

NCHRP Peer Exchange 2008



September 23-25, 2008

Washington, DC

CONTENTS

Introduction

Abbreviations, Acronyms, and Initialisms

The Team

Theme Areas

Results

Team Member Reports

Conclusions

Appendix A: Agenda

Appendix B: Team Roster

Appendix C: Discussion Papers

INTRODUCTION

Peer exchanges for state department of transportation (DOT) research programs originated with the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). That federal legislation required the states to conduct periodic peer exchanges to foster excellence in research program management. State DOTs have found the peer exchange to be an excellent forum for the open exchange of ideas, knowledge, and brainstorming. Many states have now conducted two or three peer exchanges, and the value and benefits of the program have been significant.

The National Cooperative Highway Research Program (NCHRP) of the Transportation Research Board (TRB) is not required to conduct a peer exchange, but NCHRP management recognize the peer exchange format as an excellent tool to explore new ways of improving the efficiency and effectiveness of the program.

The first NCHRP peer exchange, held in March 2002, was a general review of the full research program. This report documents the results of NCHRP's second peer exchange, held September 23-25, 2008 (refer to Appendix A for details of the agenda). The 2008 event focused on four specific themes:

1. Doing the Right Research
2. Dissemination and Implementation
3. Keeping on Track
4. Workforce Development

In preparation for the peer exchange, team members (refer to Appendix B for contact information for the participants) were sent a discussion paper on each of the four theme areas for review. (These discussion papers constitute Appendix C). The report includes general observations of the peer exchange team, as well as specific items for consideration by the NCHRP.

ABBREVIATIONS, ACRONYMS, AND INITIALISMS

AASHTO	American Association of State Highway and Transportation Officials
ACRP	Airport Cooperative Research Program
CEO	Chief Executive Officer, usually of a state DOT
CTS	Center for Transportation Studies, University of Minnesota
DOT	Department of Transportation
FHWA	U.S. Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
HMCRP	Hazardous Materials Cooperative Research Program
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
OGC	Office of Contracts and Grants (of The National Academies)
PDA	Personal Digital Assistant
RAC	AASHTO Research Advisory Committee (advisors to SCOR)
RFP	request for proposal
RITA	Research and Innovative Technology Administration
SCOR	AASHTO Standing Committee on Research
TCRP	Transit Cooperative Research Program
TRB	Transportation Research Board
TxDOT	Texas DOT
UTC	University Transportation Center

THE TEAM

The NCHRP 2008 peer exchange team represented a diverse cross section of program sponsors, partners, and researchers:

- State DOTs (6), the sponsors of the NCHRP
- University transportation centers (1)
- Private consulting firms (2)
- FHWA (1)
- ITE (1)
- AASHTO (2)



NCHRP Peer Exchange 2008

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NCHRP Peer Exchange 2008

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THEME AREAS

The fundamental tenet of the NCHRP is to address the most pressing problems and needs of state DOTs. A broad cross section of state DOT staff propose research ideas, review problem statements, select projects for funding, provide that funding, serve on advisory panels, and implement the results. In theory, the model guarantees that the research will effectively identify and address the highest priority topics of its primary stakeholders.

This peer exchange focused on four themes within this model that have been the subject of a great deal of recent discussion, both within the program and among the NCHRP sponsors. For each theme area, amplifying questions were identified as follows:

Theme 1. Doing the Right Research

- Is the NCHRP model still the right model? If so, what current elements can be improved and how? Example elements include the following:
 - Solicitation of problem statements
 - Review of problem statements
 - Presentation of review results to RAC and SCOR before selection meeting
 - SCOR project selection process
 - Formation of project panels
- If the NCHRP model would benefit from modification, what aspects should be considered? Example aspects include the following:
 - Tying the program to strategic needs and priorities
 - Identifying and addressing emerging issues
 - Involving other modes
 - Collaborating with other associations and organizations in identifying research needs
 - Collaborating with other funding partners

Theme 2. Dissemination and Implementation

- How can NCHRP do a better job of disseminating and marketing its products?
- How do you fit the product to the audience? Has the audience changed in the way it finds and assimilates information? Is this a good thing?
- Should a program like the NCHRP employ dedicated staff with marketing expertise? What is the potential payoff in doing so?
- What is the role of NCHRP in implementation?
- How much of the research budget should be spent on dissemination and implementation?

Theme 3. Keeping on Track

- How do you motivate contractors to perform to their highest ability?
- Are kick-off meetings with the panel and contractor effective?
- Ongoing surveillance—are our contractors providing the right number and quality of progress reports for the panels to evaluate their work effectively?
- Keeping contractors on schedule—what carrots and sticks do we have available?
- Tips and tools—what are the most important elements of project management software programs? What are the best practices of effective project management?

Theme 4. Workforce Development

- For research project managers, what is the relative importance of subject expertise versus project management expertise?
- What are the most effective ways to evaluate the performance of project managers?
- “Took the course, got the binder”—Are there really training courses that can help you do your job better?
- How do you encourage team building and keep everyone (including support staff) working toward a common goal?
- What are the pros and cons of telecommuting? Is it the wave of the future or the last refuge of the indolent? How can an agency best transition to one that makes effective use of remote staff? Do remote staff need a different management paradigm?

RESULTS

This section of the report documents the results of discussions on the four theme areas held over the 2 ½ day meeting. The points below are grouped into two categories: general observations and specific items for consideration by the NCHRP.

Theme 1: Doing the Right Research

General Observations

1. Most NCHRP research is generated from the “bottom up” —i.e., it is based on problem statements developed and submitted by practitioners. (An exception is the 20-24 series aimed at the quick response needs of senior DOT executives and AASHTO headquarters).
2. The traditional role of the NCHRP delivers a lot of value by solving problems directly related to the needs of its sponsors.
3. A blend of bottom-up and top-down research ideas would make for a more balanced overall program and better address national strategic needs and objectives.

NCHRP Peer Exchange 2008

4. Bottom-up ideas are submitted by practitioners with the energy and enthusiasm to help make the project a success. It may be harder to find such champions for top-down research addressing high-level trends and issues.
5. Experience indicates that European transportation agencies are much better than the United States in conducting policy research. The fragmented structure of the U.S. transportation system may make it more difficult to agree on top-down priorities. There is no single national transportation research agenda in the United States.
6. In the past, the transportation sector has addressed some major goals, such as building the interstate system or landing a man on the moon. Today, we face issues that do not generate as much focused interest and energy.
7. Existing data sources can be used to identify the most pressing problem areas (e.g., statistics on safety and congestion). Monitoring economic, demographic, and social trends will help research programs plan for future needs.
8. Research programs can be developed using a risk-based approach. For example, program sponsors could consider the risks of *not* having good safety data and programs, of *not* addressing congestion, of *not* having adequate design manuals, etc.
9. NCHRP problem statements can come from only three sources: state DOTs, AASHTO committees, and the FHWA. Other groups (e.g., TRB committees, which include government, private-sector, and academic members) could contribute to the program by providing a broader cross section of users, a stronger knowledge of how a research project should be structured, and more opportunities for buy-in. The problem statements from the research community itself *may* be more strategic and forward-thinking. It would be helpful to clarify and promote the opportunities for TRB committees and other groups to work with AASHTO committees, state DOTs, and FHWA to develop problem statements.
10. In Europe, there are “banks of expertise”: lists of highly qualified individuals who can be called on to serve as expert advisors (e.g., panel members or reviewers). NCHRP tends to use AASHTO and TRB committees for this role.

Considerations for NCHRP

1. Task a high-level body (e.g., the TRB Executive Committee or the AASHTO Board of Directors) with identifying top-down research ideas. Consider the appropriate role for RAC and SCOR in (a) soliciting these high-level research needs and developing problem statements and (b) reviewing NCHRP problem statements in the context of their own agency objectives and priorities.
2. Identify the unique niche to be served by the \$5 million future needs project and be realistic about expectations.

NCHRP Peer Exchange 2008

3. Finding partners to collaborate on research funding is complex. Consider developing a procedure to identify groups having common needs who can contribute funds to a joint project. Collaboration among agencies will need a blended management approach. Contributing partners will need to understand and respect the differing goals and approaches of one another and make compromises. Criteria should be established to avoid any perception of a conflict of interest between funding partners. Ensure that funding partners have missions and goals that are compatible with those of TRB and the National Academies.
4. Look for ways to expand collaborative efforts among TRB cooperative research programs (i.e., ACRP, HMCRP, NCFRP, and TCRP) and with other national and international research programs.
5. Explore opportunities for collaborative efforts with the U.S. DOT, including RITA, NHTSA, FHWA, FMCSA, and the other modal administrations (particularly in the freight area), particularly on high-level topics that cut across program areas. Develop a coordinated action plan on safety issues.
6. Consider allocating part of the NCHRP budget for cooperative efforts with other groups. Alternatively, some of the \$5 million allocated for future research needs could be allocated this way. For example, high-priority topics could be identified and NCHRP could solicit proposals from universities, local agencies, or private firms to address these topics with the understanding that the costs could be shared.
7. Examine and enhance how experts are found for NCHRP panels. Consider appointing private-sector and academic experts onto panels after a contractor has been selected (i.e., highly qualified individuals from firms or universities who were not part of the winning team). Develop a database of expertise of potential panel members. Find ways to encourage younger transportation professionals to serve on NCHRP panels.
8. Distribute AASHTO committee reviews to RAC and SCOR earlier so that these reviews could be considered during balloting.
9. Take steps to emphasize the importance of a literature review from the problem statement submitter. Examples: (a) ask the submitters to describe clearly how their proposed projects differ from or expand on, the existing body of knowledge; (b) provide guidance on how to conduct a literature search and where to turn for assistance.
10. Consider developing criteria or conditions under which lower-ranked NCHRP problem statements will be funded. Concerns have been expressed about the “bottom feeding” exercise at SCOR, where some of the lower-ranked problem statements are pulled out for discussion and often funded. This may be a result of discussions during the meeting that legitimately raised the understanding or priority of the topic. Ensure that all breakout groups at the SCOR spring meeting can review these lower-ranked problem statements.

NCHRP Peer Exchange 2008

11. Ensure that, if a multi-disciplinary approach is needed to address emerging issues, this need is addressed in panel formation.
12. Explore ways to make the review process for NCHRP problem statements more transparent and accessible. Consider distributing the summary of review comments to RAC in advance of the program selection meeting.
13. Find ways to help ensure that NCHRP problem statement review comments are clear, objective, and justified. Provide examples to assist reviewers.
14. Ensure that, when a request for project continuation funds involves a scope different from the original project, the request receives the same evaluation and ranking process as new problem statements.

Theme 2: Dissemination and Implementation

General Observations

1. Communication of research results to a non-technical or non-specialized audience is critical—both to promote (a) the value of the research program and (b) implementation of individual project results. Technical staff should understand basic principles of communication, but there is a role for communications experts in the research dissemination process.
2. Tracking the implementation and effects of research is important, and doing so will require the development (or application) of performance measures.
3. Effective dissemination is a combination of “push and pull” approaches. Best efforts should be made to get research results to the right people at the right time, but also to ensure reports are submitted to online databases and thoroughly indexed so that they can be retrieved when needed.
4. Consideration should be given to the “carrots and sticks” that encourage or inhibit implementation. Does the application of research need to be directed from upper management, or can individuals be encouraged or rewarded to adopt new research results?
5. Generally, NCHRP products can be found easily by searching the TRB website.
6. The *NCHRP Report 500* series is a good example of how products can be made more attractive and accessible through the use of glossy covers, effective graphics, and clear language.
7. Communications experts could serve in several valuable roles (e.g., writing report summaries for various target audiences, conducting surveys of research users, and working with technical staff to identify implementable elements of each project).

NCHRP Peer Exchange 2008

8. There is a need to account for generational differences because such differences affect communication strategies.

Considerations for NCHRP

1. Identify the key, implementable aspects of research reports in a concise format to help the reader quickly determine the potential benefits of the results. The NCHRP *Impacts on Practice* series or separately published “1 pagers” could fill this role.
2. For NCHRP projects intended for AASHTO balloting, consider setting aside funds for contractor revision of the report after the AASHTO review process.
3. Consider implementation from the start of each research project. The final product and target audience should be identified as early as possible in order to keep the end goal in mind. Review *NCHRP Report 442* for opportunities to enhance implementation activities.
4. NCHRP’s role is to facilitate implementation as much as possible by tailoring the final products to the target audience, and developing implementation plans—not to implement research results.
5. Consider assigning two or three members of each NCHRP panel as an implementation taskforce. This group would develop an implementation plan at project inception and work with the contractor to revise the plan, as needed, as the research is carried out. This implementation plan should include an assessment of the potential effects of the project results and how to assess those effects over time after the project is completed. Particularly for high-profile, high-benefit projects, develop a detailed, targeted implementation plan. At the end of the project, this plan can be transmitted to a targeted user community to guide implementation activities.
6. In Sweden, several research studies have been funded to track the effects of completed research projects. These are conducted by independent teams, not the sponsoring agency or the original research team. Consider whether this approach would benefit NCHRP.
7. Make greater use of communications experts to highlight the programs and disseminate the products of NCHRP research results. Consider adding an in-house communications specialist.
8. The value of a research program can be demonstrated through a few very successful projects. Consider developing communications material highlighting the results and benefits of some of NCHRP’s “big hitter” projects (e.g., the new pavement management guide and the design guide for cable guardrail).
9. Include funded tasks that can facilitate implementation within an RFP. Such tasks might include (a) a PowerPoint presentation on the project background, objectives, results, and

NCHRP Peer Exchange 2008

potential benefits or (b) presentations by the research team to relevant AASHTO or TRB committee meetings.

10. Provide funding for project panel members to attend relevant meetings to present results and promote implementation. Peer-to-peer communication is one of the most effective means of getting research put into practice.
11. Work closely with TRB Division A to incorporate high-quality NCHRP results into the Webinar program.
12. Assign an individual from the DOT or committee that submitted the original problem statement to take ownership of the results and take a leadership role in implementation.
13. Consider having a wrap-up meeting. Wrap-up meetings can be an effective way to kick off implementation with interested parties.

Theme 3: Keeping on Track

General Observations

1. Contractors are as interested as NCHRP in timely product delivery.
2. State DOTs also have problems getting contracts completed on time. Responsibility must be shared between the DOT and the contractor, and there must be an understanding of common objectives.
3. There are always tradeoffs among time, budget, and quality on a research project. Sometimes you need to settle for “good enough.”
4. For the most part, researchers are committed to delivering quality work. Private consulting firms and universities exist in unique cultural environments with their own missions, goals, and responsibilities. Consulting firms cannot afford to lose money on their contracts, and they must protect their reputations by delivering high-quality work. University faculty have a primary responsibility to educate their students and prepare the next generation of transportation professionals. Differing goals can result in conflicting priorities.
5. The best and brightest experts are in high demand and, as a result, face major pressures on their time. Consultants know that having experts on their teams will increase their chances of success. Clients have to know that there may be tradeoffs when contracting with the busiest researchers.
6. There is a perceived expectation that contractors will do work for NCHRP at a reduced rate or profit level compared with other clients. Contractors may be willing to do so because of the profile and exposure afforded to NCHRP contractor. This can affect

NCHRP Peer Exchange 2008

timeliness, and “investigator burnout” can be a real problem because contractors feel obligated to work on their own time.

7. Contractors need to protect their profit margins; project delays can result in lower profit through salary and direct expense increases/escalations not accounted for in the project budget.
8. It can be difficult for consultants to determine accurately how much time their staff and subcontractors will be able to allocate in a proposal when there is uncertainty about what other projects will be underway by the time contracts are executed.
9. In some states, a 6-month schedule delay is normal and typically does not have negative consequences. Delays are more tolerable when demonstrated progress is being made.
10. Given financial and accounting policies in some state government agencies, project delays may seriously affect whether or not they can fund projects in the next fiscal year.
11. Interaction between a project panel and research team is critical to ensuring objectives and expectations are clear. Interim meetings at key decision points help keep a project on track.
12. Project managers can affect timeliness by monitoring progress and facilitating interaction and communication between contractors and panels.
13. University faculty typically are not evaluated or rewarded based on their project management skills. These skills can be augmented by specialists within the university.
14. DOT staff receive surveys regularly but their regular responsibilities have to take preference. “Survey fatigue” limits the response rates to NCHRP surveys and can hinder timely project delivery.
15. Delays can result when a project is guided by a panel of volunteer experts. Panel members need to give priority to their own job responsibilities.
16. DOTs can slow the research process by not providing data or other support as quickly as promised.
17. Although contactors who have done NCHRP work before should have a good idea of how much time will be needed for initial survey activities, research projects have unknown elements. The project panel and consultant may not be aware of the difficulties they will encounter in finding the data needed to achieve the project objectives. Timelines need to be realistic for initial tasks. Proposers feel obligated to commit to the schedules given in RFPs.
18. Reassigning project management and administrative activities from the PI to other team members on the consultant’s staff can reduce delays.

NCHRP Peer Exchange 2008

19. Some DOTs will not award new contracts to a university until current projects awarded to the university are completed and products are delivered.
20. The distinction between contracts and grants needs to be clear to the researchers.
21. Using performance measures to evaluate project managers can affect the timeliness of project delivery; however selecting appropriate value-added measures is a challenge.
22. Compared with the top consulting firms, universities do not have the infrastructure to support the development and packaging of proposals.
23. Caltrans provides training for their staff in how to participate effectively in NCHRP panels. When the project is completed, staff are expected to be champions for implementation.
24. The cost of preparing proposals can limit the number of good proposals received for lower budget projects.
25. Kick-off meetings generally seem very effective. Contractually requiring the contractors to prepare technical memorandums at each step seems to help in receiving a final product on time.

Considerations for NCHRP

1. Consider giving proposers more flexibility by using outcome-based RFPs: clearly state the desired end product and allow proposers to present a workplan and schedule that demonstrates creativity. On the other hand, some projects may be “cookbook oriented” (e.g., survey the users and update a manual); such projects may not be appropriate for less-prescriptive RFPs.
2. Face-to-face meetings can have intangible benefits. Such meetings can (a) result in greater trust between the client and research team and (b) improve both timeliness and quality. Consider using face-to-face meetings as a project management tool.
3. Effective communication between researcher and client is the best way to improve performance. Research contracts are a partnership between the client and the research team. Kick-off meetings can be an effective way to build trust.
4. Panels and researchers should work together to resolve issues up front. For example, if a contractor believes there are problems with the proposed schedule, the contractor should work with the panel early in the project to develop realistic expectations.
5. Providing incentives in the research community is uncommon—consider rewarding early or timely delivery.

NCHRP Peer Exchange 2008

6. Provide better guidance on cost estimation to problem statement submitters and panels in order to develop more reasonable RFPs. To the extent possible, problem statement submitters should indicate how the cost estimate was derived.
7. To provide incentives for high-quality proposals on high-value studies, consider a two-stage process: Pre-select a few research entities by reviewing letters of interest, then fund the preparation of proposals from these pre-qualified research entities.
8. Panel members typically are in a good position to understand the availability of data. Identifying the barriers and deficiencies in the RFP will help contractors to plan time accordingly.
9. If the research team informs project managers early when there are potential problems, such problems can be dealt with in a timely manner.
10. If a problem statement is ill-conceived, the client's expectations may very well not be reasonable. Research panels should be given more direction in how to write well-crafted RFPs.
11. Penalties may be used to improve performance (e.g., by withholding invoices or a percentage of payment, through disqualification from bidding on future RFPs, and/or sending letters from the contracting authority to the CEO of a company or dean of a faculty).
12. Projects geared to key events (e.g., AASHTO Board of Directors or committee meetings, reauthorization) need to have rigid deadlines. These expectations must be made clear to the research team.
13. Using a tracking system to monitor progress and results with clear and simple outputs (e.g., dashboards) can be very effective.
14. A standard method or procedure to resolve delay-causing conflicts among panel members would be helpful.
15. Full disclosure of delinquent projects on a public website can put pressure on both researchers and project panels to stay on track.
16. NCHRP is considering increasing the NCHRP contract withholding amount to 20%. Reactions from researchers were as follows: 20% withholding may burden some contractors excessively; 10% withholding as a default value will get contractor attention without being onerous. 20% withholding may be appropriate for more high-risk projects where much of the work is done in later tasks. The withholding will not have much effect on a university, unless the client ultimately decides not to release the final payment. Consider a graduated withholding based on contractor past performance. As an alternative to withholding clauses, consider the increased use of fixed-price contracts with payments tied to deliverables.

NCHRP Peer Exchange 2008

17. Consider a “request for comments” on the NCHRP process in order to help identify new procedures or mechanisms that could be used to address delays. This request would be directed at the program sponsors as well as academics and consultants.
18. NCHRP projects are, in effect, fixed-price contracts. The budget allocated may not be sufficient to meet the panel’s expectations of outcomes. Consider seeking comments from the research community to determine whether budgets are reasonable before the budget is fixed and an RFP is issued.
19. The National Academies’ Office of Contracts and Grants (OCG) has developed a series of letters (that escalate after continued delays) to send delinquent contractors. OCG staff intend to get more involved and provide additional support to keep projects on track.
20. The project manager should be encouraged to contact the research team to make sure the team is getting needed support and feedback from the project panel.
21. Use a “designated pest”—harassment can provide results.
22. Find better ways to monitor long-term research needs related to AASHTO guides and manuals in order to plan and schedule the research when updates are needed.
23. On quick-response projects, ask the AASHTO committee that submits the problem statement to identify four or five members or other experts who are willing to serve on an advisory panel.
24. Work with AASHTO to identify procedures to minimize the time needed from the formation of a research idea to the development and submittal of a problem statement.

Theme 4: Workforce Development

General Observations

1. It has been very difficult to get transportation professionals to define the necessary skill sets required for their profession.
2. There is a tremendous need for training in the transportation sector.
3. Recent graduates are often trained in a very narrow focus area and learn their skills on the job.
4. Institutions like TRB, ITE, and AASHTO have an important role in training.
5. There are wide variations in what qualifies for continuing education credits.

NCHRP Peer Exchange 2008

6. “Too many universities are offering too many transportation programs”. Many programs have only limited numbers of faculty with practical experience. Transportation expertise is spread too thinly in educational institutions across the country.
7. Some states have modeled their research programs after NCHRP. TRB staff have a reputation for excellence, enthusiasm, and integrity.
8. Project management performance measures are not well defined or understood. Subjective evaluation of the individual’s overall project portfolio is more common.
9. Development of performance indicators requires identifying goals—these goals can be set for a department or an organization or tailored for an individual on a person-by-person basis.
10. Examples of performance indicators are as follows: number of graduate students supported, completing X% of projects on time, working within budget limits, etc. The benefits of performance measures can be both direct and indirect; working to achieve goals may provide motivational incentives.
11. “What gets measured gets done”—achievement of goals may create a false impression of competence and success. For example, you can get a project done on time by accepting a report that would have been improved through further revision.
12. Two-way communication between a manager and a supervisor is critical in setting expectations and evaluation performance.
13. Not all staff will take advantage of education and training opportunities when such opportunities are provided.
14. The TRB Annual Meeting is a great opportunity for education and networking. When staff attend the Annual Meeting, they learn to network and bring back new ideas to implement within the department.
15. Determining how many projects an individual can manage without compromising quality depends on many factors (e.g., the complexity of the project, the knowledge and skills of the project manager, the support staff available, and the extent of other related duties).
16. The number of projects a manager can handle is determined in part by the judgment of the manager, which comes with experience.
17. NCHRP program officers averaged around 15 projects 20 years ago; today the average is between 24 and 40.
18. In many cases, staff managing research projects in state DOTs do not even have “research” in their title. Program management is often an “additional responsibility” of

NCHRP Peer Exchange 2008

DOT staff—not their full-time job. The number of projects managed may range from 3 to 25, depending on other responsibilities.

19. Project managers need to understand *basic technical concepts* in order to communicate with the panel and research team, but *project management skills* may be more important when projects are guided by volunteer experts.
20. Consider assigning junior staff to work alongside senior project managers as a team to share the workload and help develop management skills. Some consultants train junior staff by assigning them as deputy project managers. Consider this particularly for large, significant projects.
21. Providing opportunities for flexible working environments (e.g., telecommuting, remote or virtual offices) can be an incentive when recruiting new staff. Some consultants have used remote working opportunistically based on staff willingness or unwillingness to relocate and overheads associated with large urban areas. There are challenges in (a) creating a sense of a team and coherence of the group; (b) communications; (c) technical issues such as infrastructure changes that are needed (e.g., laptops, PDAs, and various other paraphernalia).
22. Telecommuting can work well, but is not without challenges. The technical issues can be overcome, but creating a team to work on a common task can be more difficult.
23. Telecommuting requires the ability to work independently—this can be difficult to evaluate when hiring new staff.
24. Telecommuting works if you find the right people; it would be helpful to identify the criteria for a successful telecommuter. If someone has an assigned job that can be clearly defined, it may be well suited to telecommuting.
25. Some agencies require an inspection of the worker's home to make sure it is a safe working environment.
26. Telecommuting should not be considered an entitlement. It should be a manager's prerogative.
27. The conditions of the telecommuting arrangement (e.g., when must the individual be in the office, what equipment will be purchased for their home office, how will travel costs be handled, how they will be evaluated) must be worked out in detail before the arrangement begins.
28. Results-Oriented Work Environment. This approach, developed by Best Buy, involves defining desired results and allowing the employee to determine how to deliver those results.

NCHRP Peer Exchange 2008

29. Business is changing, and it is becoming even more difficult to identify the core competencies needed for a given position.
30. Applicants to Louisiana DOTD must answer a list of questions to assess their core competencies before they can be considered for an interview. If these core competencies can be identified effectively, this can be a very good tool to prescreen new recruits. The Louisiana DOTD research program also has a mandate to provide training services for all DOTD personnel.
31. A structured training program with minimum requirements may not be sufficient. Less structured, voluntary initiatives can provide valuable training and help to evaluate initiative and management potential. For example, Parsons Brinckerhoff has four voluntary programs that contribute to succession planning, mentoring, and training: (a) professional growth network; (b) mentor protégé program; (c) professional associate; and (d) area specialty network.
32. Informal mentoring programs can be one of the more effective methods of on-the-job training.
33. Some very highly qualified people cannot work full time. One management approach to take advantage of this expertise is to split a position and hire half-time employees.
34. TRB's flat management structure benefits project delivery.

Considerations for NCHRP

1. Consider hiring undergraduate student assistants to assist with project management. State DOTs and universities have found student help to be invaluable. If there is a mentoring component to the student employment, the results will be even more positive.
2. Consider requesting loan staff from state DOTs.
3. Develop guidelines for implementing and evaluating telecommuting for project managers.
4. Explore ways for AASHTO and NCHRP staff to work more closely on projects.

CONCLUSIONS

TRB is extremely grateful for the knowledge, experience, and enthusiasm of the peer exchange team members. Throughout the event, the team discussed a wide range of topics and generated innovative and thought-provoking ideas. We hope that the participants enjoyed the event as much as we did and went home with new ideas to help them in their own endeavors.

The results will be reported to SCOR at their upcoming meeting in Sacramento. NCHRP staff will review the many new topics for consideration over the coming months and develop strategies to implement the most promising. After initial discussions, NCHRP staff has prioritized items that will get immediate attention. These are discussed below.

Theme 1: Doing the Right Research

- **Identify and encourage the submittal of top-down research ideas from senior management.** NCHRP Project 20-24 is designed to address the needs of the leadership of state DOTs and AASHTO; the Project Panel and staff maintain a relationship with the AASHTO Board of Directors. However, there may be other possibilities. With the help and approval of SCOR, we will explore ways to supplement this program with other problems/projects of high-level interest, possibly within the scope of project 20-83 “Long-Range Strategic Issues Facing the Transportation Industry.” RAC and SCOR members can assist by (a) soliciting high-level research needs within their own states and developing problem statements, and (b) reviewing NCHRP problem statements in the context of their own agency objectives and priorities.
- **Expand opportunities for collaborative efforts.** Although collaborative efforts exist, they have been established on a project-by-project, case-by-case basis. NCHRP will explore other opportunities, including collaboration at the program level (e.g., with other CRPs and federal agencies). Help from SCOR and RAC will be elicited (and needed). Explore collaboration or involvement of UTCs to maximize opportunities for shared/matched funding.
- **Expand the body and use of experts available for NCHRP panels.** Experts from the private sector and academia are solicited for panels (and selected). However, many often decline because it would preclude the option of proposing. The prospect of augmenting panels once the project is under way will be offered as an option to staff. NCHRP panels excel in defining problems and assessing the usefulness of results, but are not always well suited for monitoring the details of the research. Staff will be reminded and encouraged to look at TRB committees continually as a “database of expertise,” supplementing the AASHTO committee membership, to help identify non-governmental expert panel members.
- **In the 2011 program year, increase the emphasis on the importance of the literature review in problem statements.** The submitter will be asked to describe clearly how the proposed project differs from or expands on the existing body of knowledge. NCHRP

will evaluate the need for additional guidance on how to conduct a literature search and where to turn for assistance. RAC members can also assist with their own state submittals.

- **Recommend to SCOR criteria or conditions under which lower-ranked NCHRP problem statements will be funded in the FY2010 program.** Concerns have been expressed about “bottom feeding” at the SCOR program selection meeting, where some of the lower-ranked problem statements are pulled out for discussion and subsequently often funded.
- **For evaluating the annual NCHRP candidates, re-examine guidelines for reviewers to help ensure that the problem statement review comments are clear, objective, and justified.**

Theme 2: Dissemination and Implementation

- **Continue and expand the use of the “Impacts on Practice” series and other brief project summaries such as website write-ups and executive summaries.** These documents will identify the key, implementable aspects of research reports in a concise, easy-to-read format so that readers can quickly determine the potential benefits of the results. We will continue to mine the results of sponsor surveys to identify key project success stories. Finding the “big hitters” will be a special emphasis.
- **Pilot-test cases where two or three members of each NCHRP panel are assigned as an implementation taskforce.** The taskforce will assess the potential effects of the project results and develop measures to evaluate those effects. Particularly for high-profile, high-benefit projects, the taskforce will develop a detailed, targeted implementation plan.
- **Make greater use of communications experts to highlight the programs and disseminate the products of NCHRP research results.** At this point, we will use contract staff unless it is determined that in-house expertise is more cost-beneficial.
- **Further encourage (or re-emphasize) the inclusion of funded tasks, within an RFP, that can facilitate implementation.** Such tasks might include (1) a PowerPoint presentation on the project background, objectives, results, and potential benefits; (2) presentations by the research team to relevant AASHTO or TRB committee meetings; and (3) workshops or webinars. NCHRP will continue to work closely with the TRB Executive Office to incorporate high-quality NCHRP results into the Webinar program.
- **Make greater use of Project 20-44, “Accelerating the Application of NCHRP Research Results,” to support champions and to take advantage of unexpected opportunities to promote or facilitate applications.**

Theme 3: Keeping on Track

- **In the 2010 program, pilot test outcome-based RFPs: clearly stating the desired product and encouraging proposers to present a workplan and schedule that demonstrates creativity.** Although NCHRP has, over the past few years, given proposers more flexibility in developing their research plans, we will test expansion of that technique.
- **On certain projects, explore opportunities for modified meeting schedules, involving the effective combination of face to face meetings and “virtual” or web-based meetings as appropriate.** Despite ongoing pressures that constrain travel, face-to-face meetings can have intangible but significant benefits. Such meetings can result in greater trust between the client and research team and improve both timeliness of delivery and quality of product. Effective communication between researcher and client is the best way to improve performance.
- **Work with the TRB Conduct of Research Committee and the RAC Task Group on Cooperation and Collaboration to develop guidelines on how to develop good problem statements.** The guidelines will include a section on cost estimation.
- **Regarding contract compliance, explore the use and structure of a higher withholding percentage on NCHRP contract payments; and use a series of letters, to send to delinquent contractors, that escalate after continued delays.** The National Academies Office of Contracts and Grants intends to get more involved with NCHRP projects and provide additional support to keep projects on track.
- **In order to get better and more reasonable proposals on large, complicated projects, provide funding support for proposal preparation to prequalified agencies as an option.**
- **Working with AASHTO staff, identify procedures to minimize the time needed from the formation of a research idea to the development and submittal of a problem statement.**
- **Examine the reporting capabilities of the CRP project management system to illustrate project delays in a simple, graphics-based format—a “dashboard” approach.**

Theme 4: Workforce Development

- **Develop plans to transition to a business environment that permits telecommuting and remote officers.** These options may be necessary to remain competitive in attracting the best and brightest.

TEAM MEMBER REPORTS

Monique Evans, Ohio DOT



Select Observations & Considerations

1. One thing that can make or break the success of any program is the quality of the resources available to run it. I think it goes without saying that NCHRP's most valuable resource is its staff. I continue to be impressed not only with the technical expertise of those involved in the program, but also with their interpersonal and social skills which enable them to cultivate the types of relationships that are absolutely essential to accomplishing the goals of the program.
2. The NCHRP program is an applied research program that implicitly reflects the needs of its sponsors through the bottom up generation of problem statements from practitioners; however, since transportation issues are becoming more complex, a strategic approach that blends top down guidance with bottom up support may also be necessary to systematically tackle some of these issues.
3. The \$5 million set aside by SCOR for strategic research is an appropriate mechanism to fund research targeted to high priority national needs. One way to maximize the benefits from this funding would be to consider a partnered approach for projects that broadens access to expertise and distributes risk across appropriate entities.
4. NCHRP's model has been successful for many years. We think it is commendable that you are committed to continuous improvement, but we also believe it is important to not abandon the key items that contribute to your overall success. Be flexible and adaptable but continue to focus on your core activities.
5. A multi-disciplinary approach is needed to address many emerging issues and this should not only be reflected in the formation of panels but it should also lead to the exploration of ways to all of the CRPs for the development and management of projects that have cross jurisdictional applications.
6. The bottom-feeding approach used by SCOR to select some projects causes some concerns for many. There is a fear by some that projects with wider support from sponsors are being leap-frogged in favor of ones with narrower support simply because they have a strong advocate at the SCOR meeting who can elevate it for consideration. Adding a few additional controls/criteria and providing explanations for selecting these projects may help clarify this process.

NCHRP Peer Exchange 2008

7. Anecdotal stories about the value of NCHRP products are beneficial, but they should be supplemented with some examples of hard numbers. Identify a few projects with high B/C ratios or other meaningful numeric PMs that could be showcased and used to help justify the entire program.
8. Communication of research results to a non-technical or non-specialized audience is critical, both to promote the value of the research program and the implementation of individual project results. Technical staff should understand basic principles of communication, but there is a role for communications experts in the research and dissemination process.
9. It is not the role of NCHRP to implement research results, but to facilitate implementation as much as possible by tailoring the final products for optimal use by the target audience.
10. There are always tradeoffs between time, budget, and quality on a research project. An experienced research manager is able to assess when adjustments should be made for the good of the project and when it's time to be satisfied with "good enough."
11. Consider giving proposers more flexibility by using outcome based RFPs for some projects that lend themselves to this type of creative approach. Clearly state the desired outcomes and end products and give the proposers the opportunity to present a workplan that demonstrates their creativity. Other projects with clearer expectations for tasks may not lend themselves to less prescriptive plans.
12. Determining how much technical expertise is needed for NCHRP project managers is a difficult task and measuring the performance of these individuals is also a challenge. There is always a risk of "what gets measured will get done." Achievement of these indicators may create a false impression of competence and value. For example, you can get a project done on time by accepting a report that would have been substantially improved through further investigation.
13. Consider assigning junior staff to work alongside senior project managers as a team to share the workload and help develop management skills.
14. Telecommuting can work well, but is not without challenges. Guidelines for implementing and evaluating this option as well as other flexible work environments for project managers should be considered.
15. Consider soliciting comments on the results of this exchange from users and sponsors including academics and consultants.

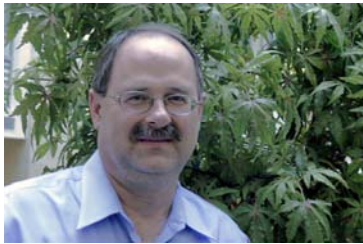
Take Homes

1. May need to revise the timeline Ohio uses for identifying research needs in order to take better advantage of the NCHRP submittal process.
2. Consider ways to fairly engage the academic community to help craft NCHRP problem statements before we submit them.
3. Explore Florida's 5-step deployment plan: (1) Implementation, (2) Performance Measures, (3) Training, (4) Communication, and (5) Technology Transfer.
4. Recognize that implementation involves push and pull activities and increase the opportunities to facilitate the pull components.
5. Award 10% of the 20% we withhold on all research contracts upon receipt of the draft final report or other major deliverables.

NCHRP Peer Exchange 2008



David L. Lippert, Illinois DOT



Theme 1: Doing the Right Research

The NCHRP project solicitation model or modifications of the model have been adopted by several states and other groups funding research. Any changes adopted by NCHRP should be considered by Illinois.

Solicitation of problem statements from key stakeholders (those funding i.e. States, AASHTO and FHWA) has been successful for the program. Illinois' open solicitation practice results in a large number of project ideas being submitted from non IDOT sources resulting in a large amount of rejected projects.

AASHTO committee comments and ranking is very helpful. Obtaining rankings and feedback from key stake holders that deal with the problem statement presented is perhaps the best way to determine need for work on a research topic.

While collaboration is highly desirable from both an academic and fiscal view there can be competing interests that would make such efforts a challenge. NCHRP future efforts with collaboration should be watched for a model Illinois may be able to use.

For Scoring/rating efforts by RAC and SCOR the process could be helped the most by having the literature review revisited and improved. Literature reviews are something that is helpful, but nobody wants to do it. Concerned if submitters will ever do a good job in a usable format. Need a format that is consistent for the rater to consider. May need to include a standard form that captures some of the key info - # related articles and the like, what needs to be different from past research if study funded and so on. Project not to be considered unless filled in.

Theme 2. Dissemination and Implementation

All projects result in a traditional report as a deliverable, however, time constraints do not allow the review of reports in great detail. Illinois' executive summary format could be reformatted to be more interesting to the reader. Printable versions of the Illinois Center for Transportation's web "Research Focus" articles should be presented in PDF form as a replacement the current executive summary.

Some international research agencies fund reviews of program results. Now that the Illinois Center for Transportation is starting to have more projects completed, at some point a review of results in use would be a good method to measure impacts of the program.

NCHRP Peer Exchange 2008

Illinois should review our communication methods to determine if effective. As staff changes the primary methods of obtaining notification of new information will change. The program must be in line with needs of staff demands, i.e., paper (old delivery method) to electronic to fully searchable.

Current economic down turn is likely to limit states travel even more for conferences where results might be presented. Methods of dissemination that use web based formats may be in greater demand in the future. Such trends would be good to keep eye on. Some states post conference slide shows. A link on the TRIS abstract page to any such electronic resources is just a thought. Research managers may be able to provide links if any are developed.

Theme 3: Keeping on Track

Clear communication and knowledge of work status are key to keeping projects on track. Illinois staffing levels are trending in such a way that reduced monitoring and decreased meeting frequency is the result. Measures to inform upper management of project delivery performance may need to be established to show the resulting impacts.

Illinois would benefit from adopting CALTRANS "NCHRP Panel Training" effort.

Survey fatigue is becoming a bigger issue in Illinois staff reduction environment. Those serving on panels and committees should be encouraged to make any surveys targeted, brief and to the target group.

Timely work is a problem for all research managers, and NCHRP handles as well as anyone. Not sure 10-20% withholding is very effective with University researchers due to disconnect between payments and project funding systems. Have found that most consultants do get through projects in a more timely fashion due to monetary incentive of getting work done and moving on to new work.

Theme 4: Workforce Development

Results Oriented Work Environment by Best Buy is a management method that should be explored in more detail for use in Illinois.

Staff shortages may be partly addressed by co-op students.

Highly skilled managers of TRB/NCHRP provide support to 30-40 projects. Illinois may wish to review the current additional duties project manager model versus a full-time dedicated skilled manager.

Having co-op or similar student help is sometimes more work for full-time staff. Key is finding motivated and independent people who are truly a help and can contribute.



Richard Long, Florida DOT



- Is our research center marketing research results or communication results? We need to revisit the terms we use in our deployment plan.
- Is there a role for SCOR and RAC as AASHTO committees to define high-level research issues and submit these needs for NCHRP funding with the annual submittals?
- Apply more risk analysis modeling to our research funding requests.
- Need to develop closer relationship with our Executive Committee on “red meat” issues.
- Investigate the potential for sponsoring more behavioral science research projects for safety applications (Implementation Risk Analysis).
- Upgrade Project Manager training to include segments on
 - Creativity costs/prescriptive tasks limit potential.
 - Pitfalls of using popular researchers who may be overloaded with other projects. Consultants tend to overbook their best and brightest.
 - Scheduling: Don’t force average projects into tight schedules. Consider incentives for high-priority research.
- Is there a way to ease the burden on the researcher in terms of administration matters, report writing, responses to requests for needed information, and data?



Rick Collins, Texas DOT



- I can do a better job at the state level in developing problem statements for the NCHRP Program. This includes engaging the TxDOT Administration, District Engineers, and Division Directors.
- I will consider California's approach to ranking proposed NCHRP projects (for a project to get a 5, a Division Chief must agree to be a champion for that project).
- I can do a better job at the state level in disseminating information coming out of the NCHRP Program by targeting specific research project results toward the TxDOT Administration and/or Division Directors.
- I will look at and consider Florida's 5-step deployment practice.
- I will look at Louisiana's implementation practices and what the "implementation engineer" does.
- I would like to get a copy of the "ROWE" book mentioned by Laurie.
- I will get a copy of and consider California's NCHRP training.
- I will discuss proposal issues (budget, time, creativity, etc.) with universities.
- I will consider involving others (TexITE, AGC, etc.) in the identification of our research needs.



Wes Lum, CALTRANS



Theme 1: Doing the Right Research

- The NCHRP distribution of research is well balanced, from quick response to AASHTO committee issues to strategic, long term research. Share this balance with Caltrans research management.

Theme 2: Dissemination and Implementation

- The research product and deployment activities are important to capturing the research benefits. The problem statement author, research panel, and researcher should be required to identify the product, training, deployment plan, and implementation plan. Share Andy Lemer's paper from Appendix A, Enhancing the Likelihood of NCHRP Project Impact on Practice, with Caltrans research management and the RAC Task Group on Value of Research.
- Florida DOT produced and displayed to SASHTO a 15-minute research video. It contained three minute segments on successful research and was well received by DOT officials from the region. Obtain a copy of the video and share it with Caltrans research management.

Theme 3: Keeping on Track

- Six months after research is started, Illinois DOT conducts a survey of the panel and PI to rate how the project is proceeding. NCHRP Peer panel discussed how better information is obtained by less formal discussions. Consider this type of procedure in Caltrans research program management.
- ICF International has an internal program management process to help deliver projects on time in within budget. Learn more about this process from Janet D'Ignazio and share with Caltrans research management as appropriate.
- Louisiana DOTD experienced more meetings of panel and PI when used performance indicators on project managers. Consider performance metrics with Caltrans research management.
- Consider the NCHRP as a good example for Caltrans research management. Problem statements, Requests for Proposals, project management processes (TRB staff may have 30-

NCHRP Peer Exchange 2008

40 projects to manage) should be considered. Also, RFP winners should be considered when deciding how widely to advertise a Caltrans RFP.

- The University of Minnesota, Center for Transportation Studies appreciates when an RFP requires a project management plan because they can help the professor deliver. Find out more about these kinds of RFPs and share with Caltrans research management as appropriate.
- Send Peer participants the Caltrans training for CRP panels.

Theme 4: Workforce Development

- Parsons Brinckerhoff utilizes four informal, volunteer programs for staff development Professional Growth Network, Mentor Protégé Program, Professional Associate, and Practice Area Networks. Obtain more information on these programs and share with Caltrans management and the TRB Education and Training Committee.
- Review the reference recommended by the Center for Transportation Studies ROWE: Results-Oriented Work Environment by Best Buy and share with Caltrans management as appropriate.
- Share the paper in Appendix F, Designing an Interdisciplinary Education Program to Support Transportation Workforce Development, by Steven Polzin and Beverly Ward, with Caltrans management and the TRB Education and Training Committee.



Laurie McGinnis, Center for Transportation Studies, University of Minnesota



- Continue to encourage University of Minnesota faculty and research staff to participate in TRB committees where they can help shape NCHRP problem statements. This will also help them build networks and give them opportunities to raise other's awareness of their technical knowledge and research capabilities, so they are better positioned to compete for NCHRP projects.
- Encourage NCHRP panel participation from University of Minnesota faculty and research staff. Help them understand that this is another way to help shape NCHRP problem statements so that the research will add to the body of knowledge. Follow up with NCHRP staff to collect information regarding the value and benefits to university researchers to serving as panel members. Panel participation would also help them build networks and give them opportunities to raise other's awareness of their technical knowledge and research capabilities.
- Reinforce the importance of timely performance and frequent communication to University of Minnesota PIs. Continue to perform outreach about CTS's project management services that help PIs with project reporting requirements, communication, and adherence to schedule.
- Explore additional mechanisms for communicating the value and role of research universities to the NCHRP community. In addition, look for opportunities to specifically communicate the research capabilities of University of Minnesota faculty and staff.
- Consider being a model for future collaboration between a UTC and NCHRP.



Ken Kobetsky, AASHTO



Key Points

1. Even though the NCHRP problem statements only come from three sources: state DOT, AASHTO subcommittees, and FHWA I believe a closer cooperative effort by the TRB committees and the AASHTO subcommittees would be productive and yet maintain the present requirement of where the problem statements come from, as the program is mostly about applied research.
2. I would encourage the use of at least one or more members of the project panel being early to mid range of his/her career.
3. Provide for as much interaction between the panel and contractor as much as possible besides just getting quarterly reports
4. Continue to encourage the AASHTO subcommittees to rank the problem statements before SCOR has returned their ballot.
5. Continue to monitor the new \$5million set aside program to ensure that the long-range goals are met.

Take Homes

1. Work closer with the NCHRP staff in identifying possible panel members.
2. Identify early on if a project will produce a possible AASHTO document or publication.
3. Work closer with the NCHRP staff on the quick turnaround projects such as 20-7 to improve the delivery schedule.



Janet D'Ignazio, ICF International



- Communicate level of concern from TRB on timeliness of projects so we need to continue to place focus on timely delivery of final reports and products
- Best Buy's Results-Oriented Work Environment approach for virtual organizations
- Need to analyze potential impact of NCHRP idea of withholding funds for late projects
- Potential for outcome-based RFP's
- Explore consultant role in assuring productive and meaningful kick-off meetings



Hal Kassoff, Parsons Brinckerhoff



I have been reflecting primarily on the time frame issue and our need to focus more on timely results - but I am also concerned that we could find fewer premier practitioners interested in getting involved in research, or could compromise on quality, if there is a "crack-down" in that area without regard to circumstances. The rule of reason should prevail, case by case.

Because the best talent is often in great demand, and we normally want practitioner/researchers (people who have hands-on experience) to lead our research, the way in which you, Chris Hedges, and Crawford Jencks have approached it makes the most sense, recognizing that people need to juggle many priorities, and more often than not, end up working on their own personal time to complete a research project - especially given the uncertainties inherent in research plus the firmness of price ceilings, which I certainly understand and accept.

From my end, my primary take home will be to better anticipate and communicate schedule issues.

Having said all of that, I certainly agree that if delays are severe and without a reasonable basis, and responses to recover are lame or non-existent, understandably there needs to be consequences.



APPENDIX A: AGENDA

NCHRP PEER EXCHANGE – 2008
September 23-25, 2008
National Academies Keck Center, Room 208
Washington, D.C. 20001

AGENDA

Tuesday, September 23

- 8:30 a.m. Opening Remarks – Chair Evans
— Welcome – C. Jenks
— Self Introductions – All
— Meeting Objectives – C. Jencks
- 9:00 a.m. Topic 1 Discussion: Doing the Right Research
— Introduction – C. Jencks
— Discussion – All
— Summary Remarks – M. Evans
- 9:30 a.m. *Break*
- 9:45 a.m. Topic 1 Discussion (cont'd)
- 12:00 noon Working Lunch
- 1:00 p.m. Topic 2 Discussion: Effective Dissemination of Research Results
— Introduction – C. Jencks
— Discussion – All
— Summary Remarks – M. Evans
- 2:30 p.m. *Break*
- 2:45 p.m. Topic 2 Discussion: (cont'd)
- 5:30 p.m. *Reception*
- 6:30 p.m. *Dinner*

Wednesday, September 24

- 8:30 a.m. Topics 1 & 2 Discussion (as needed)
- 9:00 a.m. Topic 3 Discussion: Keeping Projects on Schedule
— Introduction – N. Srinivasan

NCHRP Peer Exchange 2008

- Discussion – All
- Summary Remarks – M. Evans

9:30 a.m. *Break*

9:45 a.m. Topic 3 Discussion (cont'd)

12:00 p.m. Working Lunch

1:00 p.m. Topic 4 Discussion: Professional Development for Research Staff
— Introduction – C. Hedges
— Discussion – All
— Summary Remarks – M. Evans

1:30 p.m. *Break*

1:45 p.m. Topic 4 Discussion (cont'd)

5:00 p.m. *Adjourn for the day*

Thursday, September 25

10:00 a.m. General Discussion – M. Evans
Presentation of Reports – All

12:00 noon Working Lunch

1:00 p.m. Conclusions – M. Evans

2:00 p.m. *Adjourn*

APPENDIX B: TEAM ROSTER

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NCHRP Peer Exchange 2008

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Appendix C: Discussion Papers

THEME 1: DOING THE RIGHT RESEARCH

The fundamental tenet of the NCHRP is to address the most pressing current problems and needs of state Departments of Transportation. A broad cross-section of state DOT staff propose research ideas, review problem statements, select projects for funding, provide that funding, serve on advisory panels, and implement the results. In theory, the model guarantees that the research will effectively identify and address the highest priority topics of its primary stakeholders.

NCHRP was created in 1962; just as Highway Planning and Research [now SPR] funds were created by the Federal-aid Highway Act of 1962. The 1962 Act mandated that these funds be spent on planning and/or research; heretofore, it was an option. [Presumably, the federal government thought states were not doing enough in either planning or research.] Given this mandate, the advantages of a cooperative program became apparent. States often experienced similar problems and issues; these common problems needed solutions; and this was a way to leverage funds. Research was also needed to support policy and specification developments affecting the growth of the nation's highways and in particular the Interstate Highway System.

The Highway Research Board [now TRB] had just successfully finished managing the AASHO Road Test. As a consequence, the American Association of State Highway Officials [now AASHTO] and its member highway departments agreed to create and fund the NCHRP. HRB was asked to manage the program of research selected by AASHO. The Bureau of Public Roads [now FHWA] agreed to cooperate by helping to collect the state contributions and by ensuring coordination with its own research activity and Federal requirements. These relationships were set out in a Memorandum of Agreement, last revisited and resigned in 2004.

The focus of NCHRP has been on applied research to improve existing practice, absolutely needed in the earlier days of the Interstate Highway Program and in highway building in general. Today, this is still essentially the mission of NCHRP as evidenced by the research projects assigned to TRB to manage under the NCHRP.

The resources available for research, although considered limited, have increased through the years—HPR/SPR funds for states and, consequently, the NCHRP. At the same time, the highway departments, now transportation departments, have evolved into highly sophisticated agencies, many with highly evolved research functions. Given these two factors, is the current way of formulating the NCHRP program and the types of projects still the best way of doing business, should it be modified, or are there other alternatives?

The current process is based on the submittal of individual problem statements from state DOTs, AASHTO committees, and FHWA. Statements from state DOTs are usually concerns experienced by that state and perceived to be a problem with other state DOTs; they can be existing or emerging problems/concerns. Problems from AASHTO committees (and subcommittees) can also be existing or emerging concerns, but among like minded professionals. Committee submittals can also be part of a longer range strategy or plan; some submittals are in direct support of a committee's responsibility for maintaining or developing an AASHTO

NCHRP Peer Exchange 2008

standard, guide, or policy. Although few, FHWA submittals are typically priority problems for which there is insufficient FHWA funding.

In addition to the individual problem/project assignments, there are continuing projects (subprograms of NCHRP)—see “Product Types of NCHRP Research Projects.” SCOR annually allocates funds within the NCHRP budget, but provides authority to another NCHRP panel to select and assign tasks. And at its last meeting, SCOR initiated a new program and set aside \$5 million to address longer term strategic issues—an evolving concept.

The process that is currently used to evaluate all problem submittals (new and continuing) is designed to ensure the selection of the most important problems not already studied or being studied—see “The NCHRP Process.” Submitters are to provide evidence and a summary of a literature search. NCHRP and FHWA staff or evaluation panels review and comment on all submittals. Submitters are provided an opportunity to refute or agree with the evaluation comments. Relevant AASHTO committees are asked to rank problems in their respective areas. Using this input as well as their own perspective, mail ballots of RAC and SCOR members are used to provide a priority order to the discussion by SCOR at its annual meeting. SCOR selects the recommended NCHRP program and forwards it to the AASHTO Board of Directors for approval. Each project requires a 2/3rds majority vote to be approved.

With this introduction, the following are the specific issues/questions that NCHRP staff is interested in discussing.

- a) Is this still the right model for NCHRP? If so, what current elements can be improved and how? For example,
 - Solicitation of problem statements
 - Review of problem statements
 - Presentation of review results to RAC and SCOR before selection meeting.
 - SCOR project selection process.
 - Formation of project panels.

- b) If the NCHRP model needs tweaking for the 21st century, what aspects should be considered? For example,
 - How to tie the program to strategic needs and priorities?
 - How to identify and address emerging issues?
 - How to involve other modes?
 - How to collaborate with other associations and organizations in the identification of research needs?
 - How to collaborate with other funding partners?

PRODUCT TYPES OF NCHRP RESEARCH PROJECTS

“TRADITIONAL/REGULAR” RESEARCH PROJECTS (45.6%)

(Typical examples of applied research)

- Recommended AASHTO Guides and Specifications
- Guides for practitioners
- Software products
- New or improved models/tools
- Improved operations and services
- Testing/evaluation techniques

SPECIAL PROJECTS--“SUB-PROGRAMS” (28.5%)

- 20-5 Synthesis Program (\$1.2M)
State-of-the-practice reports.
- 20-6 Legal Studies (\$150K)
Syntheses of case law on tort, construction contract, eminent domain, environmental, and governmental relationship issues.
- 20-7 AASHTO Highways Com. (\$1M); 8-36 AASHTO Planning Com. (\$600K); 25-25 AASHTO Environmental Com. (\$600K); & 20-65 AASHTO Public Transportation Com. (\$300K)
Quick response, task oriented projects/reports to support the respective AASHTO standing committees.
- 20-24 Adm. of State DOTs (for CEOs) (\$1M)
Projects/reports of importance to the leadership of AASHTO and state DOTs.
- 20-30 NCHRP-IDEA (\$1.25M)
Seed money and a reality check for product innovators.
- 20-36 International Info. Sharing (\$950K)
International scans (shared with FHWA) and travel for state DOT members of PIARC committees.
- 20-59 Surface Transportation Security Research (\$600K)
Various reports in support of the AASHTO Special Committee on Transportation Security and transportation security in general.
- 20-68 US Domestic Scan Program (\$500K)
Domestic scans with scan specific FHWA support welcomed.

NEW SET ASIDE (17.5%)

- 20-83 Long Range Strategic Issues Facing the Transportation Industry (\$5M)
SCOR proposes to pursue a process to capture futuristic thinking on the economic, social, and environmental realities that will place new demands on transportation and then fund research to address the challenges created by these demands.

CONTINUATIONS OF EXISTING PROJECTS (8.4%)

THE NCHRP PROCESS

- July** **SUBMITTAL**
1. NCHRP solicits problem statements as the secretariat to the AASHTO Standing Committee on Research (SCOR).
 2. Authorized sources submit problems to the secretariat:
 - DOTs
 - AASHTO Committees/Subcommittees
 - FHWA
- September** **EVALUATION**
1. FHWA and NCHRP staffs evaluate problems; or selected problems reviewed by evaluation panels (materials, structures, and traffic/safety).
 2. NCHRP staff forwards evaluations to submitters.
 3. Submitters respond to evaluations (optional).
- December** **PROGRAM FORMULATION**
1. Secretariat (NCHRP staff) compiles submittals in a report to SCOR and RAC. Website prepared.
 2. Report sent to SCOR and RAC with ballot for rating both new and continuation problems.
 3. Selected problems sent to relevant AASHTO committees for evaluation; results provided to SCOR and RAC for additional guidance in completing their ballots.
 4. SCOR and RAC rate problems and return ballots to secretariat.
 5. Secretariat compiles ratings and ranks all problems.
 6. "Summary of Balloting" is prepared and sent to SCOR.
 7. SCOR meets to formulate recommended program and review NCHRP progress.
- March** **PROGRAM APPROVAL**
1. Secretariat reports outcome of SCOR meeting to the AASHTO Board of Directors. Tentative program of projects announced.
 2. AASHTO Executive Director mails out states' ballots for 2/3 endorsement.
 3. Ballots are returned to AASHTO office.
 4. AASHTO refers program to the National Academy of Sciences (NAS) for administration.
 5. The NAS reviews for acceptance.
- June** **PANEL FORMULATION**
1. Solicit for panel nominees.
 2. Extend invitations.
 3. Finalize panel rosters.
- August** **PROPOSAL PROCESS**
1. First panel meetings, analyze assigned AASHTO problems and write project statements.
 2. Solicit proposals.
 3. Panels review proposals.

NCHRP Peer Exchange 2008

November

AGENCY SELECTION

1. Second panel meetings, selection of agencies.
2. TRB reports to SCOR requesting agency approvals.
3. AASHTO approval of agencies.
4. Negotiate contracts.

February

PROJECT SURVEILLANCE

1. Staff visits to research agencies.
2. Staff provide liaison between panels and research agencies.
3. Review monthly and quarterly progress reports.
4. Staff review agency monthly invoices.
5. Evaluate interim and final reports.
6. Facilitate application of results.

THEME 2. DISSEMINATION (AND IMPLEMENTATION)

NCHRP research project results are packaged in a variety of ways depending on such factors as the overall success of the project, usefulness to sponsors, expected audience, cost of formal publication versus impact, and whether it is a full NCHRP project or a quick-response study. Examples of the packaging of NCHRP results are as follows:

- Contractor's final report is edited and published as an **NCHRP report (or NCHRP synthesis)**.
- Contractor's final report is adapted and/or adopted, edited, and **published by AASHTO** as a guide specification, policy, or practice.
- Contractor's report is made available as a **web only document**.
- Portions of a contractor's report is **formally published** (e.g., a guide) while parts are made available as a **web only document** (e.g., the supporting research report or extensive appendices or data files).
- **Research Results Digest** is published summarizing the contractor's final report in conjunction with a contractor's web only document. Research Results Digests are sometimes used to make available interim project results.
- **CD-ROMS** are occasionally used as the published medium or to supplement the published report.
- **Software products** are typically licensed to others (e.g., AASHTOWare) for the continued care (maintenance and enhancements); on occasion NCHRP makes software products or the initial versions available for use as is.
- Contractor reports for "**quick response**" tasks in support of various AASHTO standing committees are offered to the respective committees for use and disposition (many are published on AASHTO's committee websites). Attaching the contractor's report to the project write-up on the NCHRP website has recently been instituted to ensure that these reports can be readily located.

Various distribution strategies can involve techniques such as the following:

- Published reports are sent to state DOT CEOs.
- Multiple copies are sent to the TRB Distribution list (members who have designated the relevant subject area(s))
- Specialized distributions are occasionally made at AASHTO committee/subcommittee meetings and FHWA and TRB events.
- Web only documents if the interested audience is judged to be limited or the research may not have been completely successful and therefore not of interest to sponsors, but to other researchers only.
- Copies are sent to major transportation libraries and information is entered into the Transportation Research Information Services (TRIS) database.
- TRB E-Newsletter email announcements.
- Webinars, recently initiated by TRB's Division A, focusing on completed projects.

NCHRP staff is fairly confident that results from mainstream, regular research projects are being successfully disseminated, at least to our sponsors, the state DOTs, using the TRB Distribution list and notifications through the TRB E-Newsletter of the report's web location. Furthermore, NCHRP staff has developed relationships with various AASHTO committees and subcommittees that indicate

NCHRP Peer Exchange 2008

an awareness of NCHRP results—some better than others. And, although a more passive technique, there is TRIS for the more astute practitioner. The difficult job for NCHRP staff is to determine the actual impact or implementation of the research results.

Some impacts are obvious when AASHTO adopts and/or adapts the results; NCHRP tracks this activity and records it on the NCHRP website. More challenging, however, is the impact on individual state DOTs and their practitioner employees. But, there is some promising evidence that products are being used. Retired panels are surveyed every four years. The survey is simple, using only questions that can be quickly answered. One of the questions asks the retired member of any known applications of the research result. This survey has now been done three times, and each time the results show significant usage of NCHRP results.

All research projects are to include or recommend an implementation plan. (Admittedly, follow through on this requirement in many cases is not aggressively pursued or understood.) And money is available via NCHRP Project 20-44 to take advantage of unexpected opportunities to implement or apply research findings; examples are available on the NCHRP website.

Among the techniques being employed by Project 20-44 is a series of one-page handouts recently initiated to highlight specific NCHRP “Impacts on Practice.” These are posted on the NCHRP website and used as handouts at various meetings and exhibits and will be a continuing series. An upcoming *Impacts on Practice* looked more deeply into the usage of NCHRP results throughout the Louisiana DOTD. The breadth and depth of that usage to verify, change, or improve practice was most impressive. The variety of products referenced from various NCHRP projects and subprograms (e.g., syntheses, 20-7 task reports, IDEA) was also impressive.

Regardless of this promising evidence, more needs to be done to ensure and assist in the implementation of results, but within the limitations of TRB/NCHRP’s parent organization, the National Academy of Sciences, whose primary mission is to advise.

The NCHRP is interested in what other agencies and organizations do to ensure the implementation of their products. Some guiding questions include:

- How can NCHRP do a better job of disseminating and marketing its products?
- How do you fit the product to the audience? Has the audience changed in the way it finds and assimilates information? Is this a good thing?
- Should a program like the NCHRP employ dedicated staff with marketing expertise? What is the potential payoff?
- What is the role of NCHRP in implementation?
- How much of the research budget should be spent on dissemination and deployment?
- How can new and emerging technologies be used in aiding dissemination and keeping/renewing interest in NCHRP products of research?

THEME 3: KEEPING ON TRACK

There are two major concerns in keeping research projects on track—quality and timeliness, with quality being the primary emphasis over the years. Although timeliness is very important, we often tolerate delay—and there may be many reasons for delay, some legitimate, some not so legitimate—if the ultimate outcome is a quality product. In other words, the NCHRP gets an objective and a budget to find a solution; it is primarily a one-shot proposition. The NCHRP wants to optimize both and is seeking the experience of others to ensure quality and timeliness in their own activities.

Contractors, first and foremost, and then panels and staff all play a significant role in the quality and timeliness of research projects. Some factors that impact quality and timeliness are as follows:

1. The “Overbooked” Consultant/Researcher: NCHRP projects typically require a Principal Investigator (PI) who is a top class researcher in his or her subject area. Often, these PIs have multiple commitments, and there have been times when NCHRP projects are not given top priority. For the most part, there does not seem to be a sense of urgency associated with NCHRP work.

2. NCHRP Research Process: Several components of NCHRP research result in time delays. For example, one first and significant portion of the research involves surveying state DOTs or other agency staffs in developing guidance for subsequent research tasks. Many consultants are reporting higher non-responses and greater than anticipated costs in conducting this portion of the work. Another is the processing of interim products that often contributes significantly to the delays--contractors not getting reports in on time and panel members not responding in a timely fashion, if at all.

3. Lack of Field Data: Many NCHRP projects are also hampered by an unexpected lack of readily available data for analysis. The lack of field data is a significant limitation for traffic engineering, environment-related, and transportation planning research.

4. Panel Response Time: The project panels for NCHRP consist of volunteers drawn from state DOTs (over 50%), academia, industry, associations, etc. who may be overbooked or extremely busy as well. However, in their oversight role, NCHRP relies a great deal on panel members for technical expertise that must be delivered in a timely way. Limited responses, both in quality and number, cause a number of concerns for the eventual outcome of a project.

A couple of examples that have been tried include:

- On the quality front, “harassment and embarrassment” (diplomatically of course) of contractors and panel members by staff to perform. (However, with increasing workloads, NCHRP may not be as much of the squeaky wheel we once were. More time needs to be taken to communicate with panels and contractors.)

NCHRP Peer Exchange 2008

- As for timeliness, the National Academies contracts office is becoming far less timid in supporting the NCHRP in the most egregious situations—give us the product or give us our money back, then we work from there.
- Contractor quarterly progress reports address quality and timeliness and are an effective tool available to panels and staff.

The objective for this peer exchange is to identify ways and means to better motivate, monitor, and execute projects. Some questions to guide the discussion are:

- How do you motivate contractors to perform to their highest ability?
- Are kick-off meetings with the panel and contractor effective?
- Ongoing surveillance – are our contractors providing the right quantity and quality of progress reports for the panels to effectively evaluate their work?
- Keeping contractors on schedule – what carrots and sticks do we have at our disposal?
- Tips and tools – what are the most important elements of project management software programs? What are the “best practices” of effective project management?

THEME 4: TRANSPORTATION WORKFORCE DEVELOPMENT

Few issues in the transportation sector have received as much scrutiny over the past 20 years as workforce development. Activities at TRB alone have included a conference on education and training needs in 1984, a Special Report on workforce needs and opportunities in 1985, a circular on workforce needs among research staff in 2000, an international scan in 2001, and two current NCHRP projects on recruiting and retaining a skilled workforce.

Discussions of workforce development center around several recurring themes: increased demand on highway agencies coupled with reduced personnel budgets, an aging workforce and high numbers of retirements, competition with the private sector in hiring new staff, and changing skill set requirements. A wide range of goals, strategies, and practices have been identified to address the problems, and continue to be refined.

The workforce development cycle can be classified into four components:

- Recruiting
- Training and education
- Retaining
- Succession management

One could easily assume that training and education is the easiest issue to address. Education and training programs are for the most part directed at individuals who have either made the decision to enter a career in transportation, or are already on the job. Recruiting, retaining, and planning for the succession of the workforce involve more complex motivational, financial, and longer term planning issues that make training and education seem relatively straightforward by comparison. In fact, the issues are not simple or clearly defined.

Training and education can be grouped into two categories: transportation-related, and non-transportation related. Transportation-related training and education needs include the need for a grounding in the fundamental subjects related to the planning, design, construction, operation, and maintenance of transportation facilities. Professional staff in state departments of transportation tend to be graduates of educational programs in technical areas such as engineering, planning, business, and economics. Ongoing training is needed to keep up with new and improved tools and technologies, as well as evolutionary changes in business practices, such as increasing emphasis on societal needs, environmental concerns, and stakeholder involvement.

The needs related to non-transportation related training and education are not as well understood. Professional staff with a technical background often face a common dilemma early in their careers: many of the skills they need on the job have not been part of their educational experience. Today's transportation professional needs to be an excellent oral and written communicator. They need to get their point across clearly and succinctly to others who may or may not have come from a similar background. They need to work well with others, often in multidisciplinary teams. They need to be promoters, "selling" their image, products and services to management or to the public. They need to know how to manage others, and how to be

NCHRP Peer Exchange 2008

managed. It is common to reward someone good at a technical skill with a promotion to a position where they no longer use that technical skill; they instead have a responsibility to manage others, without any particular demonstrated management expertise or training.

NCHRP Project Managers tend to be in mid-career when they are hired. Most have a good deal of technical expertise, but may or may not have managed research project contract before they arrive at NCHRP. Current staff and new applicants often inquire about telecommuting, but so far the practice has not been embraced by TRB. Continuing education benefits exist for NCHRP staff, but don't seem to be encouraged. Professional licenses are desired when hiring, but there are no inducements to maintain professional status.

The skill set and core competencies required by today's transportation professional may need to be revisited. Emphasis on a broader education may be the norm in the future. In 1984, an article by S.C. Florman in the journal *Professional Engineer* illustrated the characteristics of the ideal engineer by describing John and Washington Roebling, the father and son team that engineered the Brooklyn Bridge. John Roebling, in addition to an education in architecture, bridge construction, and hydraulics, studied philosophy under Georg W.F. Hegel, one of the most influential philosophers of the day. Washington Roebling, in addition to his technical training, studied "logical and rhetorical criticism, French composition and literature, and intellectual and ethical philosophy". According to Florman, the Roebling's ability to "persuade, enlighten, and inspire their fellow citizens contributed as much to the success of the Brooklyn Bridge project as did their considerable technical talent".¹

While it is unlikely that Renaissance men like the Roeblings will be the model for future transportation professionals, it is reasonable to expect that academic institutions will re-evaluate the way they structure their transportation programs in response to changing needs. At the University of South Florida, for example, there is a "growing appreciation of the complex interactions of the transportation system with the social, political, and physical environment ..." leading to "an expectation that today's planners and engineers should have competencies in communication, be able to carry out ... citizen participation activities ... and be able to communicate with other professionals and policy makers as required for virtually all transportation projects to wind through the approval processes necessary for funding and implementation".²

In summary, operations of a typical state highway transportation agency has changed a great deal over the past several decades. As a result, the skill sets and core competencies required by transportation professionals are very different than they were in the last century. There is a both a great need and a great opportunity to address these changes through a review of education and training needs of the current and future transportation workforce.

Questions for Discussion:

¹ S.C. Florman, *Looking to the future: the "master" engineer*. *Professional Engineer*, Vol. 54, no 2, Summer 1984, pp. 22-23.

² S. Polzin and B. Ward, *Designing an interdisciplinary educational program to support transportation workforce development*. *Transportation Research Record* 1812, 2002, pp. 143-150.

NCHRP Peer Exchange 2008

- What continuing education programs are offered in your agency?
- Do your staff seem motivated to take advantage of continuing education offers?
- Do you work with universities in your state on curriculum development?
- Have you seen changes in the academic background or qualifications of new employees over the past several years?
- For research project managers, what is the relative importance of subject expertise versus project management expertise?
- What are the most effective ways to evaluate the performance of project managers?
- Took the course, got the binder—Are there really training courses that can help you do your job better?
- How do you encourage team building and keep everyone (including support staff) working towards a common goal?
- What are the pros and cons of telecommuting? How can an agency best transition to one that makes effective use of remote staff? Do remote staff need a different management paradigm?