- **Laws on use of hand-held devices by teens**
- **Vehicle design: safe use of new technologies; evaluation of crash warning algorithms**
- **Education: feedback to teens and parents**
- **Roadway design**
- **Planning, highway operations, fuel efficiency, environmental effects**
- **Psychology of driving**

Camera Views



Safety Research Highlights

- As of mid-June: 1934 participants on the road; 3.2 million trips; 386 crashes; 10,560 CL miles of roadway data
- Verizon and AT&T agreed to provide cell phone records directly to the study with the permission of participants. Participants with other carriers can request their own records and send them to SHRP 2.
- Inquiries from 20+ organizations interested in using data: federal agencies, transportation associations, automobile manufacturers, universities, and private sector companies
- Rolled out web-site last week for pilot testing group



Initial Analysis Projects

- **Rural 2-lane curves** – Iowa State University
 - Ex. App : more cost-effective roadway measures to prevent crashes
- **Offset left-turn bays** – MRI Global
 - Ex. App: cost-effective intersection design
- **Driver inattention** – SAFER, Chalmers Univ.
 - Ex. App: vehicle technology to track driver attention, warn distracted drivers

NRC Committee on Long-Term Stewardship of SHRP 2 Safety Data

- Provide policy and technical advice on strategies for meeting long-term requirements of SHRP 2 safety data
- Recommendations may address:
 - Resource requirements
 - Administrative and oversight structures, including institutional arrangements and legal requirements
 - Database management and security
 - User access and support
- Chair: Joe Schofer, Northwestern U.

Status of Committee Work

- First committee meeting: February 19, 2013
- First letter report: May 3, 2013
 - Take a phased approach
 - Phase 1 includes operating the databases and performing pilots and studies to support decisions about future phase(s)
 - Concur with Volpe report on NRC ownership of the data (for phase 1)
- Agreement in concept from FHWA, AASHTO, NHTSA, SHRP 2 Oversight Committee
- Conditional agreement from NRC

SHRP 2 DNA: Success Factors

- Customer-oriented goals
- Stakeholder-driven agenda: research needs identified by state DOT and industry leaders
- User/stakeholder/expert-guided programming, budgeting, monitoring, review of results
- Portfolio approach: from new knowledge to practice tools to allow existing innovations to be more widely used
- Focus on strategic objectives required:
 - Expertise of multiple disciplines
 - Coordination among tiered committees
 - Active management by and involvement from staff
 - Inclusion of business practice as well as technical innovations
 - Collaboration of non-DOT stakeholders

Challenge

- Sustainability of information technology (IT) products:
 - Websites
 - Web tools
 - Software
 - E-books/guides
- Increasingly, this is how knowledge is being embodied and communicated
- Issues:
 - Hosting
 - Updating (content, software, hardware) and “retirement”
 - User support
 - Integration and compatibility among systems and products
- Existing models and mechanisms seem inadequate