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Spreading New Ideas from Peer to Peer

*Domestic Scan Program
Confirms Its Benefits*

Also in This Issue:

- States Improvise to Improve Services
- Reinforcing the Workforce Pipeline
- Managing Staff: An Online Resource



Tracing Innovation's Spread

Impacts of the Domestic Scan Program

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Innovation is the application of new ideas confirmed through research or developed through the efforts of practitioners to improve performance. When innovation spreads, the improvements benefit everyone involved. Helping transportation professionals learn about the innovations that their colleagues have applied successfully on the job and that boost performance for system users can accelerate the spread of innovation.

Experience and research show that peer-to-peer communication is one of the most effective ways of learning. The National Cooperative Highway Research Program (NCHRP) has established a U.S. Domestic Scan Program that relies on travel and other methods to create the person-to-person links that facilitate learning and the spread of innovation.

The domestic scan program works to hasten the movement of tested new ideas into widespread practice. The program arranges person-to-person contact between peers who deal with similar problems in different agencies. Participants learn firsthand from colleagues around the country about successful new ideas and practices and then return home to spread the word about what they have learned to colleagues in their own agencies and in professional and trade organizations.

Scan team members and hosts develop professional connections that reach across agencies and geography—connections that persist and grow. By facilitating these connections, the domestic scan program serves as an engine for implementing innovation.

(Above:) The Escambia Bay Bridge in Florida was included in a 2009 scan on accelerated construction techniques. Heavily damaged by Hurricane Ivan, the bridge reopened within three months of the storm thanks to a prefabricated steel bridge system.

(Right:) The 2009 scan on bridge management decision making included a visit to Ohio DOT and a review of the state's bridge maintenance program. Scan participants learn best practices firsthand and disseminate them to colleagues in their home states.



PHOTO: OHIO DOT

History and Precedent

NCHRP launched the domestic scan program as a continuing activity in January 2008.¹ The NCHRP project panel recognized that departments of transportation (DOTs) and other transportation agencies around the country are evolving and discovering new ways to do their jobs. The panel was tasked with designing a program to find and disseminate these discoveries, leading to high returns on the investment of research dollars.

"The goal of the domestic scan program is to facilitate technology transfer," observes panel chair Harold R. (Skip) Paul, Director of the Louisiana

¹ NCHRP Project 20-68A, U.S. Domestic Scan Program, initiated December 27, 2007. www.trb.org/TRBNet/ProjectDisplay.asp?ProjectID=1570.



Roadway tunnels scan team members (*back row, left to right:*) Louis Ruzzi, Pennsylvania DOT; Michael G. Salamon, Colorado DOT; Jesus M. Rohena, FHWA; Mary Lou Ralls, Ralls Newman, LLC; Melissa Jiang, Arora and Associates; Barry B. Brecto, FHWA; Kevin Thompson, Caltrans; Fulvio Tonon, University of Texas at Austin; (*front row, left to right:*) Alexander K. Bardow, Massachusetts Highway Department; and Bijan Khaleghi, Washington State DOT.

Transportation Research Center. “We have lots of great knowledge and innovation in transportation throughout the country, and we want to see it spread around.”

NCHRP engaged Cambridge Systematics, Inc., to develop a business plan for the domestic scan program² and to conduct two pilot scans as a proof of the concept. The two pilots, on right-of-way (ROW) acquisition and utilities relocation³ and on transportation asset management⁴, provided a basis for estimating the costs and time requirements for the

² NCHRP Project 20-68, U.S. Domestic Scan Program, Final Business Plan, Cambridge Systematics, July 2005. www.trb.org/NotesDocs/20-68_FR.pdf.

³ http://onlinepubs.trb.org/onlinepubs/trbnet/acl/FR1_NCHRP2068_Right-of-Way_all-in-one.pdf.

⁴ http://onlinepubs.trb.org/onlinepubs/trbnet/acl/NCHRP2068_Domestic_Scan_TAM_Final_Report.pdf.

program.⁵ Since then, NCHRP has completed 12 additional scans, and seven others are in progress or planned.

As a continuing NCHRP project activity, the domestic scan program is funded primarily by the state DOTs through the American Association of State Highway and Transportation Officials (AASHTO); AASHTO's Standing Committee on Research has allocated \$500,000 annually since the full program's initiation. The NCHRP Project 20-68A panel oversees the program as a whole, defining scan topics from suggestions submitted via state DOTs and FHWA and reviewing the program's overall progress and direction (see list of project panel members, page 8). Producing the scan and preparing the report are the responsibility of a consultant team led by Arora and Associates, PC, with Harry A. Capers, Jr., serving as principal investigator.

The panel selects cochair to plan and conduct each scan; the cochair in turn select 8 to 10 scan team members. A subject matter expert works with the team to conduct a desk scan—that is, a limited, office-based, preparatory gathering of information—to define the duration and technical structure of the scan and to explore factors likely to influence the planning of the scan. The subject matter expert also prepares technical materials and drafts the final report. An online document, Prospectus and Status of Programmed Scans, includes complete details on the domestic scan program.⁶

What Is a Scan?

A scan involves a person-to-person exchange in a setting that facilitates “hands-on” learning about the methods, practices, and tools that represent the ideas to be shared. Experience and research show that engineers and other technology professionals prefer to learn from peers and are more likely to accept new ideas when they can see that the ideas work.

A group of 8 to 10 scan team members visit innovative agencies on a one- to two-week tour, meeting with the staff who were involved in developing and implementing the new ideas. A subject matter expert (SME) works with the scan team members, initially conducting what is termed a desk scan to identify sites and individuals to be visited, the duration of the scan, and the technical structure. The SME acts as recording secretary during the scan and produces a report from the team's observations and conclusions. This format is termed a Type 1 scan.

NCHRP is experimenting with other formats to learn if the objectives may be achieved at lower cost and with less demand on scan team members who must take time from their usual jobs. A Type 2 scan brings representatives of innovative agencies to one or more central locations to meet in a forum with the scan team. A Type 3 scan supplements the desk scan with a 1- to 2-day workshop that brings together the scan team and representatives of the innovating agencies.

Person-to-Person Exchange

The scan process complements published research and professional conferences by reducing the time lag between the successful application of a new idea and the point at which others learn about that new idea. The scan serves as a forum for knowledgeable practitioners to discuss, debate, and synthesize recent applied research in terms of their own experience.

A scan can be planned quickly and carried out while the ideas and experiences are still fresh. Scan participants are encouraged to take home the ideas for use in their own agencies and are asked to develop implementation plans (see box, page 7). This emphasis on successful transfer of innovative technology and practice is the primary goal and hallmark of the program.

⁵ See Porter, C. Scanning the Home Front for Transportation's Best Practices: Program Facilitates State Agency Exchange of Information, Technology, *TR News*, May–June 2008 (No. 256), pp. 3–9. <http://onlinepubs.trb.org/onlinepubs/trnews/trnews256.pdf>.

⁶ http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-68A_Prospectus.pdf.

A typical scan first involves the selection of a team of practitioners who are able to understand the value of what their colleagues are doing. Field visits follow, allowing the team to observe the promising practices and to meet with the local practitioners who have developed and applied the new ideas. The scan team's members can identify issues related to development and application and can assess the opportunities and methods for technology transfer.

"Conference calls and webinars are great, but talking with your peers in person has definite advantages," notes Michigan DOT Director Kirk Steudle, who cochaired the transportation asset management scan.

A byproduct of the scan experience is the development of professional relationships among the participants and the network of personal contacts among peers in the host and visiting agencies. These person-to-person links can remain valuable for years after completion of the scan.

Realizing the range of benefits—for the agencies that send their staff on a scan, the agencies that host a scan team, and the individuals who participate—takes time. Therefore, individuals selected to a scan team should not be close to retirement. The domestic scan program represents an investment in the participants.

Motivating Change

Although spreading ideas is crucial, the goal is the implementation of new technologies and practices. Scan team members are encouraged to use what they learn from visits to sites with new technologies at work, from their conversations with practitioners, and from their own experience to probe the conditions for the innovation's success. They are asked to



PHOTO: DOMESTIC SCAN PROGRAM

A scan team takes a close look at roadway tunnel innovations and practices. As a complement to published research, a scan provides an opportunity for knowledge to be shared face-to-face and quickly transformed into practice.

Scanning the Range of Business Concerns

Two successful pilot scans in 2006 led to the funding of the ongoing U.S. Domestic Scan Program through NCHRP Project 20-68A. The first six scans that were launched after the pilots are the subject of an evaluation study by CTC & Associates LLC, *Accelerating the Rate of Innovation Among State DOTs—Tracing Domestic Scan Impacts*, which started in May 2010. An additional 13 scans are in progress or have been completed. For more details, see the online *Prospectus and Status of Programmed Scans*.^a

Following are the topics and dates of domestic scans:

- ◆ Transportation Asset Management (pilot), August–September 2006
- ◆ Right-of-Way and Utilities Relocation (pilot), July 2006
- ◆ Project Delivery Management, February–March 2009
- ◆ Accelerated Construction Techniques, March 2009
- ◆ Winter Maintenance, March–April 2009
- ◆ Bridge Management Decision Making, May–June 2009
- ◆ Managing STIPS, TIPS, and Metropolitan Transportation Plans in Response to Fiscal Constraints, June 2009
- ◆ Addressing NPDES and Other Water Quality Issues in Highway System Management, July 2009
- ◆ Maximizing Traffic Flow on Existing Highway Facilities, November 2009
- ◆ Work Zone Assessment, Data Collection, and Performance Measurements, March 2010
- ◆ Quality Control–Quality Assurance of Design Plans, October–December 2010
- ◆ Solutions for Lane Departure Avoidance and Traffic Calming, November–December 2010
- ◆ Successful Strategies for Motorcycle Safety, March–April 2011
- ◆ Roadway Tunnel Design, Construction, and Maintenance, August–September 2009
- ◆ Risk-Based Forecasts of Land Volatility for Corridor Management and Sustainable Communities, October–November 2011
- ◆ Addressing Access and Parking Needs of Nonresident Users of Rail and Intermodal Transportation Stations in Transit-Oriented Developments, June 2011
- ◆ Performance Measuring for Highway Maintenance and Preservation, October 2011
- ◆ Supporting Traffic Incident Management Through Integrated Communication Between Traffic Management Centers and Law Enforcement and Effective Performance-Measurement Data Collection, April 2012
- ◆ Regional, Multiagency Traffic Signal Operations Management, November 2011
- ◆ Privatization of Maintenance Functions, June 2012
- ◆ Performance of Accelerated Bridge Construction Connections in Bridges Subjected to Multihazard and Extreme Events, April 2012

^a http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-68A_Prospectus.pdf or <http://domesticscan.org/>.

look for avenues to profitable application in their home agencies and elsewhere.

At the end of the tour, participants develop implementation plans, outlining the short- and long-term efforts to undertake in facilitating the transfer of information to their home institutions. These activities may include presentations to internal groups or to meetings of the Transportation Research Board

(TRB) and AASHTO, shepherding the technologies to implementation, or empowering others to take on the task (see box, page 7.)

“The implementation plans are a key component of the scans,” notes Crawford Jencks, Deputy Director of TRB’s Cooperative Research Programs. “They represent the difference between gathering information and making real change within agencies.”

Typical Scan Itinerary

Each domestic scan tour entails visits to five to seven states; depending on the topic, team members also may visit several cities within a state to gain the perspective of local transportation practitioners. The scan tour organizer, Arora and Associates, PC, designs the itinerary for maximum travel efficiency and cost-effectiveness—travel often is completed after normal business hours.

The itinerary for the scan of Best Practices in Addressing National Pollutant Discharge Elimination System and Other Water Quality Issues in Highway System Management is shown below.

Date	Day	Time	Activities
7/11/09	Saturday		Team members fly to Buffalo, N.Y.
7/12/09	Sunday		Team members fly to Buffalo
		Evening	Team meeting
7/13/09	Monday	a.m.	Meetings with New York State DOT
		p.m.	Meetings with New York State DOT
		Evening	Fly from Buffalo to Baltimore, Md.
7/14/09	Tuesday	a.m.	Meetings with District DOT in Washington, D.C.
		p.m.	Meetings with District DOT
		Evening	Drive from Washington, D.C., to Baltimore
7/15/09	Wednesday	a.m.	Meetings with Maryland SHA in Baltimore
		p.m.	Meetings with Maryland SHA
		Evening	Fly from Baltimore to Raleigh, N.C.
7/16/09	Thursday	a.m.	Meetings with North Carolina DOT
		p.m.	Meetings with North Carolina DOT
7/17/09	Friday	a.m.	Meetings with North Carolina DOT
		p.m.	Meetings with North Carolina DOT
7/18/09	Saturday	a.m.	Fly from Raleigh to Austin, Tex.
		p.m.	Team meeting
7/19/09	Sunday	a.m.	No assignment
		p.m.	No assignment
7/20/09	Monday	a.m.	Meetings with Texas DOT in Austin
		p.m.	Meetings with Texas DOT
7/21/09	Tuesday	a.m.	Meetings with Texas DOT
		p.m.	Fly from Austin to Orlando, Fla.
7/22/09	Wednesday	a.m.	Meetings with Florida DOT and Florida Turnpike
		p.m.	Meetings with Florida DOT and Florida Turnpike
7/23/09	Thursday	a.m.	Meetings with Florida DOT and Florida Turnpike
		Evening	Meetings with Florida DOT and Florida Turnpike
7/24/09	Friday	a.m.	Final team meeting
		p.m.	Final team meeting
		Evening	Team members fly back home

Tracing Impacts

Although scan participants have been enthusiastic about their experiences, and although the theoretical arguments for the value of domestic scans are ample, the NCHRP oversight panel has recognized that solid evidence must justify the program’s continuation. Does a scan facilitate the spread of new ideas, and does the effect extend beyond the immediate group of participants? Are the technologies and practices described in scan reports implemented with good effect in agencies that have learned about the findings?

The panel contracted with CTC & Associates LLC under NCHRP Project 20-68B to trace the technology transfer and implementation resulting from the domestic scans. CTC started with the pilot scans, surveying and interviewing scan team members, host agency personnel, and others who had direct contact with scan participants.

A report, *Accelerating the Rate of Innovation Among State DOTs—Tracing Domestic Scan Impacts*, documents the results of the initial effort.⁷ The report traces the impacts of the ROW acquisition and utilities relocation and the transportation asset management pilot scans and investigates the depth and breadth of the technology transfer. After reviewing the initial findings, the project panel asked CTC to continue investigating the other completed scans.

CTC has documented direct and indirect experiences with the scans, the relative success of the

⁷ http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-68B%2801%29_FR.pdf.



A scan on roadway tunnels featured the Devil’s Slide Tunnel near San Francisco, a double-bore tunnel that

implementation activities, and observations and insights on the effectiveness of the scan program. To investigate the secondary impacts of the scans, the researchers interviewed people who had not participated directly in a scan but who had contact with participants, exploring the ripple effects that are a hypothetical strength of the person-to-person model of technology transfer.

Seeing Is Believing

The research is proving that the ripple effects are more than hypothetical. Participants consider the contacts and communication with peers from other states and regions to be major benefits of the scan. The team members judge the experience of the scan itself as indispensable, providing an opportunity to interact directly with those who developed the relevant technologies.

In addition, the scan participants become believers in the new ideas they encounter on the scan, and this turns them into champions determined to apply what they have learned and to tell others about the opportunity. Many scan team members have direct oversight of implementation efforts within their own agencies and promote scan results by giving presentations, serving on professional committees, and providing their personal testimony in other venues.

Nearly all of the participants surveyed about the value of their participation in the domestic scan program have cited the connections and resources gained through the intense experience. The scan tours were physically and mentally challenging, but all participants agreed that the tours were productive. More than two years later, team members cited specific ideas from the scan that had contributed to improving their departments' performance.

"Talking to the people who made it happen makes all the difference," states John Sherman of Wyoming DOT, a participant in the ROW acquisition and utilities relocation scan.



PHOTO: DOMESTIC SCAN PROGRAM

is under construction and scheduled to open this year. It will be the longest tunnel in California.

PHOTO: UTAH DOT



Current and Future Directions

The examination of the impacts of the pilot scans was the first stage of a program to monitor the impacts of all of the domestic scans. In May 2010, CTC & Associates LLC began to conduct interviews and to survey participants in other scans. The research team created a domestic scan program website to serve the scan participants and to open the scan activities to a wider audience, <http://domesticscan.org>.

Practical impacts of the winter maintenance scan in 2009 included implementation of a maintenance decision support system, a GPS-automatic vehicle location pilot program for a snowplow fleet, and expanded tow plow use.

Implementing Scan Findings

To underscore the importance of spreading scan technologies beyond the team members, each scan tour concludes with the development of an implementation plan. The detailed plans appear in the final report and identify activities to be undertaken, the person or persons responsible, and a target completion date. The scan tour organizer, Arora and Associates, PC, tracks the implementation activities, with follow-up by CTC & Associates, tasked with tracing the impacts of the scans.

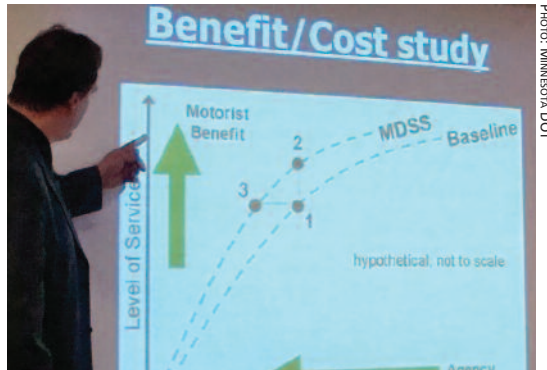
◆ **Presentations** of scan technologies and practices at state, regional, and national meetings are the most common implementation activities. Scan team members have made presentations to AASHTO committees and subcommittees, local meetings of the Institute of Transportation Engineers, TRB meetings, and to industry groups, such as the American Road and Transportation Builders Association and the American Public Works Association.

◆ **Webinars**, either as single sessions or as a series, have tapped scan team members to present and comment on their findings to interested practitioners, with an opportunity for questions. Many of these webinars are archived and available for replay.

◆ **Articles** in agency and trade publications, such as *Focus*, *Public Roads*, and *Roads & Bridges*, have provided detailed descriptions of the technologies and practices explored on the scans.

◆ **Direct personal contact** with individual colleagues—an activity not usually specified in the implementation plans—is an effective means for scan team members to transfer the benefits of the new technologies and practices experienced on the tour.

Representatives from Minnesota DOT presented a benefit–cost analysis of maintenance decision support systems to the winter maintenance scan team.



The researchers collect feedback from scan participants approximately six months after the scan report is issued, to learn about the participants' implementation and dissemination activities and to gain contact information for those who are working on implementing the scan technologies but who did not participate directly in the scan. In addition, researchers survey those who had been briefed by members of the original scan team, to trace how the impacts of the scan move out—and perhaps take on new life in new locations.

The researchers host a webinar with members of the scan team and the NCHRP project panel to review the collected feedback and to discuss the successes and challenges that team members have encountered in their implementation activities. The final report tracing the impacts of the first six scans is posted on the website.⁸

For example, team members on the project

⁸ <http://domesticscan.org/wp-content/uploads/NCHRP20-68B02-Final-Report-December-2011.pdf>.

U.S. Domestic Scan Program Project Panel

Selected by TRB and AASHTO, the oversight panel for NCHRP Project 20-68 provides a variety of perspectives on DOT innovation and on the dissemination of new ideas:

- ◆ Harold R. (Skip) Paul, Louisiana Transportation Research Center, *Chair*
- ◆ Shane Brown, Washington State University
- ◆ Nancy Chinlund, California DOT
- ◆ Marsha Fiol, Virginia DOT
- ◆ Rick Kreider, Kansas DOT
- ◆ Glenn Roberts, New Hampshire DOT
- ◆ Amy Schutzbach, Illinois DOT
- ◆ Mark Van Port Fleet, Michigan DOT
- ◆ David M. (Mike) Burk, FHWA liaison
- ◆ Keith M. Platte, AASHTO liaison
- ◆ Mark R. Norman, TRB liaison
- ◆ Andrew C. Lemer, TRB staff

delivery management scan tour explained to investigators how they have used information from the scan to

- ◆ Develop a new project screening tool,
- ◆ Add to performance measures to assist in program delivery and to promote transparency and accountability, and
- ◆ Launch projects with the contracting practice of construction manager–general contractor, demonstrated in the scan.

As a result of practices seen firsthand during the scan on winter maintenance, participants had taken action to

- ◆ Start a Global Positioning System–automatic vehicle location pilot program for the snowplow fleet,
- ◆ Implement a maintenance decision support system, and
- ◆ Expand the use of tow plows, to clear a second lane with a single truck.

Team members on the scan to address National Pollutant Discharge Elimination System (NPDES) and other water quality issues in highway system management cited the following changes, among others that they were implementing:

- ◆ Adoption of the asset management tools from two host states to implement a stormwater retrofit program,
- ◆ Employing permeable friction course overlays to reduce pollutant discharge from freeways, and
- ◆ Beginning use of flocculants to prevent erosion and improve sediment control.

The NCHRP project panel has initiated an additional research effort to trace how the networks of links from scan team members to others develop over time and facilitate the spread of new ideas between and within agencies. This research will explore the characteristics of an agency's organization and management that may encourage adoption of new ideas to benefit the agency and its clientele of transportation system users.

AASHTO's Standing Committee on Research authorized the domestic scan program for a 6-year period. NCHRP expects to complete 19 scans and to have studied the impacts of all of these. The results to date indicate that continuation of the domestic scan program will receive serious consideration.