

Accelerating the Rate of Innovation among State DOTs
Tracing Domestic Scan Impacts

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Prepared by:

Dylan P. Casey, Patrick C. Casey
CTC & Associates LLC
Madison, Wisconsin

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Disclaimer

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Executive Summary

The objectives of this project are twofold: First, to trace the impacts of two pilot domestic scan tours at participating state transportation agencies in the two and a half years since the scans occurred; and second, to investigate the depth and breadth of the domestic scans' technology transfer effects among state DOTs broadly, looking for evidence that the reach extends beyond the immediate circle of initial participants. Finally, this research is intended to propose a plan for continued evaluation of the impacts of the NCHRP U.S. Domestic Scan Program.

The U.S. Domestic Scan Program is an effort to facilitate technology transfer and innovation among state departments of transportation and others through personal contact. CTC & Associates LLC was contracted to examine the long-term effectiveness of the two pilot scans conducted in 2006 on Right-of-Way Acquisition/Utility Relocation and Transportation Asset Management. We did so through a brief preliminary survey and subsequent telephone interviews of the original scan tour participants. Additionally, we were asked to look at the reach of the scan program as a mode of technology transfer and examine the social connections among those that participated in and were affected by the scans.

We successfully interviewed 17 of 22 scan participants from state DOTs and FHWA. Four participants either retired or left their departments shortly after the scan tours, and one was unavailable. In the initial survey of the participants, we found that most of the take-away findings from the scans are at least on the table for implementation, with many either in process or successfully implemented. Significant effort has been made toward implementing technical solutions, with mixed success due primarily to funding pressures. The primary roadblock to implementation of new technologies is funding. Since they require less capital investment, agencies are able to make structural, procedural and policy changes more successfully. High-cost innovations such as computer-based GIS tracking systems and bridge/pavement management systems are slower to be implemented, though many DOTs have them in development.

The following report contains articulated examples and details documenting both the primary and secondary effects of the scans that facilitate the implementation of innovative technologies and practices. Additionally, we include three case studies of successful implementations directly attributable to the scan tours.

Scan participants communicated the results of the scan through professional meetings (AASHTO, TRB and FHWA meetings were most common) and through informal discussions with colleagues at their departments, particularly regarding how to implement specific technologies and practices at their home DOTs. Additionally, working groups within these professional organizations, particularly the AASHTO Subcommittee on Transportation Asset Management, are significant avenues for continuing discussions of the results of the scan tours.

Participants considered the long-term effectiveness of the scan to lie primarily in the value of the contacts and communication with peers that they normally would not encounter. The scan itself was considered indispensable for allowing them to interact directly with those who developed the relevant technologies. For many, the scan tour was a welcome complement to the kinds of interaction facilitated at AASHTO and TRB meetings.

We interviewed eight individuals referred to us by scan participants who were participating in the implementation of scan technologies at various levels. Most were given implementation tasks directly by scan participants, though knowledge of the scan itself varied widely from person to person.

Nearly all of the participants cited the connections and resources fostered by the intense experience of the scan as one of its primary benefits. Many welcomed regular follow-up meetings among the participants with the goal of re-establishing and renewing the implementation goals developed during the scan tour itself. Many participants also suggested the formal establishment of targeted response teams (or “SWAT teams”) as discussed in the Final Evaluation Report of the pilot scans in order to enhance the implementation effects of the scan tour program.

Based on our review, it appears that the intended effect of the U.S. Domestic Scan Program is being achieved at least to some degree: Participants are being exposed to useful technologies and practices, are implementing some of them in their agencies, and are passing on information from the scan to others who may also be acting on it. We propose a consistent evaluation component to be added to the Domestic Scan Program to enhance the implementation activities of the scan team and continue to examine the effects of social connections in technology transfer.

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1. Introduction

The NCHRP U.S. Domestic Scan Program (1) was launched as a continuing activity in January 2008 in an effort to facilitate technology transfer and innovation among state departments of transportation and others through personal contact. The program was shaped by a business plan (2) developed in July 2005 and a pilot program (3) consisting of two scans that took place between July and September 2006. A report of the scan on Right-of-Way Acquisition and Utility Relocation (4) was produced in December 2006, and a report on the Transportation Asset Management scan (5) was produced in February 2007. An overall evaluation (6) of both pilot scans in June 2007 reviewed the experience of scan planning and execution.

The U.S. Domestic Scan Program is modeled after the International Scan Program (7), and both programs have been deemed very successful as avenues for the dissemination of innovative technologies and practices. By design, both scan programs reflect the view that engineers and other technology professionals prefer to process new information and add new technologies and practices to their repertoires by interacting with their peers. (8) Both scan programs enable engineers and other transportation professionals to present their findings directly to one another, in an environment that fosters face-to-face discussion and cooperative approaches to solving problems.

A scan tour typically uses field visits and meetings with local engineers to directly observe promising new practices, identify pertinent development and application issues, and assess appropriate opportunities and methods for technology transfer. During the intense experience of the scans, the participants develop close professional relationships and contacts that they consider readily available to them even years after the scan tour.

The expected success of this design is confirmed by current research into the modes of connection and technology transfer among engineers. Recent presentations to TRB regarding the communication patterns among engineers (8) noted that “engineers rely more on internal information sources” and “rely on colleagues more” when getting information on innovations and new technologies. Another article concerning technology transfer and the management of “innovation information” among engineers and engineering firms notes that “project managers rely heavily on trade magazines and conversations with internal colleagues for information about innovations, and that firms’ efforts to facilitate information seeking by their project managers focus primarily on information from internal sources, through reports of ‘lessons learned’ and other means.” (9)

These issues apply not just to engineers, but in other instances where the gap between innovation and implementation, policy and policy transfer, must be bridged. Research in policy transfer in local governments “directs us towards the importance of informal networks in the policy transfer process, towards an examination of the motivations of producers, senders, and disseminators of information, and towards the difficulty all participants in the network have in assessing the quality and validity of the information they receive” (10). A sidebar in the March/April 2009 issue of *TR News* noted that research on learning patterns among practitioners showed that engineers “prefer informal networks of trusted contacts and short news articles” rather than academically oriented research (11).

In addition to the direct benefit to the scan participants and their home DOTs, it is expected that the scans encourage dissemination of technologies and practices beyond the initial participants. However, the long-term effectiveness of the scans in fostering adoption of innovative

technologies and practices by DOTs beyond those immediately involved has not been formally explored for either the U.S. Domestic Scan Program or the International Scan Program.

The current project is such an effort. The objectives of this project are twofold: First, to trace the impacts of the two pilot scans at participating state transportation agencies in the two and a half years since the scans occurred; and second, to investigate the depth and breadth of the domestic scans' technology transfer effects among DOTs broadly, looking for evidence that the reach extends beyond the immediate circle of initial participants. Finally, this research is intended to propose a plan for the continuing evaluation of the impacts of the U.S. Domestic Scan Program.

2. Methodology

This research proceeded in two main phases. In the first phase (detailed in Section 3 of this report), after reviewing the original scan reports and other materials, we developed a short Web-based questionnaire (Appendix A) and interview questions for each of the participants in the two pilot scans. We interviewed all available participants using their responses to the questionnaire and the developed questions as a guide. The interview questions were reported in the First Technical Memorandum to this project (12) and are attached as Appendix B. Through the interviews we documented implementation activities of scan participants, obtained names of others they talked to about scan findings, and received their comments about the strengths and weaknesses of the scan program.

The second phase (detailed in Section 4) consisted of interviewing nonparticipants to investigate the secondary impacts of the scans, looking for effects that go beyond the handful of direct participants. In this phase we interviewed state DOT personnel referred to us by the scan participants as people who were directly involved with the implementation of scan-related technologies and practices, but were not scan participants themselves. We also interviewed all of the coordinators of the original scans (the host sites), looking for cases where they had been contacted by people who had read the scan reports or heard about the scan through other avenues. We also surveyed attendees at the AASHTO ROW/Utilities and Asset Management subcommittee meetings regarding the presentations they heard about the respective Domestic Scan tours at their meetings in 2007 and 2008, looking for paths of technology transfer growing out of the scans.

In Section 5 we explicitly examine our survey and interview findings for the role of person-to-person contacts (social connections) in the technology transfer process. We point out the importance of personal contact for implementation and dissemination of new technologies and practices, and we consider possible enhancements to the U.S. Domestic Scan Program that might support even more effective technology transfer.

3. Examination of Direct Effects—Scan Participants

We successfully interviewed 17 of the 22 scan participants from the state DOTs and FHWA. Four participants either retired or left their departments shortly after the scan, and one participant was unavailable. (We confirmed this information with current members of their respective organizations.) The following is a complete list of interviewees. Their contact information is listed in Appendix C.

ROW Acquisition and Utility Relocation Scan Participants**Interviewed**

- Richard Allen, Connecticut DOT
- Bimla Rhinehart, California DOT
- John Sherman, Wyoming DOT
- John Campbell, Texas DOT (Scan Co-Chair)
- Ray Lorello, Ohio DOT
- Kevin Stout, Oklahoma DOT
- Daniel Mathis, FHWA Washington State Division
- James Cheatham, FHWA Pennsylvania Division
- Don Nelson, Washington State DOT
- George Lovett, Florida DOT

Retired/Left Department

- John Ewald, Texas DOT
- Donald Jackson, FHWA Office of Infrastructure
- Susan Lauffer, FHWA Office of Real Estate Services (Scan Co-Chair)

Transportation Asset Management Scan Participants**Interviewed**

- Leonard Evans, Ohio DOT
- Lacy Love, North Carolina DOT
- Bart Selle, Vermont DOT
- Kirk Steudle, Michigan DOT (Scan Co-Chair)
- Paul Wirfs, Oregon DOT
- Robert Ritter, FHWA Office of Planning
- Dennis Merida, FHWA New Jersey Division

Unavailable

- Thay Bishop, FHWA Georgia Division

Retired/Left Department

- David Geiger, FHWA Office of Asset Management (Scan Co-Chair)

In addition to those who retired and were unavailable for interviewing, several members had moved to new positions that distanced them from implementation activities. James Cheatham moved from the FHWA Pennsylvania Division to a new position in Washington, D.C., in October 2007, and while he had initial conversations with relevant individuals immediately following the scan, he has had little involvement in ROW activities since the scan. George Lovett had been an ROW manager at Florida DOT and was promoted in late 2006 to District Director of Transportation Management, with broader responsibilities over the project development process. Lastly, we were unable to secure an interview with Thay Bishop, FHWA Georgia Division, after repeated attempts to reach her by telephone and e-mail.

3.1 Initial Survey of Participants

Prior to the interviews, we surveyed participants via a short Web-based questionnaire centered on the cross-cutting technologies and practices observed as part of the scan tours and documented in the scan reports. In the questionnaire we asked participants to categorize each of these technologies and practices as:

- Not Attractive for Implementation
- Previously Implemented
- Attempted to Implement (Unsuccessful)
- Planning to Implement
- In Process of Implementing
- Implemented

Appendix A shows the questionnaires as they appeared to the interview candidates.

In the survey we aimed to obtain a summary of what participants took away from the scan and what they have been implementing since its conclusion, particularly in the context of how the information was understood during the scan by the participants themselves. Survey responses are shown in Tables 1 and 2. From this information we can make a number of broad observations regarding the impact of the two pilot Domestic Scans:

Summary Observations

- Two years following the scans, most of the take-away findings are at least on the table for implementation, with many either in process or successfully implemented.
- A significant number of the technologies and practices had already been implemented at one or more of the agencies of the scan participants prior to the scan. This largely reflects the fact that several of the scan participants were also employees of host site agencies where innovative technologies and practices were part of the structure of their organizations.
- In both scans, a number of the findings were deemed “not attractive for implementation,” though more so in the ROW Acquisition/Utility Relocation scan than in the Transportation Asset Management scan. This reflects the independence of each of the states and the importance of tuning the implementation activities to particular institutional realities. For instance, “incentives to maintain staff continuity,” “design-build procedures,” and “utility reimbursements” are all practices that depend significantly on both local statutes and the cultural conventions within each agency and their partners. The Transportation Asset Management scan had fewer cases of practices that were not attractive for implementation, presumably because there is wider agreement regarding the need for and approaches to good asset management practice than there is regarding the tools for ROW management and utility relocation.
- Significant effort has been made in implementing technical solutions (computer-based management systems, data collection, etc), and while there has been some successful implementation, many efforts are still in the planning stages. Database systems and management software are expensive to acquire and require the addition of new local expertise, both of which raise the cost of implementation. All participants interviewed noted that their agencies are constrained financially, making such implementations more difficult regardless of the desirability of the technology.
- Similarly, significant changes in practice, especially formal and structural changes that cut across an agency, can be challenging to implement. For instance, establishing an asset

management champion requires assigning particular responsibilities to either a current or new member of the agency and can be completed relatively easily. On the other hand, establishing a formal asset management process requires contributions from numerous sections of an agency and can simply be more difficult to implement.

- Very few implementations that were attempted ended unsuccessfully.

**Table 1. Responses to Initial ROW Acquisition/Utility Relocation Scan
Questionnaire**

Answer Options	Not Attractive For Implementation	Previously Implemented	Attempted to Implement (Unsuccessful)	In Process of Implementing	Plan to Implement	Implemented	Response Count
Supportive of Institutional Environment:							
Team approach	0	3	0	0	1	3	7
Upper management support	0	2	0	1	1	3	7
Innovation and risk taking	2	0	1	1	2	1	7
Adequate resources	1	2	1	0	1	2	7
Monitor/improve performance	0	1	0	1	1	4	7
Focus on Process:							
Cross-disciplinary approach	0	2	0	0	1	4	7
Early involvement of stakeholders	0	2	0	3	1	1	7
Explicit, written procedures	0	2	0	3	1	1	7
Incentives to maintain staff continuity	4	0	0	2	0	0	6
Delegated decision-making authority	0	2	0	1	1	3	7
Conflict resolution	0	2	0	1	1	1	5
Collocation of major participants	2	2	0	0	1	2	7
Focus on Schedule Adherence	0	3	0	0	2	2	7
Design-build Procedures	3	1	0	0	2	1	7
Technical Tools:							
Property management systems	0	0	0	4	1	2	7
Document and information management systems	1	0	0	2	1	3	7
Electronic field data entry	2	0	0	1	1	3	7
Visualization and animation technology	2	0	0	0	3	1	6
Web sites	1	1	0	3	2	0	7
Environmental management systems	4	1	0	0	0	1	6
Other Techniques:							
Incentive acquisition and relocation payments	3	0	0	1	2	1	7
Advance acquisition payments	2	3	0	1	1	0	7
Appraisal waiver and appraisal review modification	0	3	0	0	1	2	6
Utility reimbursements	4	1	0	1	1	0	7
Employment of subsurface utility engineering	3	2	0	0	1	1	7
Design mitigation strategies and value engineering	1	2	0	2	0	1	6

Table 2. Responses to Initial Transportation Asset Management Scan Questionnaire

Answer Options	Not Attractive For Implementation	Previously Implemented	Attempted to Implement (Unsuccessful)	Plan to Implement	In Process of Implementing	Implemented	Response Count
Preservation-first strategy	0	1	0	1	2	2	6
Asset management champion	0	2	0	0	0	4	6
Formal asset management process	0	2	0	0	4	0	6
Investment principles based on life-cycle costing	0	0	0	2	2	1	5
Performance measures	0	1	0	1	3	1	6
Scenario analysis	0	1	0	2	2	1	6
Team approach in organizational model	0	2	0	0	1	2	5
Institutional self-assessment	0	2	0	1	0	3	6
Application of risk analysis techniques	1	0	0	2	2	1	6
Quality and cost-effective data collection	0	0	0	3	2	1	6
Customer orientation in asset management process	1	1	1	1	1	1	6
New technologies in data collection	1	0	0	2	2	1	6
Documented performance measures	0	1	1	2	2	0	6

3.2 Interviews of Participants

All available scan participants were interviewed. The interview questions, listed in Appendix B, varied slightly according to the role of the participant as a state DOT member, an FHWA member, or a scan co-leader, but fell into three broad categories (numbers refer to the state DOT list of questions):

- Implementation efforts (Questions 1, 2, 3, 7, 8 and 9)
- Communication efforts (Questions 5, 6 and 10)
- Long-term effectiveness of the scan (Questions 11 and 12).

Based upon the answers given during a particular interview, we at times omitted questions that were not relevant, and frequently asked additional follow-up questions.

3.2.1 Implementation: Standout Technologies and Practices (Questions 1, 2, 3, 7, 8 and 9)

In our first question, we asked each scan participant which technologies and practices stood out most as candidates for implementation at their home agencies. In most cases, implementation efforts were centered on these standout technologies. Many of the implementation efforts reported by the interviewees reflect those documented in the Final Evaluation Report of the two scans.

ROW Acquisition/Utility Relocation Scan

- Computerized tools (permit processing, automation, ROW line articulations, 3D effect) (Ohio, Florida, California)

- Team approach (Ohio, Wyoming, Connecticut)
- Integrated management database systems (Wyoming)
- Public/private partnerships (Florida)
- Design-build (Florida)
- Early involvement of players (Ohio)
- Conflict resolution (Connecticut)
- Coordination with maintenance division (Connecticut)
- Waiver valuations (Oklahoma)
- Relocation incentive payments (Oklahoma)
- Training enhancement (Oklahoma)
- Upper management support (Ohio)

Transportation Asset Management Scan

- Performance measures (Vermont, FHWA-NJ, North Carolina)
- Preservation first strategy (Vermont, North Carolina)
- Enterprise-type software for information sharing (Oregon)
- Application of general AM techniques and strategies (Oregon)
- Data integration (Vermont)
- Asset management champion, be it a new position or a general responsibility of a given position (FHWA-NJ)
- Organization self-assessment (FHWA-NJ)
- Forecasting tools (North Carolina)
- Computerized management systems (Ohio)

The above technologies and practices were cited by scan participants as particularly interesting for implementation in their home states. Some of the technologies cited correspond directly with those identified in the scan reports, and others correspond to groups of solutions. For instance, many states were interested in using computer technology to gather and manage data, process paperwork, and monitor assets and projects. Interviewees generally referred either to the state that made the presentations (e.g., “Mn/DOT had a lot of great computerized tools”) or to a broad classification of the technology or practice (e.g., “the application of general asset management techniques”).

It is worth noting that states that also hosted scan tours generally didn’t cite their own technologies as standouts for implementation, presumably because they were already implemented. A good example would be public/private partnerships and design-build techniques from the ROW Acquisition/Utility Relocation scan. Texas DOT already uses both approaches, and consequently did not cite them as standout technologies for the agency’s implementation.

Most of the standout results from the scan for the participants fall into the categories of technical tools and organizational structures/practices.

3.2.2 Implementation Activities: ROW Acquisition/Utility Relocation Scan

Through the interviews of the scan participants, we obtained more detailed information regarding the current state of their various implementation activities.

Ohio DOT – The department is still investigating computerized permitting processes, citing inspiration from Mn/DOT’s presentations. Ohio DOT has made some progress and has the task assigned internally. Roadblocks to implementation include lack of adequate funding and personnel. ODOT has contracted with several consultants over the past couple of years to develop solutions for computerized permitting. The agency also cited “early involvement of players,” “team approach,” and “involvement of upper management” as important features of their own program that were enhanced through their participation in the scan. (Ohio hosted one of the visits, providing presentations on just those features of the department.)

Florida DOT – The department was very impressed with the practices developed in Texas regarding “megaprojects,” and has applied some of those lessons on local projects. Florida was also very impressed with Mn/DOT’s technological solutions and leveraging of computer and database technology, and has been implementing a GIS tool that is “a major statewide commitment.” The department has funded a planning council to determine how to best utilize the GIS data that it is acquiring, and notes, “The GIS tool makes the project process much easier.” Florida DOT served as a host site regarding supportive institutional environments where buy-in from the top had significant benefits to project development and completion.

Connecticut DOT – The department implemented a change of process emphasizing the team approach, though without formal restructuring of divisions or sections. This was epitomized in the Busway project (13), a \$569 million dedicated bus rapid transit facility between New Britain and downtown Hartford, Conn., that used old railway ROW areas in its construction. The ROW/utilities coordination was headed by Michael Marzi, whom we contacted during our second round of interviews.

California DOT – Caltrans’ emphasis has been on the continued development of technical tools in line with those seen at Mn/DOT. The department “floated the idea” of an incentive payment system in which the state offers owners in excess of the appraised value in order to secure settlements similar to those obtained through a pilot program in Florida. However, Caltrans ran into local opposition from cities and counties and chose not to push the idea forward.

Wyoming DOT – This spring the department concluded a complete reorganization of the ROW section into four separate teams, which was “a direct result of the scan” and considered very successful. (See Case Study 1 on page 16 for details.) In the past year Wyoming DOT has also gone live with a new ROW management system inspired by the work presented by Mn/DOT, and staff are currently “working through the bugs.”

3.2.3 Implementation Activities: Transportation Asset Management Scan

Oregon DOT – The department has implemented enterprise software to share information agency-wide, reduce the silo effect and enhance communication between sections. The agency is trying to move away from a “worst-first” mentality in agency procedures and generally apply asset management techniques wherever appropriate. It established a steering committee for asset management and a practitioner-level task force: “With the scan we’ve been able to keep the energy going and stay on the right path regarding asset management. Everyone has the same vision and is supporting one another.” Oregon DOT has significant data transfer and IT challenges in implementing asset management, especially in the construction and maintenance sections. The department continues to work on these fundamental communication issues. It also has ongoing challenges working with the local FHWA office regarding the process and pace of implementing asset management techniques.

Vermont DOT – Data integration has become a priority since the scan. The department participated in the FHWA data integration workshop in May 2008 and is now meeting internally to put together a data warehouse. This effort is being slowed because the IT department has lost personnel. The department was very impressed with the preservation-first strategy and implemented its own version called the “road to affordability.” While it is still politically sensitive, Vermont DOT has carried through since the initial implementation nearly two years ago. The agency has some performance measures in place, but would like to “move them out of the stovepipe” and measure the condition of the overall system. The department has a roadway asset group to address this, and is thinking about an overall maintenance strategy emulating Ohio DOT.

North Carolina DOT – Preservation-first strategies, departmentwide performance measures and goals, and forecasting/software tools have all been implemented. The software tools are in the beginning stages with the implementation of a new pavement management system and replacement of the current bridge management system, which includes some formal bridge preservation analysis tools. Both should be up and running later this year.

Ohio DOT – The biggest implementation has been quarterly Webinars co-sponsored by AASHTO and FHWA. (See Case Study 2 on page 18 for details.) Ohio DOT has implemented a data integration system and is currently working on a pavement management system. Implemented performance measures continue to bear fruit. The agency is working on the second volume of a best practices guide for transportation asset management. Shortly after the scan, there was a change of administration at ODOT that resulted in significant modification of institutional processes, which ended up being positive overall.

FHWA – The most appealing features of the scan for FHWA-New Jersey were instituting an asset management champion, setting performance measures, and establishing organization self-assessment. These efforts were directed at the New Jersey DOT, where FHWA tech transfer funds were used to take the commissioner, deputy commissioner, and five senior DOT officials to Ohio to spend a day on scan-related issues. See Case Study 3 on page 20 for details.

Case Study 1

Wyoming DOT



Implementation of Team Approach for Right-of-Way Acquisition and Utility Relocation in Wyoming DOT

In the spring of 2009, under John Sherman, one of the participants in the ROW Acquisition/Utility Relocation Scan, the ROW section of Wyoming DOT completed its reorganization using team structures akin to those presented in Texas and Florida during the scan tour. The reorganization in terms of personnel began immediately after the scan tour in 2006, and Mr. Sherman characterized it as “a direct result of the scan.” Wyoming DOT has four separate teams made up of individuals with different responsibilities within the division, with a project manager to lead the team.



In restructuring the ROW section, the primary goal was to enhance cooperative responsibility for each project. In addition to building the teams and assigning managers for each, some cross-training has been instituted in order to encourage broader understanding of all dimensions of the projects within the team. Multidisciplinary training is now required before consideration for promotion. Mr. Sherman noted that there had been more resistance than he expected to the cross-training requirement, and he is not certain how things will develop. He said, “Appraisers want to appraise” and noted that it was surprisingly challenging to get personnel to fully embrace the cross-training aspects of the team development.



The formal restructuring of the division into teams has been further emphasized by a physical restructuring of the office space to group the four individual teams together into four open-space pods as opposed to a cubicle arrangement. The photos at left show one of the pod arrangements. The physical restructuring occurred concurrently with an office-remodeling project.

Wyoming DOT restructured its ROW section’s physical space to group team members into four open-space work areas.

Mr. Sherman noted that implementing the team approach in the ROW section brought his group more in line with the rest of Wyoming DOT, where there are “squad leaders” for projects in other departments. The next step in development has been implementation of teams across divisions of the DOT. These teams are put together on a project-by-project basis and the new team consists of the division team leaders. However, there is not a formal manager/leader of this higher-level team. Rather, there is a project monitor (usually an upper-level technician) charged

with tracking the overall progress of the project. “The challenge is not having an actual leader.”

Mr. Sherman says that the team restructuring within the ROW section has worked well, though the broader team implementation across projects in the DOT is still uncertain and can't be considered truly successful yet.

Impact and Benefits. This case demonstrates a straightforward technology transfer instigated by the U.S. Domestic Scan Program: A Wyoming DOT staffer participated in the ROW Acquisition/Utility Relocation Domestic Scan in 2006. Upon his return, he chose some technologies to champion and carry through implementation. Two years later, the innovation has been adopted, further developments are being considered and the technology transfer has been successful.

Case Study 2

FHWA and AASHTO



Webinar topics have included climate change and asset management, as well as performance-based maintenance.

Follow-Up Webinars on Asset Management

Subsequent to the Transportation Asset Management Domestic Scan, participants in the scan tour developed an ongoing Webinar program focusing on asset management issues. The program is sponsored by FHWA's Office of Asset Management in cooperation with AASHTO's Subcommittee on Transportation Asset Management. According to Leonard Evans of Ohio DOT, a scan participant, the Webinars "kept the scan alive. We always tell participants [in the Webinars] that it came from the scan tour."

Each quarterly Webinar features two or three 20-minute presentations on an asset management-related theme. Presenters are usually state or local practitioners, consultants, or academic researchers. Participants log on to an interactive Web site that allows them to view the PowerPoint presentations while listening to audio via telephone. Audience members ask questions through shared online messages.

The Webinars are advertised on the Web sites of the AASHTO Subcommittee on Transportation Asset Management and Local Technical Assistance Program centers, and through e-mail lists. There have been seven sessions to date:

- Intro to Asset Management (April 2007, presentations from Cambridge Systematics and Michigan)
- Results of the Domestic Scan tour (September 2007, presentations from Oregon and Utah)
- Performance-Based Maintenance (January 2008, presentations from Florida and Ohio)
- Benchmarking Asset Management (May 2008, presentations from Missouri and Ohio)
- Tradeoff Analysis for Asset Management (September 2008, presentations from Wyoming and Maryland)
- Inventory and Assets Beyond Pavement and Bridges (December 2008, presentations from Oregon, RSG Inc., and the Center for Underground Infrastructure Research and Education)
- Global Climate Change and Asset Management (April 2009, presentations from Alaska, FHWA, Georgia Tech, and RSG Inc.)

Future Webinars are planned on Asset Management and Safety (Summer 2009), and Asset Management Data Collection (Fall 2009).

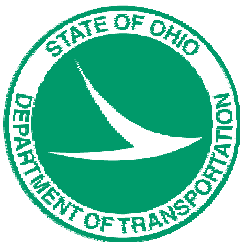
Participation has increased each quarter. There were more than 100 online connections for the “Inventory and Assets Beyond Pavement and Bridges” session in December 2008, so organizers increased the number of available connections to 150 for future sessions. There are different participants in each Webinar, which shows that the program is reaching across the community of those interested in issues in transportation asset management. Mr. Evans says that feedback on the presentations has been very positive. “People call us afterwards to get more information,” he says. “It’s been a good means of communication.” He also notes that the Webinars are a low-cost way to share ideas and that, for the host locations, they enhance their own internal development of technologies and practices.

Impact and Benefits. This case demonstrates a successful and innovative way to continue and broaden communication among DOTs after the scan, in effect continuing some aspects of the scan tour and bringing more agencies and organizations into the discussion. While not as focused and intense as the scan tours themselves, the sessions allow for some personal interaction and discussion, fostering connections among the participants that extend beyond those available from written documents.

Further information and copies of the presentations from the Webinars may be obtained by contacting Ms. Linda Riggins at linda.riggins@dot.gov or (202) 366-4847.

Case Study 3

New Jersey DOT



FHWA and New Jersey DOT staff built on relationships developed during the scan to organize a follow-up visit to Ohio DOT.

Implementing Transportation Asset Management at New Jersey DOT

For Dennis Merida, the FHWA New Jersey Division representative, the process of advocating for robust asset management at New Jersey DOT began with the Transportation Asset Management International Scan in 2005. Following that scan, he sent a personal copy of the report to the New Jersey DOT commissioner, flagged with items of particular interest, but it “didn’t get much play.”

Following his participation in the 2006 Transportation Asset Management Domestic Scan, Mr. Merida used a slightly modified strategy with the new commissioner, Kris Kolluri. He again flagged items of interest in the Domestic Scan report, and included with it a pavement study and a cover letter to emphasize the opportunities for technology transfer and department improvement available through the Domestic Scan.

During a follow-up meeting, “the new commissioner got excited about it.” They spoke at length, and ultimately Mr. Merida arranged to use FHWA technology transfer funds to fly the commissioner, his deputy (Steve Dilts, the current commissioner today), and five senior DOT officials to Ohio, where they “spent a solid day” hearing from top managers about the use and implementation of asset management techniques. The team from Ohio that Mr. Merida arranged for the meeting was headed by Gordon Proctor and Leonard Evans, both participants in the Domestic Scan, Mr. Proctor on the host site side and Mr. Evans as a participant.

Out of this meeting in Ohio, a robust asset management program has taken root in New Jersey DOT. The agency created a new senior position (Dave Kuhn; see Section 5) that reports directly to the commissioner and is charged with the development of the annual capital program and investment strategy for the entire DOT. He is the Asset Management Champion and is in charge of performance measures within the DOT. The agency completed an organizational assessment in the fall of 2007 using tools from the FHWA asset management guide. The department created an asset management steering committee that has been meeting for the past year, and a capital programming committee that approves and screens projects according to asset

management strategies and the current performance goals of the DOT as a whole.

This technology transfer effort has taken hold within New Jersey DOT, continuing through a new commissioner, Steve Dilts. Mr. Merida recalls, “At the going-away party for the commissioner (Mr. Kolluri), he said that the day he spent in Ohio was one of his best days on the job.”

Impact and Benefits. This case reveals a multifaceted path of technology transfer, highlighting the importance of personal connection facilitated by the U.S. Domestic Scan Program. It is doubtful that the transfer would have happened at all without Mr. Merida’s persistence and inventiveness in his approach to the state transportation commissioner. Also, the personal connections from the scan made the on-site visit to Ohio a practical possibility that otherwise might not have been available. This case also highlights the important positive force that FHWA can have both by encouraging consideration of new approaches and by use technology transfer funds to bring people together face-to-face.

3.2.4 Roadblocks to Implementation

The primary roadblock to implementation of new technologies from the scan tours is funding, according to the scan participants. While agencies may need some time to acclimate to institutional and procedural changes, generally there is both acceptance and buy-in across the board, and the implementation moves forward. Part of this overall success can be attributed to the good judgment of the scan participants regarding what to implement and when to implement it. Scan participants know their institutions, both their superiors and those they supervise, and choose to implement technologies and practices that fit well within their agencies and have a high likelihood of success. In some cases, buy-in from upper management simply might take some time.

In general, however, the scan participants didn't consider intransigence by elements of their agencies or state government to significantly impede their implementation efforts. This is borne out by the sorts of implementations that have been completed versus those that are either in process or in planning stages. Low-capital changes like team reorganization and the centralization of responsibilities have been completed. High-capital changes like the acquisition of new software or hardware are taking significantly longer to complete.

Although this was not cited directly by scan participants, during the interviews it was clear that lack of focused time and attention is also a roadblock to adopting innovations. Any changes to procedures or additions of technologies require significant devotion of time and effort, which can wane as time passes after the initial inspiration. Thus, several of the participants spoke of how early good intentions and excitement regarding scan technologies had "moved to the back burner" as the crush of day-to-day tasks had taken over. Part of this roadblock might be alleviated by regular reconnection among the scan participants, allowing them to bounce strategies for implementation off one another and provide peer support for each other's efforts.

3.2.5 Communication Efforts (Questions 5, 6 and 10)

Scan participants communicated the results of their experiences on the scans in a variety of ways in a variety of venues. Formal presentations of the scan results outside of their agencies was limited to AASHTO subcommittee meetings or TRB meetings, most of which were enumerated in the Final Evaluation Report for the two scans. Formal presentations of scan results were given by scan participants at the following regional and national meetings:

ROW Acquisition/Utility Relocation

- Presentation to Western Division FHWA
- Northwestern ROW Directors Conference (fall 2006 and fall 2007)
- Orlando ROW conference
- International ROW Association Annual Conference
- AASHTO subcommittee meetings

Transportation Asset Management

- Regional AASHTO Asset Management subcommittee meetings (in Boston, Albuquerque and Las Vegas in 2007 and 2008)
- Louisiana DOT engineering conference
- National Asset Management conference (TRB/AASHTO/FHWA, November 2007)

- Atlantic Regional Asset Management conference (April 2008)
- Regional Asset Management Conference (Tennessee, November 2008)

In most cases, the presentations were about the U.S. Domestic Scan Program in particular (sometimes along with the International Scan). A few talks were presentations by scan participants regarding scan-related technologies, but not necessarily about the scan itself nor citing the scan in the formal presentation.

While these presentations constituted a significant mode of communication with peers outside of scan participants' departments, informal discussion of the scan results and how to implement specific technologies and practices with their home DOT colleagues constituted a significant and primary mode of communication for all the participants. Several made formal presentations to their departments. Many members sent copies of the scan report to relevant personnel, both those they managed and their own managers. In some cases, accounts of the scan were given in internal publications of the DOTs.

Those who made formal presentations, whether within their own agencies or at regional and national transportation meetings, generally used some portion of the PowerPoint presentation assembled by the scan tour consultants. A typical comment from participants was that they would "pick and choose the most relevant and important material."

Concurring with other research findings regarding communication patterns of engineers, we found that scan participants always passed along scan information informally and preferred doing so, even if they also made formal presentations. Presentations made at their local agencies fall between the formality of large conference meetings and informal conversations. The slides and other formal presentations provided some structure to an exchange of information that is essentially conversational and functions much like a working-group presentation.

There are two broad kinds of information communicated by the participants. One is the existence of the scan itself as a resource for other DOTs. Another is the content of the findings of the scan tour. The two may often be linked to one another, as in a presentation outlining the results of the scan. However, the findings of the scan tour were not always associated with the scan itself or the Domestic Scan Program, but simply presented as useful knowledge with attribution to a particular case of implementation (e.g., database solutions in Minnesota). Additionally, in many instances the scan tour represents a significant source of information about a technology or practice, but by no means the sole source. Thus, there can be reluctance by those involved to attribute causal connections between scan tour activities (and participation in the scan tour) and subsequent implementation of a technology or practice.

In addition to citing dissemination of specific technologies and practices highlighted during the scan tours, all participants pointed to other effects that fall under the umbrella of enhanced communication. Participants, particularly those at state DOTs, underlined the benefits from the scans of working with their peers across the country. Because of participation in the scan tours, participants developed new connections with peers that are not present and available through normal national transportation organizations and working groups. These connections built a sense of trust and collegiality that has persisted through the past two years and which participants considered a significant asset.

Some DOTs involved in the scans, particularly those that were hosts in addition to participating, reported visits from other DOTs following the scan inquiring about their technologies and practices:

- In December 2006, staff from Maryland DOT visited Ohio DOT to learn about ODOT's Organizational Performance Index as it pertains to highway maintenance operations and to discuss general highway maintenance practices employed by ODOT. The Maryland team included the Maryland Director of Maintenance, the Assistant District Maintenance Engineer, and members from IT, Materials and Technology, and the Peer Review office.
- In December 2006, Ohio DOT staff met with the New Jersey DOT Commissioner, Deputy Commissioner, two Assistant Commissioners, an IT manager, two New Jersey FHWA representatives and an Ohio FHWA representative to talk about Ohio's asset management practices. (See Case Study 3 on page 20 for details.)
- In December 2006, Ohio DOT met with Indiana DOT management regarding several ODOT management practices, including asset management and performance measures.
- Members of the Connecticut DOT asset management group spent a day in January 2008 in Vermont focusing on transportation asset management issues.
- The Texas ROW Acquisition/Utility Relocation group says it is contacted regularly regarding its procedures, especially large-project management and public/private partnerships.

3.2.6 Long-Term Effectiveness (Questions 11 and 12)

Participants considered the long-term effectiveness of the scan to lie primarily in the value of contacts and communication with peers that they would normally not encounter. The scan itself was considered indispensable for allowing them to interact directly with those who developed the relevant technologies. For many, it is a welcome complement to the kinds of interaction facilitated at AASHTO and TRB meetings, which were considered important, but fulfilled other purposes.

Participants regularly cited the importance of seeing the results directly from those who had been implementing the innovations. They cited a significant difference between hearing a summary report from a supervisor who arguably had little direct contact with the development and implementation process, and speaking with an agency staff member who had direct, hands-on responsibility for the technology or practice. Part of this difference lies in the ability of those close to the projects to answer detailed questions regarding development and implementation.

3.3 Host Sites

Several participants cited the infectious enthusiasm coming from those who made presentations at the host sites. The host site members were proud to be part of the scan as examples of innovative and successful programs. That excitement rubbed off on scan participants, adding to the effectiveness of the communication of the information.

Many scan participants commented that the Domestic Scan Program had important positive effects for the host sites in addition to the participants. The process of preparing for the scan was "a shot in the arm" for the host site personnel, engendering good feelings about their own work (because they were selected as host sites). Preparing for the scan presentations also turned into an occasion for self-evaluation and revision among some host sites, leading to more robust procedures and deeper implementations of successful programs. Ultimately, their participation

reflected back upon them in the form of further innovation and deeper commitment to the strengths of their programs and a further winnowing of the weak points.

In both final reports for the pilot scans, the host sites are listed and local staff are named for further contact regarding the content of the scan presentations. The ROW Acquisition/Utility Relocation report is more forthright about encouraging further contact with the host sites, providing detailed contact information following each section of the report. The Transportation Asset Management report is less so, providing the names of the local host site participants in the introduction to the report, but not including detailed contact information.

Using the information in the ROW report and a list of host site names from the original scan provided by Cambridge Systematics, we contacted each host site to investigate whether they had been asked for further information in the wake of the scan. We were particularly interested in whether the documented information in the scan reports had prompted further inquiry by DOTs not associated with the scan at all. Such contact would be evidence of another avenue of dissemination and technology transfer attributable to the scan program. Appendix D lists names and contact information for the host sites we contacted.

A number of the host sites were in fact contacted regarding the scan report. In general, these contacts were phone conversations gathering information for the home DOT and have not been documented regarding their source.

From the ROW Acquisition/Utility Relocation Scan:

- Texas DOT says it is regularly contacted by other state DOTs about its practices. TxDOT staff attribute some of that contact to their participation in the Domestic Scan, but note that TxDOT staff regularly make presentations regarding their practices at conferences and meetings around the country and that it is not likely that the contacts are solely due to the scan tour.
- Florida DOT has had discussions with other DOT personnel not originally involved in the scan.
- Minnesota DOT says it has had some queries, but they may be as attributable to AASHTO presentations as to the domestic scan report.

From the Transportation Asset Management Scan:

- Florida DOT is regularly contacted by states and other countries regarding asset management issues, but have had no contacts attributable solely to the scan.
- Staff at the Kent County Road Commission recall one or two phone conversations following the scan asking for information about their asset management practices.
- Michigan DOT was contacted by North Dakota DOT in the wake of the scan, and NDDOT brought a 10-person team for a visit to MDOT in the third quarter of 2008. The visitors knew of the scan tour from 2006, and “it was involved in their decision” to request a visit.
- Utah DOT is called “a couple times a year” regarding the scan, though staff received more calls in the time immediately following the scan. The agency hasn’t received any calls in 2009.

3.4 Observations

The first round of interviews revealed the enthusiasm of most participants for the value of the scan and their own participation in it. However, it is clear that the Domestic Scan is no longer strongly present in their minds, as day-to-day necessities of their particular positions require attention. The implementation activities have been generally limited to work begun immediately after the scan, though in many cases full completion of implementation actually took many months or longer.

As a valuable source of relevant information, all agreed that the scan tours stood the test of time; the same practices and technologies are as relevant now as they were in 2006. Keeping these technologies front and center and facilitating their implementation would be enhanced by the development of resources that could aid in leveraging the knowledge base represented by the scans and reports. Please see Sections 5 and 6 for further discussion on this topic.

4. Examination of Indirect Effects—Beyond Scan Participants

4.1 Interviews of Individuals Referred by Scan Participants

The goal of the second round of interviews was to further trace the implementation of a handful of technologies and practices at individual DOTs and to explore the web of connections that facilitate technology transfer from the scan tour outward. We asked scan participants to identify individuals they talked to, either in their own DOTs or externally, about their experience on the scan tour. We then made an effort to contact these people and interview them.

We interviewed the following people in this second round:

ROW Acquisition/Utility Relocation Scan

- Elizabeth Healy, FHWA Washington State Division, referred by Dan Mathis, FHWA Washington State Division
- Myra Binns, Ohio DOT, referred by Ray Lorello, Ohio DOT
- Michael Marzi, Connecticut DOT, referred by Rich Allen, Connecticut DOT

Transportation Asset Management Scan

- Laura Wipper, Oregon DOT, referred by Paul Wirfs, Oregon DOT
- Cathy Nelson, Oregon DOT, referred by Paul Wirfs, Oregon DOT
- Dave Kuhn, New Jersey DOT, referred by Dennis Merida, FHWA New Jersey Division
- Tim Rose, Utah DOT, contacted through host site investigation
- Stephen Gaj, FHWA Washington, D.C., referred by Leonard Evans, Ohio DOT

Here we present narrative summaries of our interviews, followed by analysis and discussion in Section 4.3.

ROW Acquisition/Utility Relocation Scan

Elizabeth Healy, ROW Program Manager/Environmental Specialist, FHWA Washington State Division

Referred by Dan Mathis, FHWA Washington State Division

Ms. Healy learned of the ROW Acquisition/Utility Relocation Domestic Scan through the participation of Dan Mathis and knew Don Nelson (now retired) had participated. She came into her current position about one year after the scan (June 2007) and was previously an area engineer in FHWA Washington State Division working with the ROW group, but was not a member. She has skimmed the Domestic Scan report, but not read it in depth. She has had more interaction with the recent International Scan and regularly checks in with Jerry Solomon at FHWA headquarters.

Ms. Healy considers the scan tour a resource and would consult with Dan Mathis regarding choices to be made between recommendations of the Domestic and International Scans. She noted that in her contacts with the state DOT there have been no discussions about the scan, either about results or implementation. There is new management at the state level and there has been a reorganization of the state DOT since the scan tour, and “in the turnover, the scan information just fell off the radar screen.”

The current reorganization at Washington State DOT has been aimed at increasing efficiency and reducing FTEs. Under current economic conditions the individual regions within the state want more direct control over projects. Ms. Healy thinks that recent changes have primarily grown out of the innovations of the new leadership within the ROW section, and not out of consideration of any particular research.

Myra Binns, ROW group, Ohio DOT
Referred by Ray Lorello, Ohio DOT

Ms. Binns is responsible for the implementation of the electronic permitting process in Ohio, which was inspired by the technologies observed in Minnesota. Ms. Binns' awareness of the Transportation Asset Management Domestic Scan was limited to knowing that Mr. Lorello was a participant. The electronic permitting process is still "in its infancy," having gotten off the ground in the summer of 2008. (Mr. Lorello initiated the program, but delegated it to Ms. Binns' group early on.)

Ms. Binns described the goal of the electronic permitting process as standardizing the permitting process across the 12 independent districts within the state and at local levels, allowing requestors online access to view the status of their application. Her group has had several meetings on the topic, bringing in IT and three of the 12 districts. They are still considering whether to create the process internally or hire a consultant to develop the application. The effort is currently hampered by travel and financial restrictions within the DOT. Ms. Binns noted that some districts have very good permitting processes, but that they don't yet have online viewing capabilities. Currently the project is "on the back burner" because of day-to-day pressures and financial constraints. The key to making the project successful is dedicated time, particularly of IT personnel.

In our discussion Ms. Binns liked the idea of a "SWAT team" resource assembled from participants in the scan tour who would be available for jump-starting a program like the electronic permitting process. She particularly liked the idea of combining raw information gathering, available from a report, with the possibility of asking questions of those with related experience.

Michael Marzi, ROW champion, Connecticut DOT
Referred by Rich Allen, Connecticut DOT

Mr. Marzi implemented a team approach for the ROW acquisition portion of the Busway project in Connecticut. The Busway project is a \$569 million bus rapid transit project connecting New Britain to downtown Hartford, using rail lines repurposed for buses. Mr. Marzi was introduced to the project in 2002-2003, and the ROW acquisition portion, begun in 2006, involved a great deal of work with the Federal Transit Authority and with various Connecticut DOT divisions. Each DOT division supplied a person to the team. After the initial meeting, the team met every month to review the status of each piece of the project and determine what adjustments needed to be made to stay on schedule, which required give and take among the different divisions to meet the overall goals of the ROW section. The team met nearly all of their set dates.

Mr. Marzi was enthusiastic about the benefits of using the team approach for the ROW portion of this project. The biggest benefit is that "everybody has an active role and is part of something, not just another cog." The cooperation leads to innovative ideas and satisfies an "innate desire to be part of something," "raises spirits" and leads to more effort overall. He says that a big part of

implementing the team approach turns on giving people thanks for the work that they do. “A pat on the back doesn’t cost you a dime,” Mr. Marzi says. “Our team will do anything I ask them because people feel part of something. It works.”

The program has been praised by a federal review of the project, which noted that the ROW effort was far ahead of other portions of the project. As part of the implementation of the team approach, Mr. Marzi developed a “soup to nuts” chart of progress that was praised for its clarity and helpfulness by Mike Butler at FHWA.

Mr. Marzi was not particularly aware of the ROW Acquisition/Utility Relocation Domestic Scan or what role it may have had as an impetus for using the team approach in this project, though as we went through the history of the Busway project and the ROW effort there, it came up. He recalled that scan participant Rich Allen “called me into his office and had gone to a conference” suggesting that they try out some of the team approach techniques. He talked with Mr. Allen regarding what needed to be done and implemented it. There is some documentation regarding the structure for the team, “written up by superiors,” but in general the arrangement is relatively informal.

There has been universal buy-in to the team approach. Mr. Marzi attributes this to the uniqueness of the Busway project, its high priority within the department, and the general enthusiasm generated by the team approach itself.

The Busway project is the only one currently using the team approach for management, and Mr. Marzi says that smaller projects don’t necessarily need it. He says that there has been some desire by administrators to formalize the team approach and use it on all projects, but his opinion is that smaller projects are handled more efficiently and effectively without the team approach.

Transportation Asset Management Scan

Laura Wipper, Asset Management Integration Section, Planning Department, Oregon DOT Referred by Paul Wirfs, Oregon DOT

Ms. Wipper heard about the Transportation Asset Management Scan through Mr. Wirfs’ involvement as a scan participant, and knew that Oregon had hosted some portion of the scan, though she was not involved in that hosting. She has seen the published scan report, but not read it. She has not been involved in the implementation of any particular result from the scan but is carrying out her asset management responsibilities. Oregon DOT planning staff are trying to be holistic in their approach to asset management while implementing the principles of broad-based AM techniques, but are not able to do so all at once. They keep working through various barriers in this implementation. The biggest hurdle is resources, both financial and in the capacity to develop local expertise. They have had some tension with FHWA regarding expectations and achievements and recently had “an honest conversation” about the matter, which seemed to help relieve that tension.

Cathy Nelson, Chief Engineer, Oregon DOT Referred by Paul Wirfs, Oregon DOT

Ms. Nelson leads an executive-level steering committee for the asset management program in Oregon DOT and was familiar with the Transportation Asset Management Domestic Scan. The

steering committee is a technical group of the owners of various assets gathered together to prioritize funding needs. Ms. Nelson says that Oregon DOT has been “doing asset management forever,” though that term has not always been used, and it is becoming much more sophisticated as a comprehensive approach cutting across the various groups in the department.

For her, the real goal is to reveal the common purposes among the silos of activity within the department and tie their expertise together. The biggest challenge is that the individual silos often think that they are in a zero-sum game where cooperation often yields only fewer resources. She says that the steering committee has had success in making the various parties aware of the complexities involved and fostering a broader understanding of the usefulness of sound, broad-based asset management practices.

Ms. Nelson presented some of the results from Oregon DOT during the domestic scan tour stop in the state. She recalls getting some questions after the presentation, but doesn’t remember specific details regarding who contacted her or when. She participates in a variety of activities involving discussions about technologies and practices, and says that she cannot separate her role in the scan tour from those other activities. She is a member of the AASHTO Subcommittee on Asset Management and has regular contact with scan participants Kirk Steudle (Michigan DOT) and Leonard Evans (Ohio DOT).

Given her involvement with other national organizations regarding asset management practices, we asked what she thought the U.S. Domestic Scan Program added to the mix. She replied that the Domestic Scan Program is “an incredible complement to the synthesis studies” with “more in-depth knowledge and case studies.” She noted that the packaged report is available to share with people. The scan tour can “jump-start those that have an initial interest” and provide contacts to them. She considered the Domestic Scan a very useful tool for evolving concepts that are toward the beginning or middle stage of development.

**Dave Kuhn, Executive Director, Capital Investment Strategies, New Jersey DOT
Referred by Dennis Merida, FHWA New Jersey Division**

Mr. Kuhn came to his position partly as a result of the 2006 Transportation Asset Management Domestic Scan. As part of his implementation efforts (see Case Study 3 on page 20), Dennis Merida encouraged the creation of a senior position to oversee asset management issues and implement asset management strategies within New Jersey DOT.

Mr. Kuhn characterized his job as a “breakout position” and part of a revision of strategy within NJDOT as a whole. His core function is the development of an annual capital program and investment strategy for the whole DOT. His role is to work on finance and asset management issues that were “independent of line functions” (no delivery responsibilities for any particular projects), allowing a more objective view of the funds allocation process that worked across institutional boundaries and kept view over many different needs. He considered all three of the most important issues pointed to by Mr. Merida—the presence of an asset management champion, the institution of performance measures, and an organizational assessment—to be critical issues for his group.

New Jersey DOT developed an organizational assessment in the fall of 2007 and is within six months of fully implementing it. Mr. Kuhn participated in the development of a cross-organizational steering committee that meets “every couple of weeks” to sort out funding changes and reallocations. The Asset Management Steering Committee was formed in June 2008 and

consists of the Deputy Commissioner (committee chair); Assistant Commissioner, Capital Program Management; Assistant Commissioner, Planning and Development; Assistant Commissioner, Operations; Assistant Commissioner, Administration; Executive Director, Capital Investment Strategies; Executive Director, Statewide Traffic Operations; Executive Director, Civil Rights and Affirmative Action; Director, Information Technology; Chief Financial Officer. The committee was put together to enhance the overall accountability and transparency of the budgeting process at NJDOT, and is considered a success by Mr. Kuhn

Mr. Kuhn characterized his initial time in his position as a struggle to understand the meaning of asset management and the distinction being made from other forms of financial management. To formulate its mission and articulate tasks, New Jersey DOT used the final report from the 2006 Domestic Scan, the AASHTO Asset Management subcommittee Web site (15), and details from the New Zealand Infrastructure Management Model, which was part of the International Scan Tour in Asset Management. Using these documents, NJDOT staff developed a policy document for asset management in New Jersey.

The steering committee has a draft AM plan, and members are developing a detailed process for measuring performance along a 10-year time scale. They have completed performance measures for bridges and pavement, are completing them for safety issues now, and will next move to mobility issues. The template for the performance measures consists of 13 key questions culled from the New Zealand Infrastructure Management Model (16).

New Jersey DOT has not had many barriers to overcome during this implementation. Problems that do exist stem from the previous capital investment strategy that rewarded champions of individual “siloes” areas and encouraged competition for resources rather than cross-organizational allocation of resources. Mr. Kuhn pointed out that a broad-based training of personnel in sound asset management strategies had helped a great deal. The training brought in both subject matter experts and people cross-trained in a swath of asset management issues. Mr. Kuhn characterized the training sessions as “an intro class to asset management.” Ninety people went through the training in three sessions. It was done through the National Highway Institute (course number 131.106) and used the workbook for the course itself and FHWA’s *Asset Management Overview* (14). The course helped solidify the principles of sound asset management within the group and bred a broad-based understanding of the issues and challenges across the department.

There was a peer exchange in Baltimore in August 2007, and New Jersey DOT consulted a number of times in the early days of developing the asset management policy document with the AM groups in Oregon, Maryland, Kentucky and North Carolina.

FHWA-New Jersey has been deeply involved and very helpful and supportive of NJDOT’s efforts. The FHWA division has members on the steering committee, and staff make regular visits to see how things are going.

Some of the upcoming challenges involve applying AM principles to mobility and safety issues. The difficulty lies in developing a policy with performance measures in the absence of a clearly appropriate physical constraint. Developing performance measures for pavement and bridges, areas that involve physical assets that need monitoring and maintenance, is easier than developing them for safety and mobility issues such as crashes or highway sprawl.

NJDOT is also in the process of utilizing new tools for predictive modeling and risk assessment. The department has implemented a new pavement management system from Deighton and may

get a similar product for bridges. NJDOT also recently had a presentation from Rutgers and Drexel Universities regarding optimizing the agency's bridge assessment procedures. One of the challenges in using these technical tools is that they currently don't talk to one another very effectively, and the information gathered from each individually is difficult to apply to related but separate issues. To this end, NJDOT is in the process of developing a data warehouse (to be completed at the end of the calendar year) that will allow departmentwide access to the output of the various computerized management systems in use. Additionally, the department is working with Cambridge Systematics to develop a decision support model that will leverage the contents of the data warehouse for more sophisticated decision-making and performance evaluation.

Tim Rose, Director of Asset Management, Utah DOT
Contacted through host site investigation

We contacted Mr. Rose when investigating the role of host sites in the web of technology transfer. He has been Director of Asset Management at Utah DOT since February 2007, six months after the Transportation Asset Management scan tour. He has been contacted informally a couple of times a year regarding the Domestic Scan, though the frequency of calls has dropped off since 2007. He has not received any calls in 2009.

Mr. Rose didn't have thoughts regarding the effectiveness of the Domestic Scan and noted that there has been a "change in philosophy" since he took over, saying that in his opinion, the "document was more about what we should do, but not what we could do in reality." He clarified by saying the cross-asset analysis doesn't really work because of current funding strategies in the department. Rather, asset management turns most on the funding silos, and the work of the individual divisions (the silos) "can't just benefit the [overall] system." One consequence in Utah is that the agency still runs the bridge and pavement sections separately. In the end, department staff apply the concepts of asset management within the separate divisions rather than across the whole department. "The core concepts of asset management are really solid, and we can pull them out and manage the parts that way," Mr. Rose says.

Stephen Gaj, FHWA Washington, D.C.
Referred by Leonard Evans, Ohio DOT

We contacted Mr. Gaj due to his involvement with the asset management Webinar program through FHWA and AASHTO. However, he has had extensive, long-term involvement with the scan program and doesn't strictly fit the mold of an outer-ring participant. On the one hand, he wasn't a participating member of either of the scan tours, though he worked extensively on the implementation of the Webinars, which were an outgrowth of the Domestic Scan Program. On the other hand, he is one of the initiators of the International Scan tour with Bob Ford and Frank Francois (then Executive Director of AASHTO) and had some interaction with the development of the Domestic Scan Program. So, in addition to discussing the Webinar program, we used the interview to gather some of his thoughts on the Domestic Scan Program in general.

Mr. Gaj noted that the cooperation of FHWA and AASHTO has been key for both the Asset Management Scan itself and the Webinar development. For the Webinars, staff pick two or three states to make 20-minute presentations on a given topic. They advertise via Web sites, e-mail and AASHTO subcommittees. The Webinars have had a steadily increasing number of attendees, and staff expect the program to continue indefinitely. In addition to Mr. Evans and Mr. Gaj, most of the Transportation Asset Management scan participants and the outer-ring participants viewed the

Webinars as being effective and an important product of that scan tour. (See Case Study 2 on page 18 for details on current and planned programs for the Webinars.)

Mr. Gaj had a number of thoughts regarding the domestic scan tour in general. He noted that there was initially some controversy regarding the printing of the original reports, and he thinks that more attention should be given to making printed copies widely available rather than having the report available principally via the Web. “People are just more likely to read at least part of it, especially the Executive Summary, if they have it on their desk,” he says. When queried, he liked the idea of making a highly condensed version of the report available in print, even something as condensed as a single page or trifold. He also emphasized the importance of strong implementation plans and formal meeting structures for bringing such plans to fruition.

Echoing the thoughts of several of the scan participants, he said that follow-up meetings “really help with formulating the implementations.” He pointed to the current practice on the International Scan in which the scan participants have activities gathering and synthesizing information in the months following the scan tour itself, and said that it has been enormously helpful to “have a team focusing on who’s doing what.”

Mr. Gaj emphasized that a key to the success of any scan lies in the people involved, their positions within their organizations to get things done, and their eagerness to do so. “People need to understand that scan participation includes some obligations,” he says.

Asked about the added value of the scan program, Mr. Gaj first noted that he was not a disinterested observer. But with that said, he thought that the approach of having individual states plus FHWA and others focus on a particular subject, learning as much as possible, with a diversity of people having a disposition toward implementation, is the best way to go in disseminating new technologies and practices. He considered the report on the Asset Management scan from the U.S. Domestic Scan Program to be the best synthesis of the subject of any in the United States.

4.2 Survey of AASHTO Meeting Attendees

In order to further explore awareness of the Domestic Scan Program and dissemination of its findings, we surveyed participants in regional and national meetings of AASHTO subcommittees relevant to the scan. We chose AASHTO meetings because they were most often cited as venues for presentations by scan participants. We confirmed that presentations regarding the two Domestic Scans were made at these meetings over the past two years by consulting the agendas and proceedings available online. Further, it is clear that the AASHTO committees are a primary avenue for the dissemination of research information and the adoption of standards of practice in transportation. In the interviews, scan participants routinely noted that AASHTO meetings and subcommittee activities (a number of scan participants are members of the subcommittees) were closely tied with their participation in the scan tours.

AASHTO Regional Asset Management Conferences

We sent the survey via e-mail to 350 participants in AASHTO Regional Asset Management Conferences in 2007 and 2008. Appendix E shows the survey as received by the attendees. We obtained the e-mail addresses of the attendees from the conference coordinator at FHWA, Francine Shaw-Whitson. Of the messages sent, 20 bounced back as bad e-mail addresses.

We received replies from 60 recipients. Figures 1 to 4 illustrate the results of the survey. Of those who responded:

- 64% said that they recalled hearing a presentation regarding the 2006 Transportation Asset Management Domestic Scan (Figure 1).
- 40% had heard about the scan from other sources (Figure 2).
- Of specific sources cited, TRB was cited most frequently (Table 3).
- 37% of the respondents said they passed along information about the scan to their departments or elsewhere (Figure 3). This is nearly two-thirds of those who recall hearing a presentation on the scan.
- 44% obtained or read the scan report upon hearing about it, and small percentages contacted either a scan participant (1.8%) or a host site (3.5%) (Figure 4).

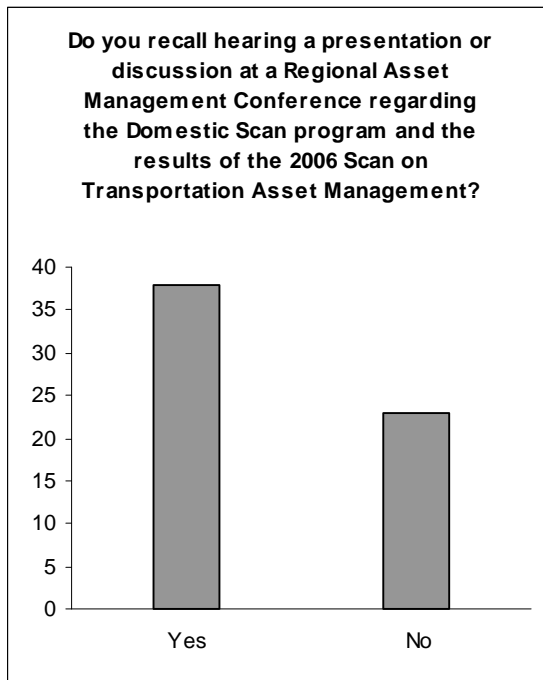


Figure 1.

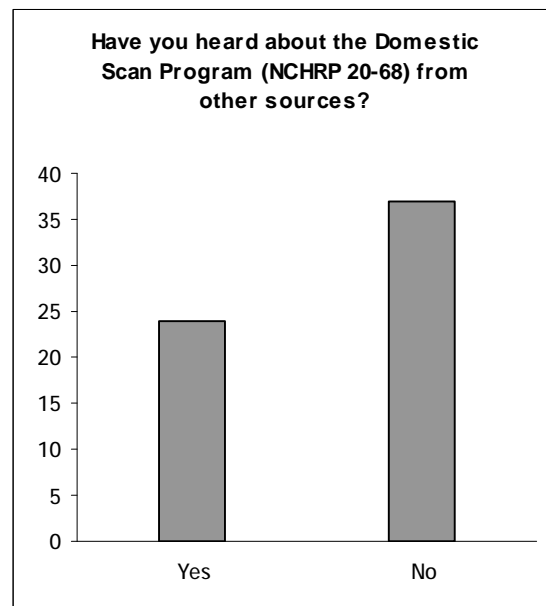


Figure 2.

Table 3. Other Sources for Awareness of the Transportation Asset Management Domestic Scan Tour for AASHTO Meeting Attendees

Respondent Number	Response Text
1	AASHTO
2	TRB newsletter
3	FHWA
4	When the report was released
5	TRB and AASHTO Research Advisory Committee
6	FHWA Personnel
7	TRB Annual Meetings, Transportation Asset Management CoP Web site, 7th NTAM Meeting

8	Florida was visited by the Scan team.
9	Internet
10	FHWA & AASHTO
11	Headquarters FHWA Office of Asset Mgt and FHWA Resource Center
12	Carlos Braceras, at the SOM session this week
13	TRB E-Newsletter
14	TRB, industry contacts
15	From my office
16	TRB
17	TRB presentation
18	Personal communication with FHWA Office of Asset Management
19	NCHRP & FHWA Web sites
20	Presentations or discussions at other conferences
21	Various emails and publications
22	TRB Panel 8-70
23	My management
24	I believe I had a copy of the Scan Report prior to the conference.

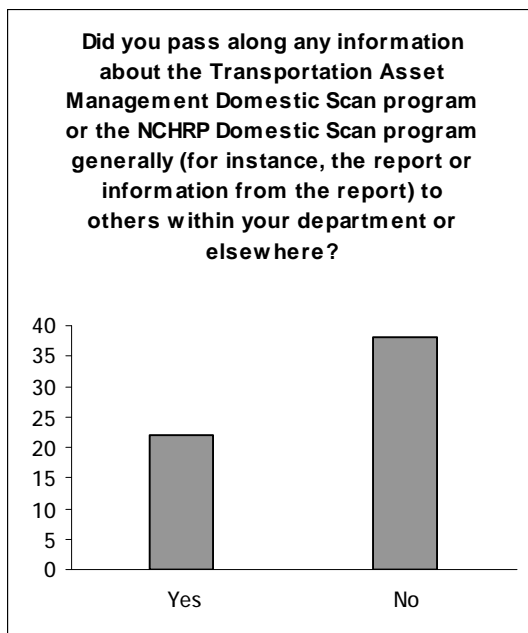


Figure 3.

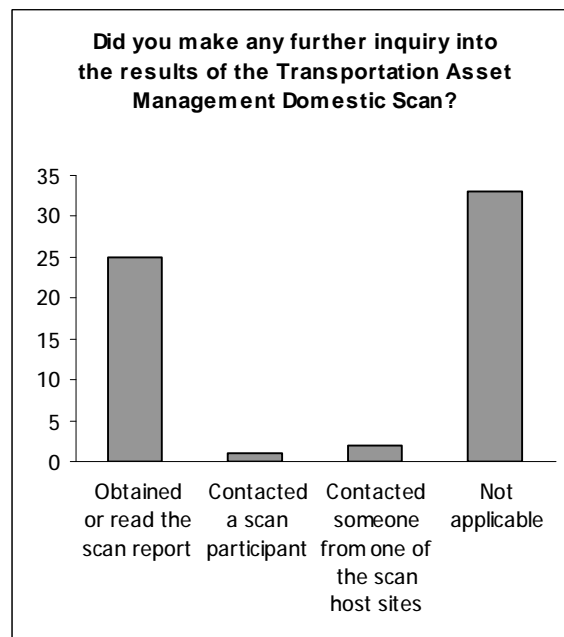


Figure 4.

AASHTO ROW/Utilities Subcommittee

We also sent the survey to 306 participants in the 2007 AASHTO ROW/Utilities Subcommittee annual meeting. We presume that the majority of the participants in the 2008 subcommittee meeting also attended the 2007 meeting. We obtained e-mail addresses for the attendees from the online posting of the conference attendee list. Of the messages sent, 45 bounced back as bad e-mail addresses.

We received replies from 40 recipients. Figures 5 to 8 illustrate the results of the survey. Of those who responded:

- 83% said that they recalled hearing a presentation regarding the 2006 ROW/Utilities Relocation Domestic Scan (Figure 5).
- 53% had heard about the scan from other sources (Figure 6).
- Of specific sources cited, FHWA was cited most frequently (Table 4).
- 65% of the respondents said that they passed along information about the scan to their departments or elsewhere (Figure 7). This is nearly three-quarters of those who recall hearing a presentation on the scan.
- 61% obtained or read the scan report upon hearing about it, 32% contacted a scan participant, and 8% contacted someone from one of the host sites (Figure 8).

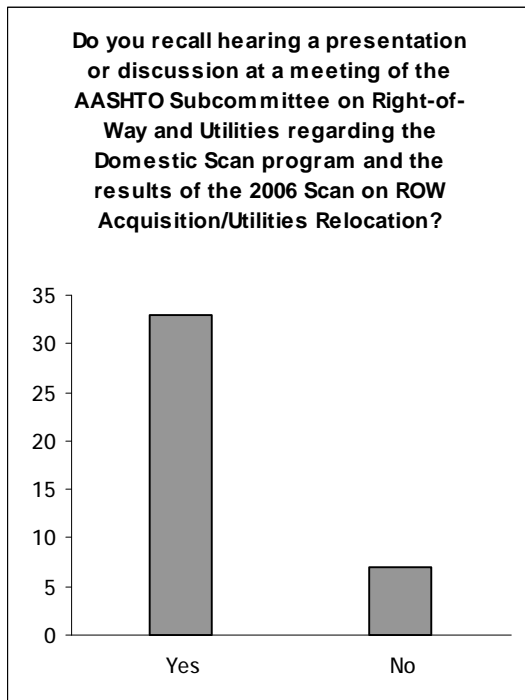


Figure 5.

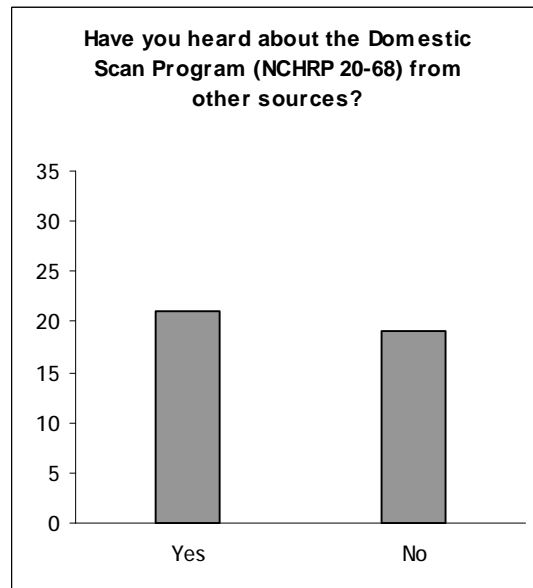


Figure 6.

Table 4. Other Sources for Awareness of the ROW Acquisition/Utility Relocation Domestic Scan Tour for AASHTO Meeting Attendees

Respondent Number	Response Text
1	I am retired FHWA and use web site
2	Numerous in my FHWA career
3	Have been looking for more info. Is the report published?
4	FHWA
5	NCHRP e-mail link or copy of a publication
6	International Right of Way Association
7	Online searchers, reports
8	participants

9	NCHRP documentation
10	The Texas Realty Officer for FHWA
11	Have participated at FHWA request
12	FHWA and various State DOT's
13	FHWA
14	AASHTO 2006 Conference, AASHTO 2009 Conference
15	I was on AASHTO Board & part of initial Domestic Scan when with Wisconsin DOT through 2003.
16	FHWA Office of Real Estate Services
17	George Lovett from D-5 participated in the Domestic Scan
18	Right of Way Consultants Council
19	My Supervisor at the time, Bimla Rhinehart, was a Scan participant
20	Colleagues

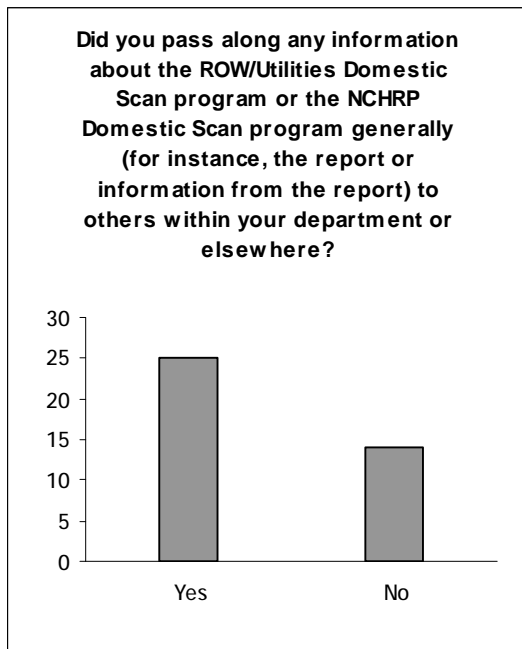


Figure 7.

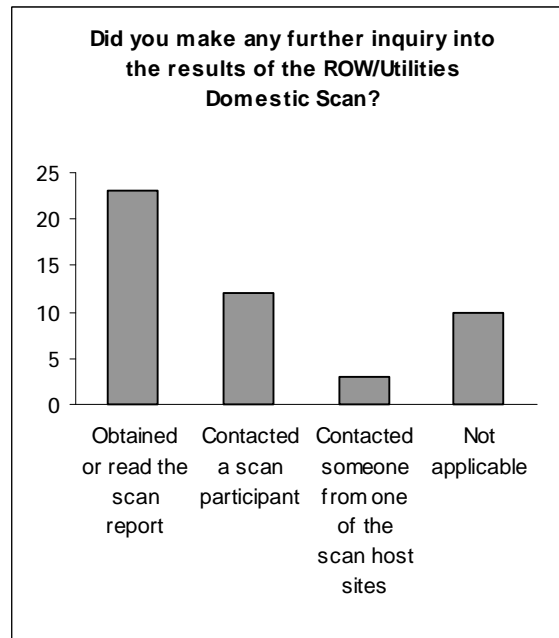


Figure 8.

Even with these brief surveys, we get some sense of the avenues of communication for outcomes of the scan tours. In each case, for about a third of the participants, the AASHTO subcommittee meetings were the only venue through which they became aware of the U.S. Domestic Scan Program, confirming that presentations at these subcommittee meetings are an important contributor to getting the word out about the program. Once people hear about the scan, it is quickly judged useful and there is a strong tendency both to get further information by either reading the reports or contacting those participating in the scan, and to pass along the information within the home agency and elsewhere, though both these tendencies were strongest for the ROW/Utilities meetings.

We also see other avenues by which people learn about the scan. Other organizations (TRB and FHWA) are important avenues for disseminating the existence and results of the Domestic Scan Program.

Future investigations of the paths of knowledge and technology transfer might probe more deeply and include brief follow-up interviews with some of the respondents, particularly those who seem far removed from the scan program itself. Additionally, the surveys didn't address what specific technologies or practices were implemented or initiated as a result of learning about the scan results. Further investigation would be necessary to identify these connections.

4.3 Discussion of Effects Beyond Scan Participants

The interviews of nonparticipants revealed that awareness of the Domestic Scan Program and subsequent implementation of new technologies and practices falls off significantly if one wasn't a participant in the scan. There are many technologies and practices implemented directly by scan participants and understood to be direct outgrowths of the Domestic Scan. However, in cases where implementation was delegated to others, the technology may be fully realized and understood to be a change and innovation within the agency, but may not be strongly associated with the Domestic Scan Program.

The implementation of the team approach on the Busway project in Connecticut and even the asset management changes in New Jersey are good examples of this. In both cases, we have robust implementation of technologies and practices highlighted during the scan. And, in both cases there is only a faint association of that change with the Domestic Scan Program. This may not be a problem for the Domestic Scan Program itself. It may not matter whether or not the program receives credit for the transfer of an innovation as long as innovation is occurring. However, continued support for the program may depend on its perceived value in promoting innovation and technology transfer.

In most cases, the nonparticipants received their information about the technologies and practices to be implemented directly from other people, primarily scan participants. While some referred to the final reports, many did not. The real communication of the results, the things to be implemented, came via direct contact with other people, much as the scan operates in the first place between the host sites and the scan participants.

Development and implementation of local versions of these technologies and practices also happens through in-person consultation, be it within the departments or by bringing in others from elsewhere. Two successful cases, the Busway in Connecticut and the asset management changes in New Jersey, used face-to-face discussions to transmit information and ensure implementation. In the Busway case, these were discussions between Michael Marzi and Rich Allen (a scan participant). In the New Jersey case, personnel in New Jersey were brought to Ohio for face-to-face encounters by the New Jersey FHWA representative, Dennis Merida (a scan participant)—mini-scan meetings in a sense—that then led to implementation in their home state.

The case in Ohio regarding computerized permitting offers a confirming counterexample. In this case, implementation of the permitting process is on hold in large part because ODOT needs to formulate a good solution to the problem. The general form of the solution is understood—computerize and centralize the permitting process. However, the particular implementation is at a standstill, in large part because the agency lacks a formulated solution. ODOT is right now considering hiring consultants to do just that. However, the resources available from other states

could easily prove equally or more valuable to them. It would seem that they would benefit from a local mini-scan meeting focused on technologies and solutions for computerized permitting processes that have been implemented in other states.

Worth noting, however, is that the preferred mode for receiving this information is face-to-face, which is essentially what a consultant would do for them—provide preferred access to information and, having gathered expertise, help them tailor the solution to their locale. It would seem that New Jersey’s high-level visit to Ohio regarding asset management techniques is a good example of states doing this sort of thing directly with one another, mediated and aided by the structure of the Domestic Scan and FHWA.

This issue goes straight to the questions of further promoting implementation at the local DOT level and enhancing the reach and effects of the Domestic Scan Program as discussed in later sections.

5. Tracing Social Connections and Technology Transfer

The Domestic Scan Program is effective in several ways. The process of the scan itself gathers innovative technologies and practices into one nexus of information. The primary distillation of that information is in the final report for the scan and represents a real resource that is easily transmitted and kept for reference. The process of the scan also benefits the host sites, acting as a stimulus to their own efforts and engendering enthusiasm and goodwill within those departments, as selection to be a host site is considered confirmation of work well done.

The participants themselves are the leading edge of the impact of the scan. Many have direct oversight of implementation efforts within their own agencies. They are in good positions to promote the scan process and the scan results through presentations, serving on other professional committees, and their own personal testimony in other venues. The members form a team, and the individuals benefit from this collaborative environment both during and after the scan tour.

It has been hypothesized that the web of interaction and technology transfer as a result of the Domestic Scan Program reaches out beyond the direct participants in the scan, the scan tour members and the host sites, and that there are several modes by which people may become part of this web.

A common mode of connection is directly within a participant's department through the implementation of a particular technology or practice. Sometimes those implementing the technology understand their activities to be an outgrowth of the Domestic Scan and other times not. For instance, Mr. Marzi in Connecticut implemented the team approach highlighted in the ROW Acquisition/Utility Relocation Scan as part of the Busway project. He was not particularly aware of the scan, though in recounting the history of his involvement with the Busway project and the ROW effort there, he recalled that Mr. Allen "called me into his office and had gone to a conference and suggested that we try out some team approach techniques." Mr. Allen said that Mr. Marzi took the team approach idea and "ran with it." Mr. Marzi, for his part, talked to Mr. Allen regarding what needed to be done and how to implement it and did not actively consult other DOTs regarding the matters, but rather developed and tuned a team approach for his project that fit with the local conventions, using the principles and framework of the team approach.

Regardless of the original consciousness of the scan as the starting point for a particular innovation of practice/technology, the ultimate form of the implementation generally is not understood as being "from the scan." This points to one of the challenges in tracing these connections—often awareness of the scan as a significant contribution to the knowledge of the technology does not travel along with the knowledge. People don't, as a rule, necessarily attribute what they are implementing to the scan program unless they themselves were directly involved in the scan tour. Instead, they attribute the implementation to the person they spoke with concerning the technology.

Part of this is due to the scan being one of several sources of knowledge about new technologies and practices. For instance, a DOT may have been planning for some time to implement a given technology, but it was only in the wake of the scan, with the knowledge distilled through the conversations of the scan team and the writing of the scan report, that the implementation came to fruition. Or another DOT might advocate for the investigation of a technology that staff heard about during a presentation about the results of the Domestic Scan. That technology might actually be adopted, and though the seed of the idea originated from the results of the scan, that knowledge isn't attributed to the scan in practice.

This means that there are at least two matters to consider: 1) dissemination of knowledge about the scan together with the scan's existence as a resource and 2) dissemination of the knowledge-content of the scan, regardless of attribution. The second case is complicated by the fact that there are often multiple sources for similar information. There may be an international scan on the same topic (as there were for both the Asset Management and ROW Acquisition/Utility Relocation Domestic Scans). There may be other organizations advocating for the adoption of technologies and practices that are in line with the results of the scan. The AASHTO subcommittees are an important factor here. For instance, Kirk Steudle, Director of the Michigan Department of Transportation, serves as chair of the AASHTO Subcommittee on Transportation Asset Management and also co-chaired the Transportation Asset Management Domestic Scan Tour. The subcommittee has an elaborate, informative Web site (15) and much of the broader work done in asset management by Steudle and others is through that subcommittee.

Keeping these challenges in mind, we can examine particular instances of social connection looking at the overall flow of information and the path of implementation and analyze some of the more general features of these connections.

Dennis Merida, FHWA-New Jersey scan participant:

Ø to Kris Kolluri and Steve Dilts, former and current Commissioners of New Jersey DOT

Ø to Dave Kuhn, Executive Director, Capital Investment Strategies, New Jersey DOT

Using funds available to him for the purpose of aiding technology transfer, scan participant Dennis Merida connected high-ranking New Jersey DOT administrators to scan host site participants in Ohio. This was enough to get motion going within New Jersey itself, out of which Dave Kuhn's position was developed. It is worth noting that Mr. Merida first attempted to get Mr. Kolluri's predecessor involved by sending him a personal copy of the scan report with individual items of interest flagged, but didn't get much response. When Mr. Kolluri came in, Mr. Merida again sent the Domestic Scan report, adding a cover letter to emphasize the results, and arranged a follow-up meeting with Mr. Kolluri. They had "a long chat" and "the new commissioner got excited about it," leading to the trip to Ohio to meet with Leonard Evans (a scan participant), Gordon Proctor, and their staff for a day. Integral to this path of connection is the person-to-person, face-to-face encounters—Mr. Merida got further in encouraging innovation at New Jersey DOT by sending the report with a cover letter and following up with a personal visit, rather than merely sending the report along, even with items flagged.

Rich Allen, Connecticut DOT scan participant:

Ø to Michael Marzi, ROW champion, Connecticut DOT

Ø to divisions within Connecticut DOT

Following the scan, Mr. Allen suggested to Mr. Marzi that the team approach might work well on the very large Busway project that was in development. They consulted together and Mr. Marzi became the lead advocate for the team approach, central to the overall success of its implementation. Within Connecticut DOT, the team approach has been promulgated and embraced by division members several steps removed from the scan tour.

**John Campbell, scan co-chair, and Don Toner, host site contact, TxDOT
Ø to other state DOTs**

Mr. Campbell was one of the scan co-chairs and Texas one of the primary host sites for the ROW Acquisition/Utility Relocation scan tour. TxDOT's ROW division is very active in promoting its own processes and technologies, particularly public/private partnerships, design-build strategies, and other practices geared toward efficiently completing very large transportation projects. In this case, the Domestic Scan is one of many avenues of communication for innovation, and TxDOT's innovative practices are disseminated via presentations and consultations that arise from the initial contact during a presentation. Some contact from other DOTs was attributed to written documents (such as the scan report), but was indistinguishable from the contact initiated because of a presentation given at a conference or personal participation in other forums (such as the International Scan tour).

The common thread in these examples is the importance of individual connection and face-to-face interaction. In virtually every case of implementation, the node of contact was a person, be it through a presentation, a superior bringing in notice of new technology, or a consultation with an industry peer. Importantly, while written documentation and reports are referred to (and are considered to be high-quality in the case of the scans), they do not constitute an avenue for implementation or innovation.

5.1 Kinds of Connections Fostered by the Scan

When asked about the value of their participation in the Domestic Scan Program in 2006, nearly all of the participants cited the connections and resources fostered by the intense experience of the scan. Many welcomed the possibility of regular follow-up meetings of scan participants with the goal of re-establishing and renewing the implementation goals developed during the scan tour itself.

The enhanced connections operate in two different ways. First, participants in the Domestic Scan form a new professional peer group based on shared experiences, both in the relatively simple ways of traveling and eating together and in the more professionally substantive ways of working together on problems, evaluating successes and failures, and learning together. The scan tours themselves were physically and mentally challenging, but all participants agreed they were productive. Even after more than two years, members cite specific technologies and practices learned on the scan as appropriate goals for their departments.

Second, the enhanced connections provide ready consultative resources to the participants by simply dialing the phone. They don't hesitate to call one another to compare notes or get advice from someone with specialized knowledge.

Some of the participants cited the arduousness of the scan itself as a problem that might be worth alleviating by breaking it up into shorter scans. However, the overall testimony in the interviews indicated this to be a minor concern.

The social connections are key, and the Domestic Scan acts as an important instigator of social connection. Most of the scan participants are peers in one way or another, though they are from different agencies. In principle, they ought to be resources for one another even apart from the scan. Yet it is only after the cooperative experience of the scan in which they get to know one

another through discussion, evaluating technologies, and working together that those connections in principle become connections in fact.

The scan functions differently in this matter than TRB meetings or AASHTO meetings. First, the scan takes a broader view of the problems facing participants, and their task is to look at their agencies in a relatively broad manner. With many professional meetings, on the other hand, issues tend to be quite specific and participants tend to stay in their own boxes. Secondly, and more importantly, the participants travel together, eat together, converse together and have a level of collegial interaction that is rare at other professional gatherings. This is facilitated by the small number of participants and the structure of the scan itself.

5.2 Enhancing Social Connection and Technology Transfer

The most effective way to enhance technology transfer from the Domestic Scan Program is to enhance the face-to-face connections between the engineers and other personnel overseeing the implementation of the technologies and practices. This is, in fact, one of the founding principles of the Domestic Scan Program, one whose effectiveness is backed up by research into the social networking and information gathering tendencies of engineers. In some sense, enhancing technology transfer from the scan equates to making the scan experience more widely available.

The key is to reproduce and make more accessible the experience of the scan, if only in small pieces. Three suggestions for such enhancement are to 1) publicize the particular scan through a short, readable, attractive document (preferably no longer than two pages) that condenses the major findings of the scan and provides references for further information; 2) make the scan teams themselves more responsible in the long term for developing and following up on implementations themselves; and 3) develop a program of targeted response teams that would be available as a resource for those that hear about the technologies and solutions promulgated in the scan and want to develop similar solutions in their home agencies.

5.3 Implementation Plans and Periodic Scan-Team Meetings

Many scan participants testified that they had gradually lost contact with the vigor and enthusiasm of the scan and with the participants themselves as time had passed. Initially, enthusiasm and focus was high, but as day-to-day demands rise, the push toward implementing changes wanes. Implementation activities are enhanced by working together with others. We see evidence of this within the scan tours themselves. Using a team approach to address multifaceted and multidivisional projects is one of the primary results of the ROW Acquisition/Utility Relocation scan tour itself, one that has met with significant success on implementation. The activities of the AASHTO subcommittee on asset management also show the enhanced effectiveness of focused cooperation and problem-solving. In both cases, regular face-to-face contact among the group members has been key to their effectiveness and has helped turn each group into a nexus of information for those practices.

Many scan participants agreed that formalizing the implementation plan requirement for participants and establishing a regular schedule of follow-up meetings with fellow participants would enhance the long-term effectiveness of the scans. Several participants pointed to such activities taking place within the International Scan Program.

5.4 Targeted Response Teams

To enhance the effectiveness of the dissemination of the new technologies and innovations articulated in the Domestic Scan, teams of experts could be designated to aid a state DOT in formulating solutions to their own challenges by leveraging the knowledge of those who participated in the scan as host sites. Developing such targeted response teams (or “SWAT teams”) was one of the recommendations in the Final Evaluation Report of the pilot scans.

Presentations, talks and publications are already part of the dissemination process. These efforts could be enhanced by mimicking some aspects of the scan itself and presenting opportunities for other state DOTs to benefit from some of the hands-on, face-to-face interaction that takes place during the scan. Members of such teams could be generated relatively ad hoc and could consist of both scan participants and host site coordinators.

Consider the following scenario. In addition to outlining the results of the scan tour at an AASHTO subcommittee meeting, the presenting scan tour member also provides the name and contact information for an implementation team leader, likely someone from one of the relevant host sites. A state DOT practitioner listening to the presentation would then have a contact designated to provide information about innovations and technologies known to be genuinely successful.

This practitioner contacts the implementation team leader and arranges for a visit to his agency from that leader and one or two other team members. This visit has two goals: first, to provide a very brief (less than 2 hours) summary of the scan results that pertain to the particular implementation issue at hand. Secondly, the rest of the visit (perhaps a full day) would consist of high-level discussion aimed at articulating an implementation scope and action plan for this new site.

Preparation for this meeting would involve the new site going through a questionnaire or self-assessment that would help guide the day’s conversation. The emphasis of the second half of the meeting would be in having the scan team educate the new site regarding the solutions implemented in other states, answer questions regarding that implementation, and help the new site formulate the path to a solution or implementation for their particular location.

Such a team visit would serve both to jump-start the innovation and implementation process at the new site and to provide tangible, useful connections. Note that this team would not be undertaking the implementation themselves; they are not typical consultants and are not responsible for formulating solutions. Rather, they would be more like mini-scan participants, a reflection of the original work in a more distilled and targeted manner. In the actual scan, a broad array of technologies and innovations are explored and articulated. With the implementation team, a small subset of issues (perhaps one or two closely related innovations) would be considered and the focus would be on how the innovation is structured, implemented and tuned to the new site.

6. Proposal for Future Review of Domestic Scan Effectiveness

Based on our review of the two pilot domestic scans, it appears that the intended effect of the U.S. Domestic Scan Program is being achieved at least to some degree: Participants are being exposed to useful technologies and practices, are implementing some of them in their agencies, and are passing on information from the scan to others who may also be acting on it.

However, a number of questions remain about the process of technology transfer from the scans:

- Can the technology transfer effect from the scans be increased or more fully documented?
- What can the organizers or participants do differently to maximize the value of the investment?
- Would additional follow-up activities measurably increase the impact from the scan?
- Can the value of the Domestic Scan Program be shown over the long term, from scan to scan?

To answer these questions and others, and to provide a consistent evaluation component to the Domestic Scan Program, we propose the following steps related to each scan tour:

1. Prior to the scan, obtain written assurance from participants that:
 - They expect to remain in their current positions or ones with related responsibilities for at least three years.
 - They agree to complete and carry out a formal implementation plan for acting on scan findings in their own agencies and also for disseminating information beyond their agencies.
 - They agree to participate in two follow-up surveys and Web conferences that will be conducted 12 months and 24 months after completion of the scan tour.
2. Twelve months after completion of the scan, using information from the final report and the participants' implementation plans, the consultant will conduct a Web survey of participants and host site organizers regarding:
 - The value of particular technologies and practices learned from the scan tour
 - Overall effectiveness of the scan tour
 - Progress toward implementation of specific findings
 - Dissemination activities completed to date and planned for the future
 - Names of individuals who have been contacted regarding scan tour findings
3. Within three weeks of the survey, the consultant will facilitate a Web conference in which survey results are presented and participants have an opportunity to:
 - Reconnect with one another and compare experiences at their own agencies since the conclusion of the scan tour
 - Compare planned efforts to present scan tour findings at industry meetings
 - Consider informal or formal meetings or teleconferences to address specific challenges of implementing scan results
4. Twenty-four months after completion of the scan, the consultant will again survey participants regarding their progress toward effecting change and disseminating knowledge from the scan tour. Names of individuals who have been contacted regarding

scan tour findings will again be solicited from participants. Survey results will again be presented and discussed in a Web conference within three weeks of the survey.

5. Following the second survey/Web conference at the two-year mark, the consultant will conduct a Web survey of all nonparticipants who have been identified as receiving information related to scan tour findings. The survey would probe:
 - What technologies or practices from the scan were of most interest
 - What implementation efforts have been made and with what success

6. At 2½ years after completion of each scan tour, the consultant will compile a final report of evaluation efforts:
 - Results from the two surveys of participants
 - Key points of discussion from the two Web conferences, especially successes in implementing and disseminating new technologies and practices
 - Results from the survey of nonparticipants
 - Observations regarding findings

Appendix A – Initial Questionnaires for Scan Participants

ROW Acquisition and Utility Relocation

*** 1. Please provide your name:**

Name:

The following questions itemize cross-cutting findings and innovative tools for improving right-of-way acquisition and utility relocation processes that were observed during the scan. Please select a single assessment for each of the listed technologies or practices that best describes your view of its current implementation status in your agency. Your responses will be used to make the best use of your time during the upcoming phone interview.

2. Supportive of Institutional Environment:

	Not Attractive For Implementation	Previously Implemented	Attempted to Implement (Unsuccessful)	In Process of Implementing	Plan to Implement	Implemented
Team approach						
Upper management support						
Innovation and risk taking						
Adequate resources						
Monitor/improve performance						

ROW Acquisition and Utility Relocation						
3. Focus on Process:						
	Not Attractive For Implementation	Previously Implemented	Attempted to Implement (Unsuccessful)	In Process of Implementing	Plan to Implement	Implemented
Cross-disciplinary approach	↓	↓	↓	↓	↓	↓
Early Involvement of stakeholders	↓	↓	↓	↓	↓	↓
Explicit, written procedures	↓	↓	↓	↓	↓	↓
Incentives to maintain staff continuity	↓	↓	↓	↓	↓	↓
Delegated decision-making authority	↓	↓	↓	↓	↓	↓
Conflict resolution	↓	↓	↓	↓	↓	↓
Colocation of major participants	↓	↓	↓	↓	↓	↓
Focus on Schedule Adherence	↓	↓	↓	↓	↓	↓
Design-build Procedures	↓	↓	↓	↓	↓	↓
4. Technical Tools:						
	Not Attractive For Implementation	Previously Implemented	Attempted to Implement (Unsuccessful)	In Process of Implementing	Plan to Implement	Implemented
Property management systems	↓	↓	↓	↓	↓	↓
Document and information management systems	↓	↓	↓	↓	↓	↓
Electronic field data entry	↓	↓	↓	↓	↓	↓
Visualization and animation technology	↓	↓	↓	↓	↓	↓
Web sites	↓	↓	↓	↓	↓	↓
Environmental management systems	↓	↓	↓	↓	↓	↓

ROW Acquisition and Utility Relocation						
5. Other Techniques:						
	Not Attractive For Implementation	Previously Implemented	Attempted to Implement (Unsuccessful)	In Process of Implementing	Plan to Implement	Implemented
Incentive acquisition and relocation payments	↓	↓	↓	↓	↓	↓
Advance acquisition payments	↓	↓	↓	↓	↓	↓
Appraisal waiver and appraisal review modification	↓	↓	↓	↓	↓	↓
Utility reimbursements	↓	↓	↓	↓	↓	↓
Employment of subsurface utility engineering	↓	↓	↓	↓	↓	↓
Design mitigation strategies and value engineering	↓	↓	↓	↓	↓	↓

Best Practices in Transportation Asset Management

*** 1. Please provide your name:**

Name:

The following question itemizes successful approaches to transportation asset management that were observed during the scan. Please select a single assessment for each of the listed approaches that best describes your view of its current implementation status in your agency. Your responses will be used to make the best use of your time during the upcoming phone interview.

2. Please provide your assessment of the following issues related to the scan:

	Not Attractive For Implementation	Previously Implemented	Attempted to Implement (Unsuccessful)	In Process of Implementing	Plan to Implement	Implemented
Preservation-first strategy	↓	↓	↓	↓	↓	↓
Asset management champion	↓	↓	↓	↓	↓	↓
Formal asset management process	↓	↓	↓	↓	↓	↓
Investment principles based on life-cycle costing	↓	↓	↓	↓	↓	↓
Performance measures	↓	↓	↓	↓	↓	↓
Scenario analysis	↓	↓	↓	↓	↓	↓
Team approach in organizational model	↓	↓	↓	↓	↓	↓
Institutional self-assessment	↓	↓	↓	↓	↓	↓
Application of risk analysis techniques	↓	↓	↓	↓	↓	↓
Quality and cost-effective data collection	↓	↓	↓	↓	↓	↓
Customer orientation in asset management process	↓	↓	↓	↓	↓	↓
New technologies in data collection	↓	↓	↓	↓	↓	↓
Documented performance measures	↓	↓	↓	↓	↓	↓

Appendix B – Interview Questions

Interview Questions – State DOT Participants

- 1) Which two or three innovative technologies or practices did you most want to see implemented in your agency when you returned from the scan tour?
- 2) What did you do in particular to initiate their implementation in your own agency? Where your efforts formal, informal or both? Did you make presentations, preside over committees, talk to colleagues one on one? Did you use all or part of the PowerPoint template provided by the scan tour consultant?
- 3) What responses did you encounter to your internal efforts? Where the response was favorable, who in particular at your agency joined you in trying to advance the innovation?
- 4) Did you communicate or work with your local FHWA division office in attempting to implement one of the innovations from the scan tour? If so, who in that office did you work with?
- 5) At what external meetings did you make presentations about the scan tour findings? Did you use all or part of the PowerPoint template provided by the scan tour consultant?
- 6) What responses did you encounter to your external efforts? For favorable responses indicating an intention to implement one of the findings, what are the names of the people and their agencies?
- 7) Describe the process of successfully implementing one of the practices or technologies that you brought with you to your agency from the scan. Do you have any documents, images or other evidence of implementation that you can share with us?
- 8) Describe an unsuccessful effort to implement one of the practices. What do you think was the principal roadblock to implementation?
- 9) What signs within your agency indicate to you that your efforts have been successful? When did something actually change and how did you know?
- 10) Do you still keep in touch with other scan participants? Do you compare notes on progress toward implementing one of the scan-tour technologies or practices?
- 11) Just stepping back a bit, what really stands out as having been the most valuable thing that you came away with from the scan tour?
- 12) What advice do you have for those running the Domestic Scan Program now regarding what to do differently, the things that would really help you back in your agency?

Interview Questions – Scan Co-Chairs

- 1) Have you had contact with other scan participants since the conclusion of the scan? Are you aware of successful implementation of scan tour findings at participant agencies or other agencies around the country as a result of the scan tour? If so, can you provide us their names?
- 2) Have you been contacted by other agencies about technologies or practices that were highlighted in the scan tour report or presented at AASHTO and other meetings? If so, can you provide us these names?
- 3) After two-plus years, do you consider the Domestic Scan Program an effective tool for technology transfer? Why or why not?
- 4) Looking back, what was the most effective part of the scan? Least effective?
- 5) Are the innovations and technologies reviewed in the scan two years ago still applicable or are they now dated?
- 6) Which of the technologies or innovations explored during the scan tour have proved to be the most robust, pertinent, and effective for the long term? Are they the ones you thought they would be two years ago?
- 7) What are the indications that the scan tour has been effective?

Interview Questions – FHWA Participants

- 1) Which two or three innovative technologies or practices did you most want to see implemented by state DOTs when you returned from the scan tour?
- 2) What did you do in particular to initiate their implementation? Were your efforts formal, informal or both? Did you make presentations to other FHWA offices, preside over committees, talk to colleagues one on one? Did you use all or part of the PowerPoint template provided by the scan tour consultant?
- 3) What responses did you encounter to your internal efforts? Where the response was favorable, who in particular at FHWA or other agency joined you in trying to advance the innovation?
- 4) Did you communicate or work with a state DOT in attempting to implement one of the innovations from the scan tour? If so, who did you work with?
- 5) At what external meetings did you make presentations about the scan tour findings? Did you use all or part of the PowerPoint template provided by the scan tour consultant?
- 6) What responses did you encounter to your external efforts? For favorable responses indicating an intention to implement one of the findings, what are the names of the people and their agencies?

- 7) Are you aware of successful implementation of one of the practices or technologies that were described during the scan tour? Can you describe the process it went through to get implemented? Do you have any documents, images or other evidence of implementation that you can share with us?
- 8) Are you aware of any unsuccessful efforts to implement one of the practices? What do you think was the principal roadblock to implementation?
- 9) What signs within FHWA or the state DOTs indicate to you that your efforts have been successful? When did something actually change and how did you know?
- 10) Do you still keep in touch with other scan participants? Do you compare notes on progress toward implementing one of the scan-tour technologies or practices?
- 11) Just stepping back a bit, what really stands out as having been the most valuable thing that you came away with from the scan tour?
- 12) What advice do you have for those running the Domestic Scan Program now regarding what to do differently, the things that would really you at FHWA or state DOT practitioners back at their agencies?

Appendix C – Scan Tour Participants

ROW Acquisition and Utility Relocation Scan – State Participants	
<p>Richard (Rich) Allen Rights of Way Administrator Connecticut Department of Transportation 2800 Berlin Turnpike Newington, CT 06131-7546 Phone: 860-594-2378 Fax: 860-594-2494 richard.allen@po.state.ct.us</p> <p>John Campbell (Scan Co-Chair) Director, Right of Way Division Texas Department of Transportation P.O. Box 5075 Austin, TX 78763-5075 Phone: 512-416-2918 Fax: 512-416-2904 jcampbel@dot.state.tx.us</p> <p>Raymond (Ray) Lorello Utility & R/W Program Manager Ohio Department of Transportation 1980 West Broad St. Columbus, OH 43223 Phone: 614-466-2279 Fax: 614-466-0158 ray.lorello@dot.state.oh.us</p> <p>George Lovett District General Counsel & Right of Way Manager Florida Dept. of Transportation, District 5 719 South Woodland Boulevard DeLand, FL 32720 Phone: 386-943-5029 Fax: 386-736-5207 george.lovett@dot.state.fl.us</p>	<p>Donald (Don) Nelson Director, Environmental & Engineering Programs Washington State Department of Transportation P.O. Box 47321 Olympia, WA 98504-7321 Phone: 360-705-7101 Fax: 360-705-6803 nelsondo@wsdot.wa.gov</p> <p>Bimla Rhinehart Chief, Division of Right of Way & Land Surveys California Department of Transportation 1120 N Street, MS #37 Sacramento, CA 95814 Phone: 916-654-5075 Fax: 916-653-8762 bimla_rhinehart@dot.ca.gov</p> <p>John Sherman Lands Management Administrator Wyoming Department of Transportation 5300 Bishop Blvd. Cheyenne, WY 82009 Phone: 307-777-4126 Fax: 307-777-4465 john.sherman@dot.state.wy.us</p> <p>Kevin Stout Assistant Chief, Right of Way Oklahoma Department of Transportation 200 N.E. 21st Street Oklahoma City, OK 73105 Phone: 405-521-2661 Fax: 405-522-1858 kstout@odot.org</p>

ROW Acquisition and Utility Relocation Scan – Federal Participants**James Cheatham**

Administrator
FHWA Pennsylvania Division
228 Walnut Street, Room 508
Harrisburg, PA 17101-1720
Phone: 717-221-3461
Fax: 717-221-3494
james.cheatham@fhwa.dot.gov

Daniel (Dan) Mathis

Administrator
FHWA Washington Division
711 S. Capitol Way, Suite 501
Olympia, WA 98501
Phone: 360-753-9480
Fax: 360-753-9889
daniel.mathis@fhwa.dot.gov

Original Participants Not Interviewed:

John (J.D.) Ewald (Texas DOT)—left department

Donald (Don) Jackson (FHWA)—retired

Susan Lauffer (FHWA)—retired

Transportation Asset Management Scan – State Participants**Leonard Evans**

Ohio Department of Transportation
1980 West Broad Street
Columbus, OH 43221
614-466-8993
leonard.evans@dot.state.oh.us

Lacy Love

North Carolina Department of Transportation
Transportation Building, Room 106
1 South Wilmington Street (Delivery)
Raleigh, NC 27601
919-733-2330
llove@dot.state.nc.us

Bart Selle

Vermont Agency of Transportation
1 National Life Drive, Drawer 33
Montpelier, VT 05633
802-828-2757
bart.selle@state.vt.us

Kirk Steudle (Scan Co-Chair)

Michigan Department of Transportation
Van Wagoner Building
425 West Ottawa
P.O. Box 30050
Lansing, MI 048909
517-373-2114
steudleK@michigan.gov

Paul Wirfs

Oregon Department of Transportation
Engineering and Asset Management
Unit Manager
Geo-Environmental Section
355 Capitol St NE, Room 318
Salem, OR 97301
503-986-3526
paul.r.wirfs@odot.state.or.us

Transportation Asset Management Scan – Federal Participants

Thay N. Bishop
Federal Highway Administration
61 Forsyth Street, SW
Suite 17T26
Atlanta, GA 30303
404-562-3695
thay.bishop@fhwa.dot.gov

David R. Geiger (Scan Co-Chair) RETIRED
Federal Highway Administration
Office of Asset Management
HIAM-1 Room 3211
400 Seventh St. SW
Washington, DC 20590

Dennis L. Merida, P.E.
Federal Highway Administration
840 Bear Tavern Road, Suite 310
West Trenton, NJ 08628
609-637-4200
dennis.merida@fhwa.dot.gov

Robert Ritter
Federal Highway Administration
Office of Planning
HEPP-20 Room 3301
400 Seventh St. SW
Washington, DC 20590
202-493-2139
robert.ritter@dot.gov

Original Participants Not Interviewed:
David R. Geiger (FHWA)—retired
Thay N. Bishop—unavailable

Appendix D – Host Site Contacts

ROW Acquisition/Utility Relocation Scan:

Florida: Shirley Martin, (386) 943-5478, shirley.martin@dot.state.fl.us

Fred Loose, (36) 943-5492, Fredrick.loose@dot.state.fl.us

Texas: Don Toner, (512) 531-5904

John Breed, (512) 531-5903

Minnesota: Mike Stensberg, (651) 366-3503

Marilyn Remer, (651) 366-4668

Transportation Asset Management Scan:

Florida: Tim Lattner, (850) 410-5757

Michigan (all sites): Bill Tansil, tansilw@michigan.gov

Utah: Tim Rose, (801) 965-4150, timrose@utah.gov

Ohio: Leonard Evans (scan participant), (614) 466-8993

Oregon: Paul Wirfs (scan participant), (503) 986-3526

Appendix E – Survey of Attendees of Regional Asset Management Conferences

NCHRP Transportation Asset Management Domestic Scan Survey

Thank you participating in this brief survey. Your responses will contribute to research into the effectiveness of the NCHRP Domestic Scan Program.

*** 1. Please provide your name and organization:**

Name:

Organization:

2. Do you recall hearing a presentation or discussion at a Regional Asset Management Conference regarding the Domestic Scan program and the results of the 2006 Scan on Transportation Asset Management?

Yes

No

3. Have you heard about the Domestic Scan Program (NCHRP 20-68) from other sources?

Yes

No

4. If so, please indicate the source:

5. Did you make any further inquiry into the results of the Transportation Asset Management Domestic Scan? (Check all that apply.)

Obtained or read the Scan report

Contacted a Scan participant

Contacted someone from one of the Scan host-sites

Not Applicable

6. Did you pass along any information about the Transportation Asset Management Domestic Scan program or the NCHRP Domestic Scan program generally (for instance, the report or information from the report) to others within your department or elsewhere?

Yes

No

NCHRP ROW/Utilities Domestic Scan Survey

Thank you participating in this brief survey. Your responses will contribute to research into the effectiveness of the NCHRP Domestic Scan Program.

*** 1. Please provide your name and organization:**

Name:

Organization:

2. Do you recall hearing a presentation or discussion at a meeting of the AASHTO Subcommittee on Right-of-Way and Utilities regarding the Domestic Scan program and the results of the 2006 Scan on ROW Acquisition/Utilities Relocation?

Yes

No

3. Have you heard about the Domestic Scan Program (NCHRP 20-68) from other sources?

Yes

No

4. If so, please indicate the source:

5. Did you make any further inquiry into the results of the ROW/Utilities Domestic Scan? (Check all that apply.)

Obtained or read the Scan report

Contacted a Scan participant

Contacted someone from one of the Scan host-sites

Not Applicable

6. Did you pass along any information about the ROW/Utilities Domestic Scan program or the NCHRP Domestic Scan program generally (for instance, the report or information from the report) to others within your department or elsewhere?

Yes

No

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