








Improving Travel Time Reliability

OCTOBER 2011

Travel time reliability is an emerging topic that is increasingly important to understand because of the benefits it can offer. Reliable travel times are related to improved safety, efficiencies for freight transport, and improved quality of life for road users who experience less delay and frustration. Unreliable travel times are caused by recurring congestion (bottlenecks and poor traffic signal timing) and nonrecurring congestion (traffic incidents, weather, work zones, and special events). Managing these challenges and achieving the benefits of reliability will require a common understanding among transportation policy makers and professionals regarding the concept of travel time reliability and the methods by which it can be improved. SHRP 2 Reliability research is developing products that transportation professionals can use to improve travel time reliability, including tools to

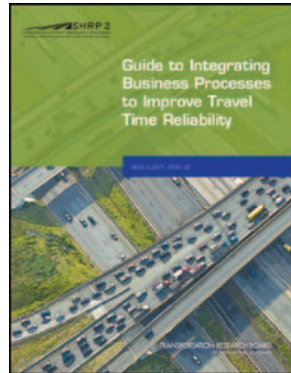
- change business processes to support travel time reliability,
- monitor travel time reliability and usefully preserve the data,
- evolve the institutional arrangements of agencies,
- improve traffic incident scene management, and
- improve overall systems operations and management.

New Tools for Reliable Travel Times

7 Causes of Nonrecurring Congestion		SHRP 2 Products
	Incidents	Regional Operations Academy to help mainstream operations strategies. Executive workshops to convey the value of operations strategies to agency mission. Interagency Training for incident responders.
	Weather	Travel Information guide and analysis tool for selecting design treatments that improve reliability. Part of a new method to address reliability in the Highway Capacity Manual.
	Work Zones	Tools for travel time monitoring. Models for real-time congestion management.
	Fluctuation in Demand	Performance Measures. Value of Reliability. Incorporating reliability into planning & programming. Economic evaluation model.
	Special Events	Travel time monitoring. Organizational strategies to improve travel time reliability. Improving data for traveler information.
	Traffic Control Devices	Reliability Monitoring Systems. Methods for estimating capacity of urban streets.
	Inadequate Base Capacity	Guide for geometric designs that advance reliability. Analytical model for assessing effectiveness of strategies. Ways to incorporate reliability into planning & programming.

How can we change business processes to improve travel time reliability?

The *Guide to Integrating Business Processes to Improve Travel Time Reliability* was developed from research that used business process modeling notation to map traffic operations business processes. The guide examines the integration of business processes at the two key levels: operational and programmatic. It provides a step-by-step guide for agencies to assess their operational processes and identify opportunities to change or develop new processes. The guide is not specific to any one process. Its purpose is to assist any agency that is seeking to improve travel time reliability through improved coordination and integration of multiple processes and agencies.



The guide will be useful to managers within state and local agencies who are responsible for overseeing operations programs for traffic management, maintenance, traveler information, and incident response and management. The content and context of operational processes described in the guide are focused on managers who develop programs, who liaise with internal and external departments within a department of transportation or law enforcement agency, and who can influence programmatic components. Their responsibilities would include recommending training needs, recommending or developing policy, or requesting funding through programming processes.

SHRP 2 Reports S2-L01-RR-1: *Integrating Business Processes to Improve Travel Time Reliability* and S2-L01-RR-2: *Guide to Integrating Business Processes to Improve Travel Time Reliability* are available as Adobe PDFs on the SHRP 2 website and in hardcopy through the TRB bookstore. Information from the guide will be used to make stand-alone software that agencies can use to integrate business processes to improve travel time reliability.

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How can we monitor travel time reliability and convey that information to customers and data users?

A guidebook is being developed in SHRP 2 project L02: Establishing Monitoring Programs for Mobility and Travel Time

Reliability that practitioners can use to design, build, operate, and maintain a reliability monitoring system. Project L02 developed analytic methods for matching historical travel time patterns under different situations. The guidebook can help operating agencies develop systems (that is, hardware, software, and strategies) that can monitor travel time reliability and convey information to customers and other data users. It will include methods for extracting segment and route-level travel time reliability information, methods for combining segment-level travel time density functions into route-level density functions, and new techniques for system detectors to report information. The guidebook will be published in 2012.

A follow-on project will take these analytic methods and extend them to increase their usefulness for real-time operations and to enable system operators to better characterize the nature of unreliability, predict the effect on road users, diagnose the cause(s) of unreliability, and be more timely and responsive in managing the highway network—for example, changing traveler information on changeable message signs or updating the messages that reach mobile phones.

The final product is expected to improve the ability to manage highway condition in near-real time. It will be valuable to those responsible for systems operations and management (SO&M) in real time, such as key personnel in traffic management centers.

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How can we evolve institutional arrangements to better suit the special demands of congestion management?

SHRP 2 Project L06: Institutional Architectures to Advance Operational Strategies undertook a comprehensive and systematic examination of the way agencies could be organized to successfully execute operations programs that improve travel time reliability. SHRP 2 discovered how the Capability Maturity Model (CMM), which is used in the information technology field for organizational self-assessment and continuous improvement of quality and reliability, can be applied to an organization to improve operations and travel time reliability. The CMM was used to develop the *Guide: Institutional Architectures to Support Improved Congestion Management*. The guide starts with agency self-evaluation to determine the current state of play and provides related appropriate incremental strategies for evolving toward institutional arrangements most supportive of congestion management. The Institutional Capability Maturity Model is presented in a series of steps and strategy matrices that can be used to improve the effectiveness of SO&M.

This guide can be used by any organization with responsibility for management and operations of highways. The guide can support transportation agencies in developing institutional arrangements suitable to the special demands of congestion management, now emerging as a new transportation agency priority.

SHRP 2 Report S2-L06-RR-2: *Guide: Institutional Architectures to Support Improved Congestion Management* will be published in November 2011. SHRP 2 Report S2-L06-RR-1: *Institutional Architectures to Improve Systems Operations and Management* will be published in December 2011.

SHRP 2 established the foundation of applying the CMM to SO&M, and others are already building on this work. The American Association of State Highway and Transportation Officials (AASHTO) supported the conversion of the SHRP 2 Reliability Project L06 research into a web-based tool that is user friendly, easy to access, and updatable. This work was done under the Transportation Research Board's NCHRP Project 03-94: *Transportation Systems Operations and Management Guide*. The web tool, *Systems Operations and Management Guidance*, is available on the AASHTO website at www.aashtosomguidance.org. At the same time, under Phase 2 of the SHRP 2 L06 project, workshops with state DOTs and metropolitan areas are being conducted to validate the research and the findings will be incorporated into the web material.

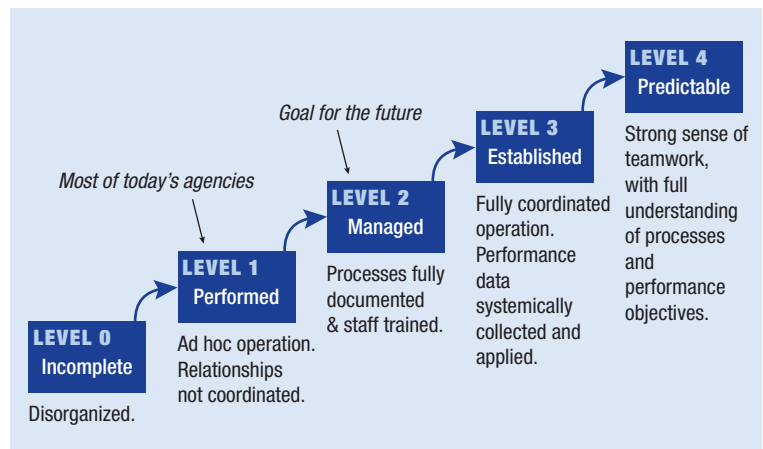
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How can we improve traffic incident scene management?

SHRP 2 Project L12: *Improving Traffic Incident Scene Management* was designed to establish the foundation for and promote certification of responders to achieve the three objectives of the Traffic Incident Management National Unified Goal: responder safety; safe, quick clearance; and prompt, reliable, interoperable communications. The intent of this project was to motivate responders from different stakeholder groups—law enforcement, fire and rescue, emergency medical services, U.S. department of transportation, towing and recovery, and notification and dispatch—to acquire a common set of core competencies that promote a shared understanding of the requirements for achieving the safety of responders and motorists, quick response, and effective communications at traffic incident scenes.

Products of this research include a training and certification course for traffic incident responders, a train-the-trainers course for incident responders and managers,

Levels of the Capability Maturity Model



e-learning for traffic incident responders and managers, an interdisciplinary train-the-trainers post-course assessment tool, and a marketing plan for the training course. These products integrate the roles of all responders and help to establish priorities and reinforce interagency cooperation. They will strengthen the incident management programs currently offered by response agencies and offer a common denominator in providing training to the trainer community. Additionally, these products are expected to enhance quick clearance efforts and ensure responders' as well as motorists' safety. The products will be available in 2012.

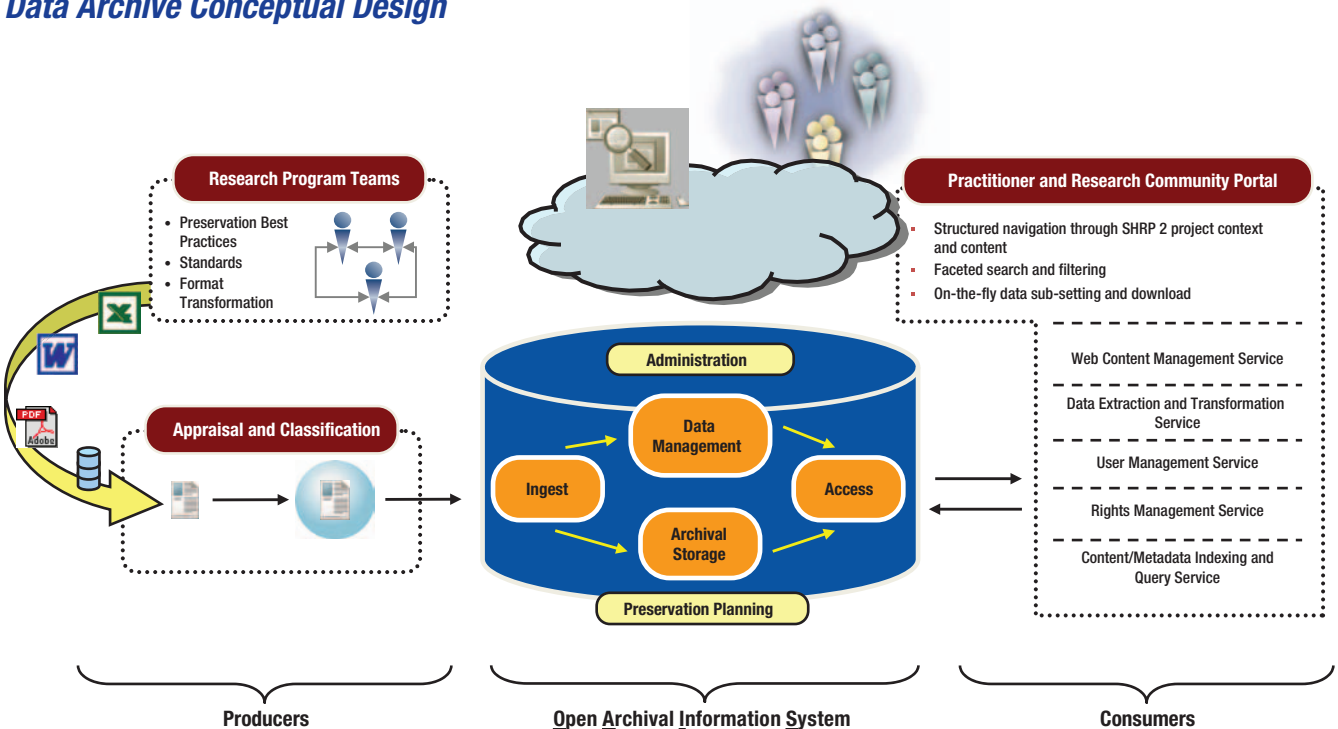
Pilot tests were conducted in Indiana and Georgia as part of this research project. More pilot tests are planned that will further refine the training courses. Marketing activities will be carried out to implement these training courses nationally.

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Pilot test of training course in Gwinnet County, Georgia



Data Archive Conceptual Design



How can we preserve data from Reliability research?

SHRP 2 Reliability projects will generate a wealth of data. To ensure that this data remains accessible for decades, SHRP 2 is developing the Capstone Reliability Data Archive. The archive will make data from SHRP 2 Reliability projects and other related projects readily available to researchers and practitioners for more than 25 years.

The archive has two groups of target audiences:

- University faculty, staff, and students in civil engineering, transportation planning, and logistics/supply chain management who conduct research on travel time reliability and closely related topics
- Researchers from private consulting firms and other private enterprises involved in analyzing and modeling travel time reliability and closely related topics

A feasibility study was conducted, which determined that creating such an archive is feasible and recommended three alternative methods of creating the archive. A follow-on project will create the actual archive and help researchers archive their data. The project team is currently reexamining the findings of the feasibility study to determine the best way to proceed in creating the archive.

SHRP 2 Report S2-L13-RW-1: *Requirements and Feasibility of a System for Archiving and Disseminating Data from SHRP 2 Reliability and Related Studies* is available as

an Adobe PDF document. The expected completion of the archive is June 2014.

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How can we improve overall systems operations and management?

Travel time reliability is not a stand-alone topic, but an integral part of SO&M. To facilitate the use of products from SHRP 2 Reliability research to improve overall SO&M, SHRP 2 is creating the Knowledge Transfer System (KTS) in project L17: A Framework for Improving Travel Time Reliability. The KTS will integrate products from SHRP 2 and other sources of SO&M information into a web-based product, but information will also be shared through workshops, peer exchanges, blogs, forums, and other social media. The KTS will provide the umbrella structure needed to incorporate the many individual elements of SO&M. It will transfer both explicit and anecdotal information. It will include content in the form of documents, reports, and other published information.

The KTS will support the development of a more reliable transportation system. It is being created for four principal audiences: policy makers, practitioners, researchers, and travelers. The first version of the KTS is expected to be complete in February 2012. Products from the SHRP 2 Reliability program will be integrated into the KTS as they are completed.

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