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**PEER EXCHANGE: A VALUE-ADDED PROGRAM  
MANAGEMENT TOOL**

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*Prepared by*

**Barbara T. Harder  
B. T. Harder, Inc.**

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**TABLE OF CONTENTS**

INTRODUCTION AND PURPOSE OF THE REPORT .....	1
SCOPE OF THE STUDY .....	2
DATA SOURCES .....	2
BACKGROUND FOR THE STUDY.....	4
Guidelines and Regulations .....	4
Transition from Peer Review to Peer Exchange -- a Key Success Factor .....	5
Brief Description of Peer Exchange.....	6
Round Two Peer Exchanges Are Beginning.....	8
General Observations About Round One Exchanges to Carry Forward to Round Two.....	9
ROUND ONE PEER EXCHANGE ACCOMPLISHMENTS .....	10
TOPICS OF DISCUSSION AT THE PEER EXCHANGES .....	15
CONCEPTS, METHODS AND RECOMMENDATIONS GENERATED BY PEER EXCHANGE DISCUSSIONS .....	17
FINDINGS AND CONCLUSIONS.....	18
REFERENCES .....	22
APPENDIX A	
Concepts, Methods, & Recommendations of Research Peers for Management of State Transportation Research, Development & Technology Programs	
INTRODUCTION.....	A-1
ACCESS TO AND COMMUNICATION WITH SENIOR MANAGEMENT .....	A-3
ALTERNATIVE FUNDING .....	A-3
CHANGE.....	A-4
CONTRACTING AND APPROVALS .....	A-5
COORDINATION OF RESEARCH EFFORTS WITH OTHER STATES.....	A-6
COST/BENEFITS OF RESEARCH RESULTS .....	A-7

CUSTOMER SERVICE .....	A-7
IMPLEMENTATION OF RESEARCH RESULTS .....	A-8
General Implementation.....	A-8
“Jump Start” for Implementation.....	A-10
Implementation Planning .....	A-10
Implementation Staff and Groups.....	A-11
Implementation Tracking.....	A-12
INDUSTRY INVOLVEMENT.....	A-13
MARKETING.....	A-13
Building Commitment to RD&T .....	A-13
Dissemination of Research Results.....	A-14
Resources to assist in Marketing.....	A-14
Marketing to Senior Management.....	A-15
Marketing Via the Internet.....	A-16
Outreach Efforts.....	A-17
Publications and Marketing Literature.....	A-18
Research Reporting.....	A-19
PARTNERSHIPS .....	A-20
Partnership Activities.....	A-20
Facilitating Partnerships.....	A-21
Setting Up Processes to Handle Partnerships .....	A-22
PROBLEM OR IDEA SOLICITATION – NEEDS IDENTIFICATION.....	A-22
Idea Prioritization.....	A-22
Long Term Needs and Horizon Issues .....	A-23
Needs Identification .....	A-23
Problem or Idea Solicitation .....	A-25
PROJECT SELECTION .....	A-26
PROJECT MANAGEMENT.....	A-27
General Project Management.....	A-27
Project Champions.....	A-28
Technical Oversight Committees.....	A-28
PROGRAM MANAGEMENT .....	A-29
Agency Research Advisory Committee .....	A-29
General Program Management .....	A-30
Performance and Value of the Program.....	A-35
STAFFING AND RESOURCES.....	A-35

## LIST OF FIGURES

Figure 1 First Round Peer Exchange Meetings.....	3
Figure 2 Round One Peer Exchange Accomplishments Ratings .....	13

# PEER EXCHANGE: A VALUE-ADDED PROGRAM MANAGEMENT TOOL

## INTRODUCTION AND PURPOSE OF THE REPORT

Peer exchanges for state departments of transportation research, development, and technology (RD&T) activities originated with the Intermodal Surface Transportation Efficiency Act of 1991. Through the process of implementing the regulation, state research managers, with guidance from the Federal Highway Administration (FHWA), developed a practical and effective tool to foster excellence in RD&T program management. In particular, this process encourages the states to apply successful program management strategies among the participating research manager peers.<sup>(1)</sup>

Now after the first round of peer exchanges are complete, several important outcomes emerged. Most notable is the wide endorsement that the process adds value to the management of state departments of transportation (DOTs) RD&T programs. The intended goal of the peer exchange process was clearly reached. Nationwide, RD&T peers comment about the success of the program and their positive experiences. Furthermore, as the RD&T units conducted the exchanges it became apparent that peer exchanges have a broader applicability than just research related activities -- many types of programs can benefit from conducting peer exchanges.

The exchanges allowed substantial management information to be transferred among participating RD&T units in an efficient and constructive manner. The knowledge gained at each peer exchange is vested in a group of individuals -- the team members, the host agency research unit, other participants from the agency, and invited outside researchers/technology professionals. The peer exchange experiences are documented in the reports of the exchanges, yet there are over 50 different reports with material of interest to all research managers. Many state RD&T programs could benefit from application of the management practices, concepts, and methods discussed at the meetings.

This report was prepared to meet the need for a broader sharing of peer exchange experiences. It has three general purposes. Foremost, it is a tool to more widely disseminate material discussed at exchange meetings. The document synthesizes what was put forth in the individual exchange meetings so that all RD&T units might benefit from the many experiences. In particular, it provides information on program management processes from the various meetings for all state DOT RD&T units. Secondly, by showing results of the general peer exchange process, the report demonstrates the usefulness of peer exchanges for the variety of programs managed throughout a state transportation agency. Finally, the report provides an opportunity for state RD&T units that are contemplating a second exchange to incorporate the results of the first round into the strategic thinking for their next experience.

## **SCOPE OF THE STUDY**

This is the second of two studies conducted describing the peer exchange process and results. The first study documented the administrative experiences of the host states and peer exchange teams for exchanges having been conducted through December 1997.<sup>(1)</sup> This second study puts forth general findings focusing on topics dealing with program management processes based on discussions from fifty-one peer exchanges (fifty states and the District of Columbia). The exchanges examined in this study were the first conducted by each of the state RD&T units and were held during the period of June 1995 through May 1999.

The main body of the report discusses outcomes from the peer exchanges as well as presents recommendations and observations about the first round of peer exchange meetings. The report contains a substantial appendix that details the various management processes discussed at the exchange meetings (Appendix A - Concepts, Methods, & Recommendations of Research Peers for Management of State RD&T Programs). The material in the appendix is organized by management process and for easy reference these main topics are listed alphabetically. The items grouped under the main topics are brief, general descriptions of the concepts, methods, and recommendations shared by the states in the management of their RD&T programs. There is no particular order in which these items are listed within the main topic groups.

The appendix continues the process improvement begun by the peer exchanges. It presents a wealth of observations and proven practices that have reaped benefits in state RD&T programs. The goal of providing the items in this report is to create interest in and a desire to explore how a concept or method might apply to individual RD&T programs. There are so many variations of the concepts provided that it is impossible to detail the specifics of each recommended process. However, this report can provide target topics for RD&T managers to seek fully detailed documentation from their research peers through requests made via the American Association of State Highway Officials (AASHTO) Research Advisory Committee (RAC) web based list serve, their Regional RAC associations, or other means. The continuing contact with peers in this process is important, because it is from peers that the best practices are transferred from one state program to another.

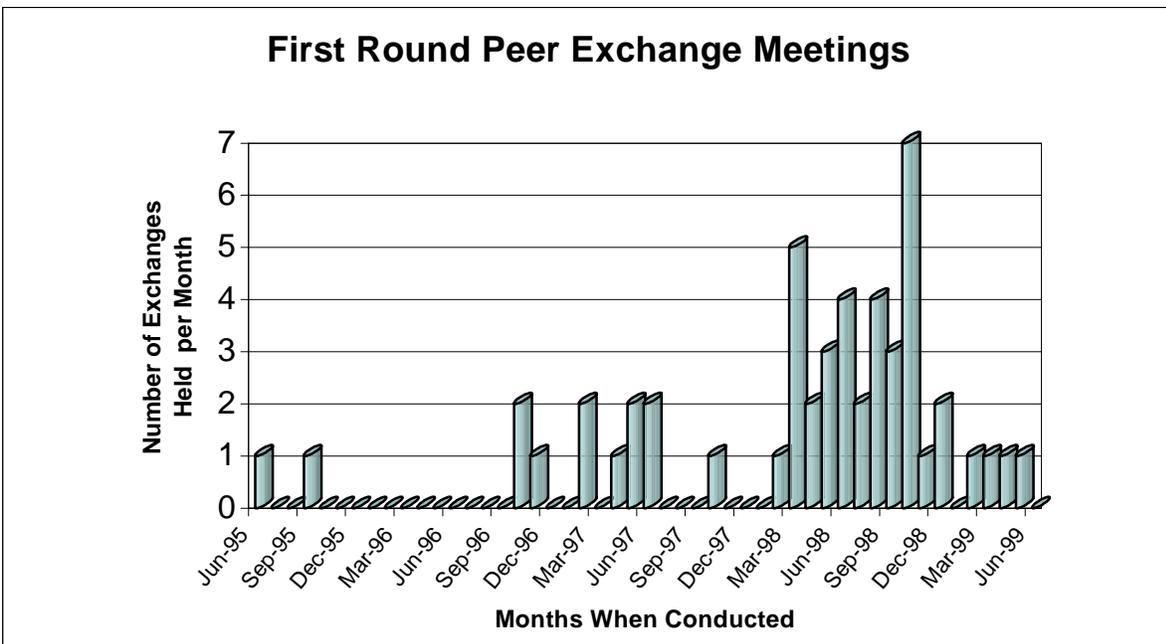
## **DATA SOURCES**

There are four major information sources for this study: 1) the fifty-one reports produced as documentation of the peer exchange meetings; 2) information received from face-to-face and telephone interviews, including telephone interviews with host state research managers and peer exchange team leaders that were conducted for the study on administrative processes; 3) respondent data from a recent AASHTO Standing Committee on Research, Research Advisory Committee survey – presenting data on 47 state RD&T units, and 4) the author's participation as

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Program Management Tool*

team member and team leader in approximately 20 percent of the exchanges.<sup>(2)</sup> Additional information about the general peer review process was gathered from business and engineering literature through the Transportation Research Board Transportation Research Information Services database and library.

This study is a retrospective of the program's first series or round of exchange meetings and consequently deals with the information generated by these exchanges. The following chart shows when the exchanges under study were conducted and the number of exchanges accomplished each month through May 1999.



**Figure 1 First Round Peer Exchange Meetings**

Data from the peer exchange reports is the primary source for management principles documented in this report. For an initial analysis the exchanges were grouped into three

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categories, large, mid-sized and small budget program. These are the same categories used in the analysis of state RD&T programs from the RAC survey:

- Large Budget Program – over \$5 Mil total funding
- Mid-sized Budget Program – between \$1.5 and \$5 Mil total funding
- Small Budget Program – up to \$1.5 Mil total funding

In addition to a general analysis of all discussion topics at the exchanges, the data were also reviewed taking into consideration these three size categories. This alternative analysis was done to find out whether the size of the program influenced the topics discussed at the exchanges, thus indicating factors of importance to a particular subset of the RD&T programs. For the most part, size of program was not as significant a factor as might be expected, yet some differentiations were present, and they are addressed in this report. While there were varying degrees of topic emphasis or complexity of discussion that occurred, many of the same concerns were expressed or issues raised regardless of program size.

## **BACKGROUND FOR THE STUDY**

### **Guidelines and Regulations**

The regulation instituting peer reviews (now peer exchanges) became effective on August 22, 1994. The authorizing language for these reviews can be found in the Title 23 Code of Federal Regulations Part 420, Subpart B -- Research, Development and Technology Transfer Program Management (Section 420.207 - Conditions for grant approval). The regulations state that a condition for federal grant approval is:

(b) Each State shall conduct peer reviews of its RD&T program and should participate in the review of other States' programs on a periodic basis. To assist peer reviewers in completing a quality and performance effectiveness review, the State shall disclose to them information and documentation required to be collected and maintained under this subpart.... At least two members of the peer review team shall be selected from the FHWA list of qualified peer reviewers. The peer review team shall provide a written report of its findings to the State. The State shall forward a copy of the report to the FHWA Division Administrator with a written response to the peer review findings.

In November 1994, the FHWA issued program administrative guidelines for the changes in the SP&R Program resulting from the new regulations. In these guidelines the conduct of peer

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Program Management Tool*

exchanges (then called peer reviews) was described. In that document the reviews were to be conducted once every three years, have two members from a list of approved peer reviewers compiled by the FHWA, may have travel and associated costs be included as a SP&R program Part II line item, and were to produce a report of the activities of the reviewing team. Further information was distributed to the states in April, 1996 containing guidelines for the conduct of peer exchanges prepared by David Huft, South Dakota Department of Transportation and Ken Eschmeyer, FHWA South Dakota Division Office.

The date on which peer exchanges were to begin was June 30, 1995, yet the FHWA provided a six month period for states to prepare to meet the new regulation. Therefore, the first triennium for the exchanges began on January 1, 1996.<sup>(1)</sup> All but one of the RD&T units receiving SP&R Part II funds completed their first exchange by May 1999.

**Transition from Peer Review to Peer Exchange -- a Key Success Factor**

The transition from peer review to peer exchange was a major key to the success of the program. The peer exchange process grew out of the original concept of peer review as conducted by organizations such as the American Society of Civil Engineers, the American Consulting Engineers Council, and the Association of Soil and Foundation Engineers. In those peer reviews, “organizations seek independent assessment of their firms and a comparison with industry norms.” Furthermore the review teams deal primarily with the chief executive officer of the organization, review standard and predetermined aspects of the organization’s operations, (e.g., financial management, project management, human resource management), conduct confidential interviews with employees, and present findings at an exit conference with the chief executive at the conclusion of the review. The final step is a staff briefing of the review report.<sup>(3)</sup> Many of the elements from this peer review methodology were retained in the development of a customized peer exchange process.

The general intent of the federal regulation for peer reviews was to enhance quality and performance of the state’s RD&T management through peer involvement. Early in the planning for implementation of the regulation, it was determined that the performance enhancements must originate within the RD&T units and not be a top management initiative, nor a compliance review by FHWA. The most readily applicable improvements for RD&T management were those currently in practice in other states’ programs. Furthermore, the performance (or compliance) review aspect of presenting a “report card,” grading the operations of the RD&T units, was viewed as a means to discuss what was lacking in an operation rather than to put forth suggestions for successful improvements. Additionally, there was great concern that the peer review reporting would present an opportunity to compare the efforts of one state’s operations to another. Such comparisons were not part of the intent of the regulation. The characteristics and

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Program Management Tool*

variables for each program are so diverse that any such comparisons would result in an unfounded assessment.

Along with the recommendations developed through accomplishing the South Dakota peer exchange in 1995, a group of research managers lead by David Huft provided additional assistance to the Federal Highway Administration in its efforts to implement the regulation. What developed was a formal program of peer exchange rather than peer review. The peer meetings took on an aspect of benchmarking, “the process of improving performance by continuously identifying, understanding, and adapting outstanding practices and processes found inside and outside of the organization.”<sup>(4)</sup> The exchange concept allows a free sharing of ideas among peers that encourages use of proven management practices. All participants learn from their peers as a result of discussing their own experiences. The transition from review to exchange shifted the basis for the peer meetings from monitoring performance against some predetermined standard to one of excelling within the RD&T program’s given context.

### **Brief Description of Peer Exchange**

FHWA states that the objective of the peer exchange program is to give state DOTs a means to improve the quality and effectiveness of their research management processes. A peer exchange is appropriate for agencies of any size, mission, discipline, or responsibility. Peer exchanges are not compliance reviews. The intent of peer exchange is for both the host state and the visiting peers to exchange information, benefitting all participants through an open discussion of ideas and knowledge. The composition of the peer exchange team, the breadth of the issues covered, and the duration of the exchange are at the host states’ discretion.<sup>(5)</sup>

Peer exchange meetings are initiated by the research manager of the state DOT. The research manager invites a team leader to chair the exchange meeting and also invites other team participants from up to four state DOT RD&T units, one or two representatives from academia, and two to three representatives from FHWA. In general the state DOT peers will have had experiences either in conducting their own exchange or through participating in another exchange. The duration of exchange meetings is on the average three days – some lasting one day and others a full week. Meetings are often held at the DOT offices or a nearby facility to enable easy access for DOT officials who present information or are interviewed by the exchange team. Only those who are invited attend the peer exchange.<sup>(1)</sup>

Before the exchange takes place, team members are given comprehensive documentation about the host state program. Often emphasis areas for discussion during the exchange are presented to the team in a pre-meeting telephone conference call. Team members arrive at the exchange with a degree of understanding of the issues to be discussed and the operations of the host state

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Program Management Tool*

program. Team members are required to bring with them documentation about the programs with which they are involved and material appropriate for sharing with peers.

The exchanges have been widely endorsed and there is no shortage of team leaders or participants. The meetings consist of sharing peer experiences, discussing the host state's RD&T program with its customers, partners, and research manager, and presenting recommendations to address problem areas presented by the host state or by others of the research peers. A report of the conduct of the exchange is produced for the host state and distributed to the FHWA division office. The report reflects a consensus of thought among the exchange team. The report generally includes a brief description of the exchange activities and discussion topics, observations about the host state program, and an action list of items to accomplish after completion of the exchange. (Each team member prepares and submits his or her own list of action items.) Exchange meetings are generally concluded by a presentation to the senior management of the host state. For a number of the exchanges, teams members have agreed to be accountable to one another for encouragement in accomplishing the action items listed in the exchange report.

The time committed to peer exchanges is an opportunity for the research manager and those on the team to address strategic issues concerning the management of their programs. Exchanges prompt in-depth looks at programs and essentially are the tool that begins the change process. Wisdom and advice from experienced peers provide the basis for program management improvements, and the encouragement of one's peers is the catalyst that turns the improvement concept into action.

Peer exchanges can be conducted with any group of peers. The peers must be willing to critically analyze their programs, open to change of perhaps long-standing processes, accepting of peers' comments and advice, eager to share their practices and secrets of success, and understand that the commitment of resources to accomplish an exchange produces a high return-on-investment. Having the FHWA structure to encourage the conduct of the exchanges was very helpful, but for other groups of peers, such oversight is not an absolute requirement.

The exchange process was so successful that research managers and some senior managers alike immediately contemplated the value of transferring the process to other program areas within an agency. At the closeout session of one exchange the deputy administrator in attendance considered the use of this exchange tool for the department's planning and program development functions. At another close-out session, the commissioner was interested in which areas this program management tool could be used in the agency. The ability to apply this process to other functional areas within an organization is one of the overall benefits demonstrated by the first round of exchanges.

## **Round Two Peer Exchanges Are Beginning**

Round two of the exchange process is now beginning. Only a very few states have completed a second exchange to-date, but many are actively planning their next exchanges. FHWA issued revised guidelines for peer exchanges and intends to also revise the regulations.<sup>(5)</sup> A most notable change will be the official renaming of “peer review” to “peer exchange” and endorsing the existing peer exchange process. Furthermore the requirements for FHWA maintaining a list of qualified peer participants, two of whom were to be exchange team members, will no longer be necessary as many people now have appropriate experience.

Based on discussions from managers of the RD&T units, many second round exchanges will focus on a manageable number of interest areas identified for in-depth discussion. The broad program overview and extensive customer interviewing popular in the first round of exchanges served as basis for the exchange process. Now, many research managers express a desire to spend quality time with peers on particularly challenging items or areas needing change in their programs. This shift from broad to more focused issues will more effectively foster the exchange of best practices and allow the exchange team members to fully pursue the identified issues. One shortcoming of the first round of exchanges noted by many participants was the lack of time to fully discuss issues of interest and synthesize the material gathered. Round two plans seem to be addressing these concerns.

By moving toward peer exchanges that focus only on interest areas, the RD&T units may be moving away from the program performance overview that formed the basis of the peer exchange concept. This shift should still address the general intent of the peer exchange program to enhance quality and performance of the state’s RD&T management through peer involvement. Yet, there is a temptation to only discuss the issues among the peer team members, rather than opening the discussion to host state partners and customers. One of the major appeals of the first round of exchanges was the exposure to and endorsement from customers of the RD&T unit. Another beneficial result was the accountability for process improvement that the RD&T unit created by committing itself to considering senior managers’ and customers’ perspectives and recommendations. Round two exchanges should be conducted in such a way that these benefits are retained even with the shift in peer exchange format or focus.

As mentioned earlier, each state RD&T program has individual characteristics and operates in a unique environment. For round two, several states have expressed a desire to incorporate more of a performance review of their programs than has been suggested in the peer exchange guidelines. The impartial review of their programs by customers was so valuable that more in-depth evaluation of the RD&T unit’s efforts is sought. This format likewise fits the objectives

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Program Management Tool*

of the peer exchange process; it will present an opportunity to enhance the quality and effectiveness of state RD&T programs.

Round two will be a refinement of the first round of exchanges. As discussed, the exchange format may differ, the subject or interest areas may change, but the goals of bettering the respective programs through customer input, peer counsel, and identification of best practices should remain the same.

**General Observations About Round One Exchanges to Carry Forward to Round Two**

There are a number of general observations about the exchanges that may be helpful for RD&T managers as they plan their second peer exchange.

- There were two separate opinions on the profile of the exchange teams. Should the peers be from programs similar to one's own or possess experience or manage programs dissimilar to one's own? There is great benefit to having a mix of experiences on the peer exchange teams. Seeking a number of team members with experience in the areas of greatest concern regardless of program size is advantageous. Adding such diversity to others that may be from highly similar programs proved to be a good formula for team selection. Goals of the exchange must be well articulated and team members' experiences should reflect those goals. Careful planning of exchange team members is one of the most productive actions taken to ensure a successful exchange.
- The degree of effort expended in preparing for the exchanges varied widely. Expenditure of large amounts of effort to prepare for the exchange may be a deterrent to conducting additional exchanges. More effort is most probably required for a full program process overview. Lesser effort may be required for exchanges that address identified focus areas.
- Time and again, research managers encouraged the participation of the CEO and other senior managers. As time progresses, there is some concern that the peer exchanges will take on a routine character and not continue to be a means to promote communication and visibility for the RD&T program at the senior management level. The second round of exchanges must retain the vitality, intensity, and dynamic nature of the first round and be an attractive venue for CEO-research unit interaction.
- For round two, host states are encouraged to consider how the exchange report may be made available to research peers that did not participate in the exchange. Many research managers could benefit from the best practices discussed at exchanges. Electronic copies

*Peer Exchange: A Value-Added  
Program Management Tool*

of the report may be appropriate, a concerted effort for promoting sharing of the reports by the Regional RAC may be beneficial, or some broader lessons learned aspect might be promoted by the National RAC.

- Many of the peer exchange reports adopted a format developed early in the process of the exchanges and used as an example in the report, “Documenting Peer Exchange Administrative Experiences.”<sup>(1)</sup> While providing documentation of the topics addressed and findings of the meeting (including lessons learned and practices discussed), this format does not include a specific section that highlights best practices. It would be very useful to research peers if the exchange reports made a particular effort to describe and discuss the best practices. Such a section in the report would provide a high payoff for those reading the report at a later time.

## **ROUND ONE PEER EXCHANGE ACCOMPLISHMENTS**

One of the most consistent accomplishments of the peer exchange meetings was the knowledge that the manager was “on the right track” with his or her program management practices. This reaction was particularly noted by host state research managers and particularly resulted from the consensus observations about the program documented in the exchange report. Across the spectrum of peer exchanges with both host state research managers and exchange team members alike, encouragement to do the job well within the given context was the most important accomplishment.

Some comments indicating the importance of the encouragement from peers:

*“I am very encouraged by the report, this provides motivation for me to continue to improve my program.”*

*“What I am doing is right and worthwhile”*

*“I thought I was the only one struggling with these issues, I now know there are some solutions, and I can get help from my peers.”*

*“I'm not alone in this, I have partners in the process.”*

*“I found out I had a resource I haven't tapped into before.”*

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Program Management Tool*

Prior to the exchanges, some research managers expressed anxiety about displaying such a comprehensive view of their research programs to others outside their own organization. Additionally, there was some further concern about presenting the team's conclusions to senior management of the organization at the close-out session. In all cases discussed with research managers, these concerns were proven to be unfounded. Therefore, another significant accomplishment of the exchanges was – they were exchanges and not compliance or performance reviews. The meetings really were opportunities to better one's program through sharing concepts and principles already proven workable by one's peers. Additionally, the reports of the exchanges were received by FHWA division offices solely for the purpose of demonstrating that the exchange was conducted and that the state met the regulation. Because of the concern about compliance and performance review, the original guidelines for the exchanges gave the host state the option of limiting distribution of the reports. Use of this option was not necessary. All states are willing to share their exchange reports because they contained cogent discussion of their programs and represent documented counsel of their peers.

An essential aspect of the peer exchange program is that all who participate benefit. In particular, the invited peers that are part of the exchange team report that they get as much benefit or more than the host state research manager. Participation on the exchange team is a unique opportunity to experience the operation of a peer program. As a visiting peer to a host state exchange meeting, research managers are able to critically evaluate their program against the demonstrated activities of the host state. Moreover the discussion with others on the exchange team provides an opportunity to determine the best practice of all participants in the exchange. A peer exchange team member may leave the meeting with a multitude of ideas and methods to apply to his or her program. Furthermore, these exchange team members will have the very rare benefit of discussing the applicability of the various practices to their respective program situations -- the in-depth discussions at exchanges may work through how a concept will apply to another state RD&T program. Questions are answered such as, "How will this practice work in my state's program; will I be able to implement this process in the same manner; what differences will be required or can I take elements of the demonstrated process and enhance my program's activities?"

Research managers enthusiastically seek participation as peer exchange team members. One research manager stated he participates in as many peer exchange meetings as possible because he always learns how to improve his program. This research manager uses these meetings as training opportunities for his staff. He makes sure one of his staff members also attends the exchanges to increase knowledge and understanding of program management concepts and to get to know others in the field. Important accomplishments for research managers participating on peer exchange teams are the opportunities to solidify peer relationships and to make new contacts with other research managers, and technical and other management staff of the host state. Better

*Peer Exchange: A Value-Added  
Program Management Tool*

peer and technical contacts promote less duplication of research effort and a higher degree of cooperation among state DOTs.

Research managers have set about the task of accomplishing the goals for themselves and/or their programs that they identified in the peer exchange reports. Overall, the host state research managers gave themselves significantly more ambitious assignments to complete after the conclusion of the exchange versus the visiting peers. This is understandable because the host state research manager organized the exchange to address topics of specific interest to the host state program and opportunities for its improvements. Although this was so, exchange reports also focused on team members' (visiting peers') observations or planned actions resulting from knowledge gained at the exchange meeting. In subsequent discussions held with research managers from host states and visiting peers, many expressed they have accomplished significant tasks based on the objectives set out in the exchanges.

*"We accomplished each of the objectives identified for our peer exchange.[and]  
We completely changed direction in one area based on what we learned."*

*"If you are doing the exchange just to fulfill the federal regulation, don't bother,  
that will be a waste of time, however if you really want material to help you  
improve your program, then by all means do it."*

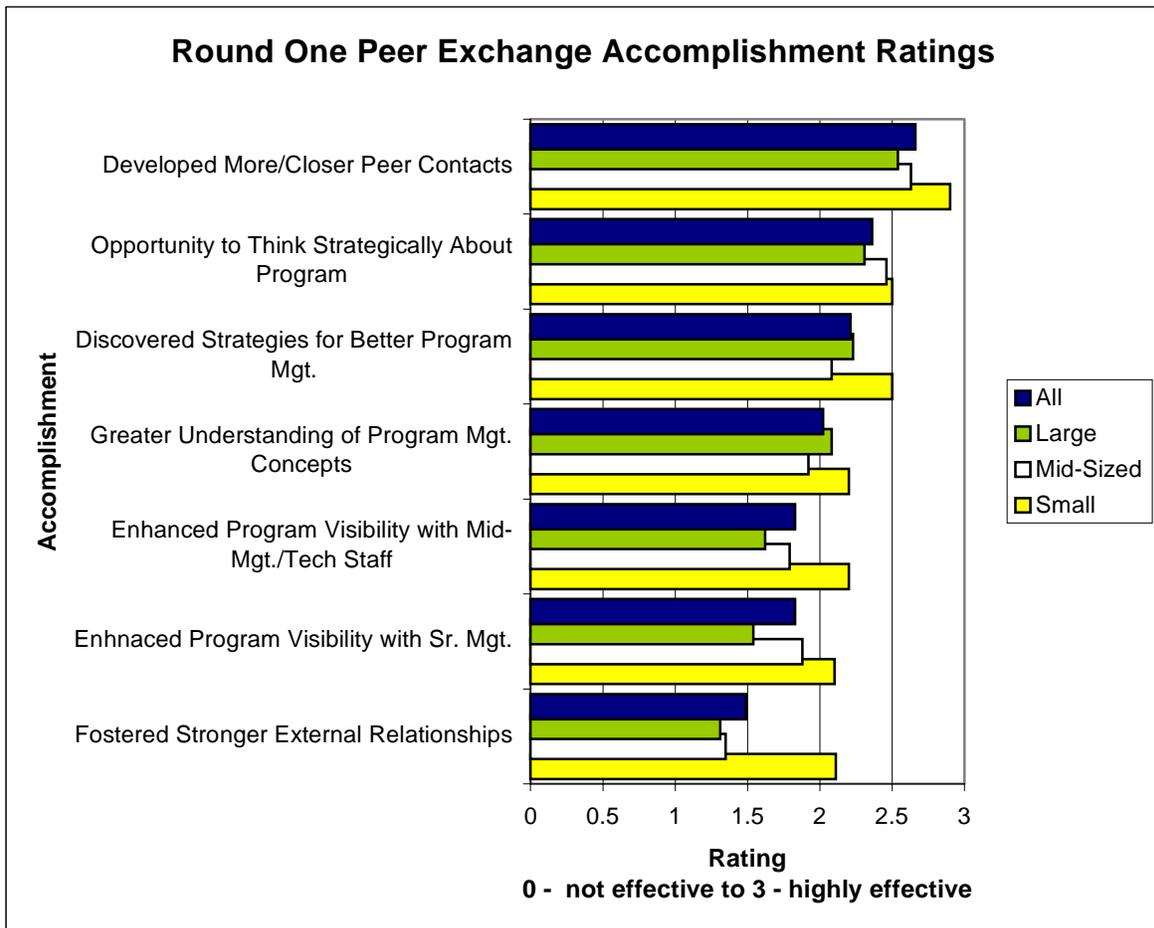
*"I've worked on all my objectives set out in the peer exchange."*

In the recently conducted survey about the program and activities of state RD&T units the AASHTO RAC provided ratings for seven potential accomplishments of the peer exchange process.<sup>(2)</sup> Figure 2 shows the ratings from the total number of state RD&T unit respondents, and also from large, mid-sized, and small budget units.

The most highly rated accomplishment from the recent survey is state RD&T managers developed more and closer contacts among their peers. This rating corresponds well with the interview comments about the importance of encouragement and gaining knowledge from one's peers. Based on a similar questionnaire conducted in late 1989, with many of the same individuals responding, state RD&T managers said that face-to-face interaction was one of the best factors for the effective coordination of research activities at the state level.<sup>(6)</sup> Noting this, it is important to recall that the origins of the peer exchange process were based on FHWA's goals to raise the level of RD&T program management effectiveness and provide a means to better coordinate these programs. Both the state RD&T units and FHWA are winners with peer exchanges. Not only are state research managers, and correspondingly, the RD&T programs, benefitting from their peers, but FHWA is accomplishing its objectives as well. Moreover,

*Peer Exchange: A Value-Added Program Management Tool*

FHWA is accomplishing these objectives by a regulation that achieves what state research managers have long indicated was a necessary and often lacking RD&T element – face-to-face interaction with peers.<sup>(6) (7)</sup>



**Figure 2 Round One Peer Exchange Accomplishments Ratings**

Research managers indicate that peer exchanges are opportunities to think strategically about their programs. Many welcomed this opportunity, admitting that their understaffed units and the level of work prevented them from dedicating sufficient time to this important activity. As an

*Peer Exchange: A Value-Added  
Program Management Tool*

example, a research manager turned this opportunity into an action item. He determined a RD&T strategic plan and vision for long term research goals was necessary and listed this as one of his planned items to accomplish.

On the average, for all sizes of RD&T programs, research managers reported that peer exchanges were effective in transfer of new knowledge about program management practice. Research managers discovered strategies for better managing their programs as well as received a greater understanding of program management concepts. This fact alone supports continuation of the peer exchange program. Interestingly, the large budget program managers learned as much or more than the average, showing that all programs, regardless of size or sophistication can benefit from the exchanges.

Peer exchanges were effective in creating increased visibility for the program but a little less so, on the average, than in transferring program management knowledge. For large programs, responses indicate peer exchanges had less impact on program visibility -- perhaps due to the already higher visibility these programs enjoy within their agencies. Correspondingly, small budget RD&T programs indicated peer exchanges were a considerable help in creating greater visibility of the program both with senior management and middle-managers and professional, and technical personnel. This is also consistent with information gathered from the research managers during interviews and informal conversations. Often the small budget programs receive very little attention from senior management or from other areas within the agency, mostly because the program funding is small and only a few projects per year are initiated. One research manager from a small budget program reported:

*“We interviewed the CEO, senior managers, division managers, project managers and technical professionals and others within the department. Many of the people we interviewed had no clue about the research program going into the exchange; they were very impressed at the end.”*

One thing to note that even with comments such as the one above, the peer exchanges generally were not sufficient to turn around attitudes of senior management that are not predisposed toward research. Although, the peer exchange process strongly encourages a close-out meeting with the CEO and other members of the executive management team, research managers are not always successful in facilitating such accountability. In several cases the CEO and/or top management were invited and scheduled to attend the close-out session but did not, even when there was no expressed situation that precluded attendance.

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When CEOs fail to attend the close-out sessions, they are not fulfilling their responsibility of calling the research unit to be accountable. This type of accountability can be an important benefit of the exchange process. At the very least the close-out session is an excellent opportunity to initiate dialogue between the executive level and the research unit. More likely, the close-out session will increase the alignment of the research program with the goals of senior management and the mission of the organization.

The exchanges were only somewhat effective in fostering stronger external relationships (other than with state RD&T program peers). The average rating of all respondents was 1.5. This is not an unexpected outcome considering a full 30 percent of the exchanges were conducted with a variety of state DOT and FHWA representatives only. The vast majority of the remaining exchanges had team members that were representatives of partnership universities or other federal partner organizations. This being the first experience with peer exchanges, most host states incorporated external representatives that were well-known to the research manager or the agency whether they were team members or interviewees.

Although the state RD&T managers do not want the peer exchange process to become a federal compliance review, aspects of program evaluation contained in the peer exchanges are important to the programs. Peer exchanges have been used as an evaluation tool by the RD&T units to assess their programs. In the recently conducted RAC survey, 79 percent of the states used the peer exchange experience as a tool for program evaluation.<sup>(2)</sup> States with large budget programs reported that they were as likely to use the peer exchange as they were to use a process of program review by in-house officials or evaluations by user or customer groups. States with mid-sized budget programs used these two other types of evaluation processes, but peer exchanges were the most popular evaluation tool. States with small budget programs were twice as likely to use peer exchanges as an evaluation tool compared to the other two evaluation processes mentioned.

## **TOPICS OF DISCUSSION AT THE PEER EXCHANGES**

The topics of discussion during the peer exchanges broadly spanned the subject of program management. Processes addressed ranged from RD&T program development techniques to project management methods, staff development concerns, a variety of aspects of research results implementation, and more.

Remarkably, although the programs differ widely, many of the same topics were discussed at the various exchanges. The degree to which each topic presented a concern varied substantially from exchange to exchange. Some exchanges focused on a number of topics and discussed them

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at length, and other exchanges may have brought up the same topics during discussion, yet treated them with significantly less depth. For example the topic of implementation tracking occurred in many peer exchange discussions. A number of RD&T units included this topic as an emphasis area and consequently directed considerable attention to this topic. On the other hand, many other exchanges included implementation tracking as just one of a host of discussion items. Yet, members of teams from both types of exchanges (significant focus on the topic or little focus on the topic) thought some aspect of implementation tracking worthy of trying in their own state programs. Lessons learned came from all aspects of the discussions whether they were topics of emphasis or side-bar conversations that emerged as a good idea to try.

The topics most frequently discussed at exchanges varied somewhat with program size. However, program size was not a predictor of topics for discussion, nor were any topics exclusively dealt with by any one sized program. The top three areas of discussion for the various sized programs are as follows:

<b>Most Frequently Discussed Topics in Peer Exchanges</b>		
<b>Large Budget Programs</b>	<b>Mid-sized Budget Programs</b>	<b>Small Budget Programs</b>
<ul style="list-style-type: none"> <li>• Process Improvements at the Program and Project Level</li> <li>• Performance Measurement and Value of Research Efforts</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of Research Results</li> <li>• Outreach/Marketing and Focus on Customer Needs</li> <li>• Performance Measurement and Value of Research Efforts</li> </ul>	<ul style="list-style-type: none"> <li>• No clear consensus on topics of emphasis -- all tended to be equally important to the smaller budget programs.</li> </ul>

The finding that small budget programs gave relatively equal weight to the variety of topics seems to indicate that these programs are working on all fronts and consider themselves needing process improvement in many aspects. In fact, several of the smaller programs were in the process of re-engineering or recreating the RD&T function in the agency.

## **CONCEPTS, METHODS AND RECOMMENDATIONS GENERATED BY PEER EXCHANGE DISCUSSIONS**

Peer exchange team members identified myriad concepts, methods, and recommendations for improving their states' RD&T programs. The following is a list of the general grouping of items considered "good ideas to take home" or "worthy of consideration for applying to one's program." The full listing of the items is contained in Appendix A following this report. The topics are listed alphabetically ease of reference and do not indicate any order of importance.

- Access to and Communication with Senior Management
- Alternative Funding
- Change
- Contracting and Approvals
- Coordination of Research Efforts with Other States
- Cost/benefits of Research Results
- Customer Service
- Implementation of Research Results
- Industry Involvement
- Marketing
- Partnerships
- Problem or Idea Solicitation – Needs Identification
- Project Management
- Program Management
- Staffing and Resources

It is apparent that the focus of the peer exchanges is acquiring strategies and methods to enhance management expertise. Clearly, this above list shows a grouping of classic management subjects: communications and human relations, marketing and customer service, project and program management, finance/accounting, change management and others. Time and again in the exchange reports, research managers showed a desire to know more about these topics and to understand effective application of them to better their programs. Additionally, as expressed in the NCHRP report, "Seven Keys to Building a Robust Research Program," CEOs and other senior managers are demanding business management solutions to DOT problems and expect research managers to "talk" their management language and participate at that level.<sup>(8)</sup> In today's state DOT, research managers must be able to express their program results as economically sound investments and show contribution to the strategic goals and mission of the organization.

Whether being prompted by the need for greater skills in managing or through the need to better interact with senior management, host state research managers and invited peer research

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managers uniformly call for enhancing their management abilities. It suggests a skills gap for research managers that could be filled by traditional business management training. Such training would promote “better management of the business of research.”

Supporting this concept of fortifying research managers with business management training, it is worthy to note that a number of research programs that are considered robust have managers with degrees in some aspect of business or economics as well as other technical degrees or experience. While sending all research managers back to school for a business degree is certainly not the solution to this expressed need, program and business management training by organizations such as the FHWA National Highway Institute or AASHTO would produce high payoff for research programs.

## **FINDINGS AND CONCLUSIONS**

*“It was a lot of work, but it was worth it; we learned a lot of good items. It was a good experience for the staff -- good news, the exchange is a good experience.”*

The most significant findings of this study are the actual items identified by research peers as worthy of consideration for applying to their own RD&T programs (See Appendix A). Yet there are findings and conclusions important to convey to state RD&T units and agency management about these peer exchanges and the peer exchange process in general.

- ◆ The intended goal of the peer exchange process was clearly reached. Nationwide, RD&T peers comment about the success of the program and their positive experiences. Furthermore, as the RD&T units conducted the exchanges it became apparent that peer exchanges have a broader applicability than just research related activities -- many types of programs can benefit from conducting peer exchanges.
- ◆ A key success factor for the peer exchange program was the change from peer review to peer exchange. The transition from review to exchange shifted the basis for the peer meetings from monitoring performance against some predetermined standard to one of excelling within the RD&T program’s given context.
- ◆ The peer exchange process was sufficiently flexible to address all of the diverse RD&T programs and sufficiently structured to produce concepts, methods, and recommendations for enhancing the quality and effectiveness of state RD&T programs. One of the peer exchange reports stated:

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“A known quantity going into the peer exchange process is that while the objectives to operate a healthy, viable, meaningful research program are the same for each DOT, individual state laws, rules and procedures do not allow for a “cookie cutter” approach to best management practices. Also each manager must work within priorities that may be unique to his or her department. The true value of the peer exchange is that knowledge has been shared and even if substantive changes do not occur exactly as in another state, the knowledge and awareness gained through the exchange will permeate each participant’s decision making process.”

- ◆ The vast majority of the peer exchange participants were very positive about the peer exchange experience and identified items to enhance the management of the program with which they were involved. One of the host state RD&T managers said.,

*“The positive feedback was very important, everything was presented in a positive way, {it} confirmed what we are doing, {and} showed us areas for improvement.”*

- ◆ Peer exchanges are an opportunity for the face-to-face contact deemed critical by the RD&T managers. The exchanges are federal program requirements and RD&T managers should take full advantage of them. RD&T managers are in the position of having to do what they have long identified as lacking in the state RD&T community. The meetings present time for exchange of management information and usually a variety of technical information, strengthens the manager’s network for future contacts, and provides encouragement for excellent performance. For all concerned, FHWA, the host state agencies, and the visiting peers, the exchanges are a win-win experience. One RD&T manager said,

*“{I spent} three days in very focused, wide-ranging discussion on how to lead a research program from people who have done it for many years. ...being with people I can learn from and with whom I can exchange experiences and information is most valuable.”*

- ◆ Peer exchanges set aside a time for strategic thinking about one’s program, with the added benefit of input from one’s peers. This is an unprecedented program opportunity for RD&T managers. There are few, if any other, organized opportunities that address the strategic aspects of managing a RD&T program. The realizations from several RD&T managers were,

*“The exchange focused attention on research in the department, this was three hours of senior management thinking about research -- a very good opportunity,” and*

*Peer Exchange: A Value-Added  
Program Management Tool*

*“The {host agency} researchers seem to have a better view of the big picture. My researchers need to understand the link between their work and the goals of our business – see the forest for the trees, and the trees for the bark.”*

- ◆ Business management training for RD&T managers is a high-payoff activity. From discussions with senior management, it is clear that research programs must address strategic goals and meet economic challenges. RD&T managers must be able to show their programs contribute on these levels and demonstrate the value of the research effort to the agency. Organizations such as FHWA National Highway Institute or AASHTO could be venues for providing such training.
- ◆ The topics most frequently discussed at exchanges varied somewhat with program size. However, program size was not a predictor of topics for discussion, nor were any topics exclusively dealt with by any one-sized program. Small budget programs discussed the full scope of management topics with relatively equal frequency -- no specific topics were considered most important, perhaps indicating that these programs are working on all fronts to improve their programs. Large budget programs most frequently dealt with process improvements at the program and project level; mid-sized budget programs most frequently addressed implementation of research results.
- ◆ Many peer exchanges identified focus areas to direct discussion during the meetings and narrow the topics to a manageable number for sharing of best practices. These exchanges tended to have clearer, more identifiable practices to share documented in their exchange reports than those without focus areas. Exchanges not having focus areas tended to produce long lists of observations.
- ◆ Overall, the host state research managers gave themselves significantly ambitious assignments to accomplish resulting from the exchange meeting. The exchanges are promoting change and the application of best practices.
- ◆ For future exchanges, host states are encouraged to consider how the exchange report may be made available to research peers that did not participate in the exchange. The regional or national RAC may be venues for sharing lessons learned and best practices.
- ◆ While providing documentation of the topics addressed and findings of the meeting (including lessons learned and practices discussed), the format most often used to report on the exchanges does not specifically highlight best practices. It would be very helpful for reports to contain a section that describes and discusses the best practices addressed during the exchange.

*Peer Exchange: A Value-Added  
Program Management Tool*

- ◆ Close-out sessions with the CEO and others of the senior management team are an excellent opportunity to encourage research to make even greater contributions to the agency. Some CEOs have not attended close-out sessions thus failing to hold the research program accountable and missing the opportunity to further align the research program with the goals and mission of the organization.
- ◆ By moving toward peer exchanges that only focus on interest areas, there is a temptation to only discuss the issues among the peer team members, rather than opening the discussion to host state partners and customers. Partners and customers provide a unique perspective for the RD&T unit. Round two exchanges should be conducted in such a way that the benefits of user perspectives are retained regardless of change in peer exchange format or focus.

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# **APPENDIX A**

## **Concepts, Methods, & Recommendations of Research Peers for Management of State Transportation Research, Development & Technology Programs**

# Appendix A

## Concepts, Methods, & Recommendations of Research Peers for Management of State Transportation Research, Development & Technology Programs

### TABLE OF CONTENTS

INTRODUCTION.....	A-1
ACCESS TO AND COMMUNICATION WITH SENIOR MANAGEMENT .....	A-3
ALTERNATIVE FUNDING .....	A-3
CHANGE.....	A-4
CONTRACTING AND APPROVALS .....	A-5
COORDINATION OF RESEARCH EFFORTS WITH OTHER STATES.....	A-6
COST/BENEFITS OF RESEARCH RESULTS .....	A-7
CUSTOMER SERVICE .....	A-7
IMPLEMENTATION OF RESEARCH RESULTS.....	A-8
General Implementation .....	A-8
“Jump Start” for Implementation .....	A-10
Implementation Planning.....	A-10
Implementation Staff and Groups .....	A-11
Implementation Tracking .....	A-12
INDUSTRY INVOLVEMENT.....	A-13
MARKETING.....	A-13
Building Commitment to RD&T.....	A-13
Dissemination of Research Results .....	A-14
Resources to assist in Marketing .....	A-14
Marketing to Senior Management.....	A-15
Marketing Via the Internet .....	A-16
Outreach Efforts .....	A-17
Publications and Marketing Literature .....	A-18
Research Reporting .....	A-19
PARTNERSHIPS .....	A-20
Partnership Activities .....	A-20
Facilitating Partnerships .....	A-21
Setting Up Processes to Handle Partnerships.....	A-22

PROBLEM OR IDEA SOLICITATION – NEEDS IDENTIFICATION .....	A-22
Idea Prioritization .....	A-22
Long Term Needs and Horizon Issues.....	A-23
Needs Identification.....	A-23
Problem or Idea Solicitation.....	A-25
PROJECT SELECTION.....	A-26
PROJECT MANAGEMENT.....	A-27
General Project Management .....	A-27
Project Champions .....	A-28
Technical Oversight Committees .....	A-28
PROGRAM MANAGEMENT.....	A-29
Agency Research Advisory Committee.....	A-29
General Program Management.....	A-30
Performance and Value of the Program .....	A-35
STAFFING AND RESOURCES.....	A-35

# **Appendix A**

## **Concepts, Methods, & Recommendations of Research Peers for Management of State Transportation Research, Development & Technology Programs**

### **INTRODUCTION**

This appendix is a synthesis of the myriad concepts, methods, and recommendations from research peers having participated in research, development, and technology (RD&T) the peer exchanges nationwide. The material contained herein is taken from the discussions and team findings and conclusions documented in the peer exchange reports and from interviews with state department of transportation (DOT) RD&T managers. The items put forth are all based on lessons learned at the exchanges.

Considering that the objective of the peer exchange program is to give state DOTs a means to improve the quality and effectiveness of their research management processes, the items reported necessarily deal exclusively with management topics. Although this report deals with research management processes, many technical topics were addressed during team discussions, and there is clear evidence in the exchange reports that technology transfer for such topics occurred. By not detailing the technical issues, this report does not lessen the importance of those exchange benefits. This synthesis only deals with the exchange's primary objective topic – management processes.

Nearly all reports documenting the exchanges contained a section for the peer exchange team members to comment about the exchange and make observations about the host state's program. In addition, all team members, including the host state members, were given the opportunity to specify an action plan or a "to do" list of items they considered "a good idea to consider for application to my state's program." These observations and lists of "take-home items" were the primary source of the concepts, methods and recommendations contained in this appendix.

While all state DOT RD&T programs have similar goals, every program has unique characteristics and attributes that set it apart from every other program. The differences are not so great that a good idea for one state RD&T program isn't still a good idea for another state. However, that good idea is most probably not beneficial for every state RD&T program. Consequently, all the items reported in this appendix will not be applicable to every state. In fact, because of the differences in the various state programs, there are concepts included that provide

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

different and sometimes opposing recommendations for the same item. For example, some states operate with a highly decentralized RD&T function and recommend that a centralized function be created, while other centralized RD&T units are seeking ways to decentralize. As with many of the issues discussed, finding the best balance for the structure and operation of the RD&T units depends on the individual program and its individual context. Readers are reminded to consider the best approach for their respective programs, while understanding that some of the concepts, methods and recommendations will not be applicable.

Caution is given to research managers seeking to use this document as an agenda for RD&T program process improvement. There are a great many items reported -- select a manageable number to consider for application to one's respective program. Forms and samples of processes are not included with this report. However, with the AASHTO Research Advisory Committee web site and list serve capabilities, any research manager can request information about the items presented and get specific responses from his or her RD&T peers.

The material is listed alphabetically by major topic. There is no importance to the order in which the items are listed within major topic. Also, there is no distinction whether items were considered a good idea for a large, medium-sized, or small budget program. The exchange teams often represented a mix of program sizes and for the most part, information exchanged showed general applicability of management practices for all sized programs. If an item is concerned with a specific sized program, it is mentioned. A table of contents is provided to assist locating material on the various management topics and processes.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

*“It was a great experience, we really benefitted from the exchange. It clarified where we were weak in our program, and it was an extremely helpful way of finding out items to work on. We implemented all five major recommendations of the team.”*

## **ACCESS TO AND COMMUNICATION WITH SENIOR MANAGEMENT**

- The research unit’s ability to be anticipatory and to respond strategically could be enhanced by frequent and direct communication with those who establish strategic direction. The unit should have increased opportunity to actively engage the CEO and his or her staff in directing the strategic impact of the research program.
- Communication linkages between middle management (technical management) and executive management (policy management) in program formulation as well as program evaluation must be over-emphasized.
- If senior managers are not members of the state research program advisory committee, include these individuals at the annual research program presentation to the executive committee; improves communications, gives senior management’s vision to the state RAC members, provides a networking opportunity between the executives and those interested and responsible for RD&T.
- Get RD&T on the executive management committee agenda 1 to 2 times per year.

## **ALTERNATIVE FUNDING**

- Take maximum advantage of FHWA demonstration and experimental programs projects. The programs provide 100 percent federal-aid funds in addition to SP&R allocations.
- State programs can show a markedly improved responsiveness to customers if they have a minimum amount of state funds for projects that do not qualify for SP&R funds -- these state funds are especially important for the quick response, “firefighting” type efforts. Such efforts are generally not high cost and do not require large amounts of state funds, but they do generate substantial credibility within the agency.
- Request funds or other resources from the DOT customer for the research product. This supplements scarce research resources and helps focus researchers and customers on implementation. For example one state has allocated a percentage of operational funds

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

for research – these moneys are the base contribution for research performed in that operational area.

- NCHRP fees should be “off the top” of the total SP&R program rather than be taken from the research budget (Part II) alone.
- Create the mechanism for accepting additional outside or alternate funding. Identify an individual, in legislature if necessary, to assist the program by creating such a mechanism. This will most likely be a top down imitative, will take considerable effort to accomplish, but will reap great benefits. Such a mechanism would encourage partnerships and consortia which advantageously leverage funding; could permit a percentage of operational funds to be used for research and technical assistance, and could direct previously unavailable state funds to be used for RD&T.
- With high industry involvement in a program, develop avenues for industry association financial support of research.
- One state uses 100 percent federal funds for research, based on its legislation that allows other state funds for roads (toll facilities) to count toward the match of federal funds for SP&R.
- There is potential for section 402 federal funding of some research-related items.
- Mechanisms must be developed whereby additional federal research funds can easily be used to supplement the agency’s program. Look for ways to take advantage of non-SP&R funds. Having a person in the research staff that is very knowledgeable about federal aid funding is quite beneficial.

**CHANGE**

- In times such as an administration change or during re-engineering efforts, while the whole of the agency is undergoing change, there are significant opportunities for establishing research as an integral part of the new paradigm.

## **CONTRACTING AND APPROVALS**

- ❑ Create a multi-function team of procurement, legal, fiscal, and administrative agency staff to streamline processes for contracting. Set goals and expectations of outcomes that foster a responsive research contracting process. Each element of the contracting process needs to be examined and a determination of optimal process should be made.
- ❑ Research staff and contract managers need to be completely informed on all parts of research project approval process. Consider formal training sessions or workshops to convey this information.
- ❑ Establish a memorandum of understanding or an umbrella agreement between federal research organizations and the DOT to enable conduct of short-term research without the lengthy advertising, selection, and approval process necessary for private sector or academic research.
- ❑ Use “retainer” contracting or “basic ordering agreements,” a contract having a longer fixed term, with an annual funding, and allowing task orders to be written detailing the work plan for short turn-around, relatively small expenditure efforts. An upper limit for time and cost of task orders should be set and specific disciplines for which services are required could be identified. Research unit managers or accessible senior managers should have the authority to fully approve the task orders. Having a readily available mechanism for quick solutions shows responsiveness of RD&T to the immediate concerns and, therefore, the goals and objectives of the agency.
- ❑ To reduce project initiation time, consider the use of boiler-plate contracts – contracts that have legal division approval and will not be changed during negotiation with researchers; the proposal/work plan becomes part of the executed contract.
- ❑ To reduce project initiation time, make an executed standard research contract part of the proposal submittal requirements from the researcher so that at project award, the contract only requires department sign-offs.
- ❑ Put a clause in research contracts to cover current practice of allowing up to 10 percent of contract cost to be shifted from one line item to another. This saves a great deal of contract modifications time and effort.
- ❑ If a time extension is need for a project, include the option in the researcher agreement to grant such extensions without a complex renegotiation.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- Consider the option of building in liquidated damages into research contracts which provide for payment of a certain fixed amount in the event of a breach. These provisions typically are used if the actual damages are difficult to determine and the amount of the liquidated damages is reasonable.

**COORDINATION OF RESEARCH EFFORTS WITH OTHER STATES**

- Place the annual RD&T work program on the agency's web site. Include federally funded and state funded research. Tell peers managing other state RD&T programs that it is available for their reference.
- Exchange work programs and program manuals with neighboring/regional state RD&T units.
- Participation in the Research Advisory Committee (of the AASHTO Standing Committee on Research) is an effective way to strengthen contact with peers to facilitate the knowledge of research activities nationwide. These contacts provide an opportunity to better understand other state's programs, are an avenue to eliminate duplicating research being performed by others, and may promote leveraging of research funds through cooperative research with partner states.
- Create multi-agency teams (small groups) of technical personnel from neighboring states and universities to investigate problems of mutual interest. Efforts would be sponsored by regional pooled fund mechanism.
- Look for pooled fund opportunities prior to the beginning of every research project.
- Early in the problem statement development stage (after receipt of research ideas) email a list of the problem statements to other states in the region to identify potential partners in research.
- Invite neighboring states' RD&T program staff to be members of project technical advisory committees.

## **COST/BENEFITS OF RESEARCH RESULTS**

- Focus on the program. Address investment returns. Use net present value (expresses values in dollars) rather than cost/benefit ratios. Key on relatively few projects that can be defensively measured. Keep the numbers reasonable, extremely high net benefits estimates raise issues of credibility. Use conservative estimates. Keep time horizon reasonable.
- Measure costs and benefits on a program-wide basis rather than project by project. To document a program's value, choose a handful of projects with truly measurable returns on investment which more than offset expenditures.
- Narrative discussion of benefits should be done for projects that have less tangible results.
- For longer projects, where possible, schedule an early deliverable of research results that provides clear benefits of the effort. This keeps the project staff motivated, gives some feedback to users, sponsors, and management, and provides an early implementation activity which forms a model for subsequent implementation.
- A small percentage of the research project funding should be reserved for calculating the anticipated benefits and value to the DOT of the research results. This can be incorporated into the responsibilities of the research contractor or in-house principal investigator.
- Document assistance provided (type of assistance and its result) by researchers for "on call" or "firefighting" efforts so such efforts can be included in the reporting of services provided and information on successful accomplishments. This will also promote internal technology transfer throughout the agency field offices.

## **CUSTOMER SERVICE**

- Improve relationships with customers by scheduling periodic visits to their sites. This may include roundtable discussions, presentations of research results, etc. Get to know customers personally. The more the customers know the RD&T unit manager and staff, the more they will be likely to use the services provided.
- Work with field offices to identify an individual to act as a research contact; this person will be a champion for research located in the field office and will promote use of

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

research services for the field staff.. Train the contact persons so that they can represent the research function in the most effective manner. To keep the research contacts knowledgeable about research activities and capabilities, have them periodically visit the research office and applicable research project sites.

- ❑ The research unit can be used to complete specialty assignments or projects for senior management.
- ❑ Periodically visit university administration and contractor's principle investigators.
- ❑ Techniques to improve response time for "brush fires" include 1) existing contracts with simplified approval process for task orders, 2) contracts with very broad task descriptions, and 3) do the project in-house.
- ❑ A quick response program established \$25,000 per project or study with a maximum of \$100,000 per contractor, 6 month time limit on efforts. This is a very effective way of providing immediate response to senior management requests and building credibility for the research unit.
- ❑ Consider performing a customer service survey of agency research users. Seek to learn as much as possible about the customers, the adequacy of the service provided by the research unit, and recommendations for positive changes in the service provided.

## **IMPLEMENTATION OF RESEARCH RESULTS**

### **General Implementation**

- ❑ A rule of thumb used by a research program that has very successful experiences with research results implementation is that it takes as many resources to implement the results of research as it does to do the research. States need to take a hard look at how well implementation resources (including staffing and champions) are calculated/estimated and the viability of the implementation funding.
- ❑ Implementation of research results cannot be assumed just because a need is being addressed. Implementation plans and budgets must be made early in a research project and then measured at the end of the project. Implementation often involves policy, technical, and operational issues, all of which need to be considered in the planning and resource commitments. A tracking system for implementation is a plus.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- ❑ Keep research recommendations before the eyes of decision makers until they act upon implementation recommendations.
- ❑ The RD&T unit developed a business plan to help focus efforts department-wide on implementation.
- ❑ A potential role of the researcher in implementation could be to provide data for a department designed database that would form an archival/historical record for future project design/analysis.
- ❑ Create a database for quick reference of research implementation data.
- ❑ Implement research results as they are obtained, don't wait for the final report.
- ❑ For a research unit that has contracted researchers performing all its research, it may be helpful for the overall implementation process if department personnel are called upon periodically to perform research. This will allow department staff to see first-hand the elements required for implementation as well as will serve as a networking mechanism between the RD&T staff and the operational unit or agency customer.
- ❑ Create a formal implementation process: implementation recommendations reviewed and approved by the technical project oversight committee, senior management approves the recommendations of the committee, the committee tracks progress until the innovation becomes standard practice and keeps the senior management informed of progress and benefits to the department.
- ❑ Develop performance measures for implementation effectiveness.
- ❑ Researchers/research staff must have the capacity for determining value and return-on-investment as part of the implementation process.
- ❑ Formalize implementation of research results by developing an agency policy for implementation.
- ❑ To aid in implementation, have trade organizations or specialized product suppliers put on training and demonstration sessions for new products.
- ❑ Include principal investigators in feedback loop concerning decisions made on implementation of results from their research. This assists the researcher in

understanding the applicability of the research results -- acting as a motivator and encouraging the researcher or shows the researchers when results could have been more closely targeted to a workable solution.

- Use compact disks as a technology transfer tool – reports and other deliverables are readily contained in an easy to transport, convenient to use, cost-effective medium.

### **“Jump Start” for Implementation**

- SP&R funds are budgeted for initial “deployment” or implementation as an inducement for participation by the engineering districts/regions. These implementation funds are seed money to help operational divisions get the implementation process started.
- Require a separate implementation planning meeting involving the project principal investigator (PI). Schedule the meeting prior to the end of each research project contract. Ensure there is sufficient time and resources remaining in the contract for the PI to perform appropriate preparatory activities necessary to “jump-start” the implementation process once the research effort is complete.
- Place language in contracts regarding recommended implementation procedures.
- An implementation statement prepared by the project oversight committee at the conclusion of a project can be used as the formal “hand-off” document from the research to the implementation team.
- When applicable, emphasize a constructability review process as an initial implementation element.

### **Implementation Planning**

- The initial elements of a project implementation plan need to be identified along with the project proposal. The project advisory committee can be used to develop a statement of department needs.
- Have the correct expertise present when discussing implementation. Policy or economic research implementation is vastly different from materials research. Do not treat all projects the same, but differentiate those products by expected outcomes.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- ❑ Each research project must include an implementation plan and appropriate implementation resources. Develop this plan along with the work plan at the beginning of the project.
- ❑ Considering project managers have full time operations jobs and their research responsibilities may not be their highest priority, having formal implementation processes documented for them, in an easy to follow format will encourage their participation and lessen the time required to perform these efforts.

**Implementation Staff and Groups**

- ❑ Skills for implementation are often different than for the conduct of research. Successful implementation often depends on training and technology transfer skills – integration of this talent into the implementation effort is desirable. Training to develop these skills to enhance the RD&T staff capacity is helpful.
- ❑ Dedicate a full-time RD&T program staff member to properly manage implementation; for states without such staffing flexibility, formally assign individuals with research results implementation responsibilities for each project.
- ❑ Use project oversight committees as a major force in implementation of research results. Keep the committees actively involved throughout the implementation process.
- ❑ Use the state’s research advisory committee as champions of implementation.
- ❑ Establish the role of “transfer agent” to help provide targeted education, training, encouragement, and follow-through for research implementation. This may be a function that can be provided by a university program. This individual or group could also provide an effective means to track the performance of innovation and provide the feedback that is essential to successfully couple research and implementation.
- ❑ A Research Implementation Council or an Implementation Task Force is responsible for forward progress on implementation of research results. Its members include staff that have authority to commit resources to the job of implementation; such a body can enhance awareness of and commitment to implementation activities throughout the DOT.
- ❑ Consider using university researchers to perform the follow-up on research results implementation and reporting.

### **Implementation Tracking**

- ❑ Implementation requires the designation of an office/person who is responsible for the implementation and accountable for why or why not something was done with the research recommendations. This must be at a level in the organization to ensure the action occurs.
- ❑ Include in contracts an implementation strategy report. Have closure meeting with researchers and functional interest stake-holders to discuss implementation. Maintain an active recommendations check-off list and review it periodically.
- ❑ Implementation should be documented. A written report needs to be maintained, checked and updated periodically. Negative study results should not be viewed as a failure.
- ❑ Attach an implementation cover sheet to the final report of research – this cover sheet is a specially colored sheet which is readily identified as the vehicle to track implementation efforts. Once the project results have been implemented, the cover sheet provides a formal record of the disposition of the research results and becomes the documented evidence of implementation
- ❑ Implementation tracking procedure: The system documents research results recommendations, management approvals, resources committed, bureau/division and individuals responsible for implementation, and the associated accomplishment dates.
- ❑ Implementation close-out memo is useful for finalizing a project and summarizing the success of the effort – documents the process of handing over the innovative technology or method to the position of being standard operating procedure.
- ❑ Incorporate top management accountability on documents that track implementation – include sign-offs, resources or other support commitments on implementation documentation.
- ❑ To get the maximum from implementation efforts, key agency staff at all levels of responsibility are engaged through semi-annual assessments of implementation issues and expectations. Problems are resolved and expectations are compared to outcomes. Deviations from expectations are addressed. Individuals are given responsibility for follow-up.

## **INDUSTRY INVOLVEMENT**

- A research program strength is industry membership on joint board of the research partnership between university and the DOT. Industry input to identification and selection of research projects and implementation of research results is particularly critical.
- To make value engineering more effective, see that research results are communicated to contractors in the state.

## **MARKETING**

### **Building Commitment to RD&T**

- Conduct face-to-face meetings with division or bureau managers/directors for a variety of RD&T purposes – problem identification, research progress reports, and implementation support. This personal approach assists in building a one-to-one relationship between the RD&T manager and the operational manager and fosters a stronger personal commitment to RD&T by the operational manager. Purpose to grow from this personality dependent basis to an organization who's culture supports and encourages the interaction between RD&T and the operational areas.
- Efforts to market the research program internally will increase the quality of research problems put forth for research consideration as well as provide sustained support for the program.
- Long-standing trustworthy relationships between the operational staff in an agency and the main university research contractor enable ready access to information and technical expertise. The research unit fostered this open communications process and continually benefits from the positive experiences received by agency operational staff.
- A well-defined mission and scope for the RD&T unit is helpful in conveying what services can be provided to customers. A short goal or mission “tag line” or slogan/motto is very effective in creating an identity for the program. Senior managers and employees throughout the agency will know what the research group does and will be able to identify with the expressed goal of the unit. The more customers understand and can identify with the goals, the more there will be buy-in and commitment to the research function.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- ❑ For building program credibility it is helpful to target projects that provide quick, high-payoff returns (showing early benefits) and reinforce the decision to support research efforts.

**Dissemination of Research Results**

- ❑ The research unit must utilize newly available technologies to more effectively disseminate research results and notices: teleconferences, Internet, DOT home page, optical scanning to produce electronic full text documents, and more.
- ❑ For those research units that have a library, distribute new library acquisitions list (including recently completed agency research projects) throughout the department.
- ❑ The research unit publishes abstracts of its projects jointly with the LTAP newsletter. State and local transportation personnel can request complete reports if they are interested.
- ❑ Contract with a university or consultant to disseminate information about contracts awarded and progress on research efforts. This could be done via the web site, newsletter or other vehicle that is an effective medium for agency and other RD&T customers.
- ❑ Use the TEL-8 video-conference system to disseminate research results, new processes and research sharing and coordination.

**Resources to assist in Marketing**

- ❑ Dedicate an individual as editor/marketing staff to enhance communications with customers and improve quality of research unit publications and outreach activities.
- ❑ Expand research unit's relationship with the agency's public affairs office. Make use of tools/expertise used by that office. Provide success stories of research results implementation. Work with them to showcase research success stories through internal and external media.
- ❑ When there are no professional department staff to perform public outreach, marketing, or communications for the RD&T unit, contract it out to a partnership university or consultant. With discrete deliverables that can be estimated relatively well, purchasing this service is easier than most other research related contracting.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- Reserve funds to perform projects in specific areas where RD&T has not had active support. Offer these funds as a test of what the research program can do for that technical area. Tailor the offer to the group's needs, but choose a project that has a high probability of successful implementation of innovative research results. Make sure the selected project can deliver results relatively quickly to show responsiveness of the RD&T effort.
- Use the expertise and reputation of the managers to whom the RD&T manager reports. Let these people promote the program and in so doing give personal credibility to the program throughout the agency.

### **Marketing to Senior Management**

- Identify a few “winner projects” annually and package them for use by CEO, senior managers, legislature, and others that can use case examples of success. These winner projects have clear dollar returns on the research investment, show the department in a positive light with specific customer groups (segments of the public), have broad appeal to lay persons, and can be presented or discussed by those who are not technical experts in the topic of research. Package the success story in whatever manner is most readily used by the targeted upper management of the organization – video, presentations, brochures, material for speeches, news stories, and more. These projects also were called “flagship projects” by some senior managers.
- For programs just starting, early “successes” (projects showing solid benefits of the research program) are needed to further establish the value of the research effort and to popularize the service of research for the agency. These quick successes in research results will serve to maintain the support and momentum surrounding research. Identify some high visibility/high payoff projects -- talk about them, get excited about them, perform them well. (“winner projects” as discussed above, projects that can easily demonstrate to a wide spectrum of people the benefits of research efforts – Brag pieces!)
- A “quarterly impact report” is an effective tool to inform management of research program activities. The report consists of a synopsis of the impact on the department generated by the implementation of research findings. Present these reports in person to the senior management and high level research oversight committee. This brings the continuing successes of the RD&T program before senior management on a regular basis.
- Provide upper management with “press-ready” research project/results highlights.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- ❑ Produce a “Value of Research” report on a periodic basis. The report documents research value and benefits to the DOT and its customers.
- ❑ A key area to be addressed by the research unit is knowledge management. Acquisition of knowledge is becoming more costly and there is an increasing need for more sophisticated knowledge support by top management.
- ❑ Include an economist on the research staff to better support management decision-making.

**Marketing Via the Internet**

- ❑ Develop a technical summary format appropriate for placing on the agency’s home page and post documents for the past five year’s research (Have hard copy available for those with out Internet access.) All supervisors in the agency will be guaranteed delivery and will be encouraged to share the information with their subordinates.
- ❑ Send emails to the field engineers highlighting new findings and soliciting engineers for user experiences. Use of email and the Internet to get research results out to the field has proven to be effective and the field representatives have requested it.
- ❑ Publish completed research and research-in-progress on the department’s web site.
- ❑ Use an internal list-serve to establish a mailing or information service for those interested in the RD&T unit’s activities, such as reports and publications, research notes, implementation activities, and more.
- ❑ Develop a research unit Intranet site as well as for the Internet.
- ❑ Advertise all research project requests for proposals on the department’s web site. Have an automated email notification system for researchers interested in proposing on research projects. The NCHRP/TCRP notification system is a good model.
- ❑ Put the research council minutes on the agency homepage. Provide positive informational opportunities for RD&T issues to be viewed by non-research oriented staff.

### **Outreach Efforts**

- ❑ Plan and conduct a Research Outreach Program that communicates at least annually to district/regional offices and other RD&T program partners. Topics to include in discussions and presentations would be: ongoing projects, completed projects, implementation of research results, joint funding of research, problem solicitation process, and other items.
- ❑ Conduct an annual “Showcase of Research Results” which provides 1) excellent technology transfer opportunities, 2) enhanced visibility department-wide for the benefits of research, and 3) needed interaction among research and between researchers and DOT personnel.
- ❑ Sponsor a “research day” at the DOT where research is showcased. Give opportunities for networking among universities/outside researchers/consultants and DOT operational and administrative personnel, include library involvement, and foster other activities promoting the RD&T program. Consider using “University Showcases” for each university to present to the DOT research users their experience, interests, results, etc.
- ❑ Conduct open houses to enhance relationships with all research unit customers.
- ❑ Conduct field trips to universities to encourage participation in the research program by presenting the research process, programs, and successful projects.
- ❑ The research processes, capabilities, and resources should be reintroduced periodically throughout the department and universities to assure new staff and researchers have a full understanding of the research program. Staff additions from retirements or general turnover produce a group of potential customers totally unaware of the program and its services.
- ❑ Conduct field trips with industry associations, DOT operations/maintenance staff, FHWA, and university or other researchers – get out and see the research with partners. Likewise, have research staff participate in field trips that other divisions in the agency conduct – put agency research staff in the situations where likely topics for future research will arise.
- ❑ Strategic direction meeting – conduct a meeting where the RD&T manager meeting with research program committee (executive management – CEO, chief engineer, and deans of engineering of two partner universities) twice a year to discuss the agency’s research program.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- Develop a prestigious agency research award commanding the same recognition as other technical excellence awards given by the agency. Involve the public affairs staff to publicize the award with internal and external customers. The award accomplishes a number of beneficial items – it motivates the researcher by recognizing superior work, it is an opportunity to talk about research and successful projects with customers, and it creates beneficial visibility for the program with senior management.
- Research unit staff members need to attend maintenance, construction, and other operational unit managers’ meetings 1) so the research staff can begin to understand what issues are of concern to the operational areas, and 2) to make presentations on relevant research results and implementation progress.
- Promote completed research performed by research unit staff or contracted researchers through periodic “brown bag” lunch presentations. Invite operations managers and especially senior management. Conduct these networking and information sessions in a place conveniently accessible to the target audience.
- Develop a catchy “tag line” or short mission phrase for RD&T to readily identify the research program in department employees' minds.
- Use AM radio to give information about research-in-progress along routes being traveled.
- Cultivate a personal network of peers at the national and international level. Plan regular contacts and interchanges with the peers to maintain the network.

**Publications and Marketing Literature**

- Short articles concerning finished research should be sent to publications like *Better Roads*, *TRNews*, and *AASHTO Journal* to help dissemination of research results. If there is no staff to write such articles, contract for these services.
- Produce an annual research accomplishments report.
- Prepare concise “research results digest” documenting the results and findings of a research investigation – possibly in bullet form. This would be a cost effective and potentially more useful way of disseminating information on completed projects.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- ❑ Prepare a research program summary booklet describing various research processes – problem solicitation, implementation of research results; funding sources; support and management; access to information and expertise; and other items, in a format suitable for internal and external customers.
- ❑ A quarterly newsletter is beneficial in showcasing research successes – similar to the SHRP FOCUS newsletter -- it could include field level personal testimonies of good experiences as well as other research and implementation activities. A journalism student from a partnership university could supplement staff.
- ❑ Weekly RD&T bulletin -- tells the agency's rank and file about what is happening in research.
- ❑ Publish a guide on how to get information through the RD&T unit, including literature searches.

**Research Reporting**

- ❑ Use alternative forms of research reporting other than the standard final report: technical summaries, research digests, CD or video documentation, or others. The state RD&T community is too committed to the traditional research report format of very lengthy reports of highly technical material, usually only attractive to other researchers.
- ❑ Require one-page summary reports be done in the routine course of project performance. Instruct researchers to include cost estimates to produce them in all project proposals. Such summaries would be useful for dissemination of project results, communication about research success, and implementation planning and technology transfer. The summary will originate at the inception of the project and will be reissued at project completion. It will target users of the research products.
- ❑ Glossy stock and attractive color pictures of some aspect of the research on the cover of the research report make a much more interesting looking document may cause someone to open the report and scan the information.
- ❑ Build into contracts the concept of research project multiple reports, one report being technical in nature usable by other researchers, one being in a format that is usable by individuals not expert in the topic, management, public, etc.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- Alternatives to detailed research report are effective in some situations. Rather than producing a large detailed report that will be read by few people, consider producing a short summary document discussing the research results and what is needed for implementation of those results.
- To promote higher quality research final reports, encourage universities to perform an internal peer review of final reports prior to the report submission to the DOT.

## **PARTNERSHIPS**

### **Partnership Activities**

- States are successfully engaging the private sector (e.g., asphalt and concrete paving associations, Associated General Contractors, mineral and aggregate associations) in their research needs identification process and in their research project review processes.
- Develop a “quick response team” at the partnership university or research organization to provide assistance to the DOT on problems that require an immediate solution.
- Expand the relationship with the university(ies) to include other disciplines outside of civil engineering.
- The relationship with the Federal Highway Administration and the partner university(ies) provide remarkable support and expertise to assist in building or rebuilding the research program. Use these resources to provide credibility for the RD&T program.
- A strong, supportive relationship with the FHWA Division Office has been highly influential in establishing the research program. Take care in developing and maintaining this relationship.
- The RD&T units sponsors a number of full time faculty appointments at the major partnership university. A close working relationship with members of the RD&T unit and operational staff is established with the faculty members. Benefits accrue to the agency through the conduct of practical and applicable research. In such situations, it is possible to work with top graduate students who may be attracted to employment opportunities at the agency. Such arrangements are profitable for the agency and university alike provided that the appointments are in force for at least two to three year periods.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- To maintain long-term quality, objectivity, and competitiveness of research performed by university partners, review by external industry and academic peers is advisable.
- Create an incentive program that, for example, takes a small percentage of the documented savings from implementation of research results and puts it in an “investment account” for the partnership university. The account can then be used for “unfettered” or blue sky research by the university with the only requirement being that it is directed at the strategic goals of the DOT. The university would be required to evaluate and document the cost savings to the department. Resources required to do this would be paid from the “investment account.”
- Create an incentive program that, for example, takes a small percentage of the documented savings from implementation of research results and puts it in an investment account at the DOT. The account could then be used for unsolicited proposals by the private sector, professional capacity building such as technical seminars, implementation assignments, and more.

**Facilitating Partnerships**

- Develop a working group between the DOT and university transportation centers to shape future strategic and tactical plans for research.
- DOT district/region offices can derive more benefit from research through developing relationships with researcher at universities located near the respective offices. Building such relationships will provide a greater capability in the academic community in the state and foster more practical solutions to DOT problems.
- Increase the communication among neighboring states regarding their experiences and research outcomes. Develop the network by scheduling regular interchange with the RD&T managers – telephone discussions, conference calls, meetings, whatever mechanism that works for the managers. Fostering such relationships may be the initial steps of cooperatively funded research.
- Commit more resources to regional pooled fund efforts. Consider a university as a project administrator.
- Develop a memoranda of understanding with various organizations to expedite the agency’s ability to use these resources.

### **Setting Up Processes to Handle Partnerships**

- ❑ Develop a standard language and processes for issuing Request for Proposals for Partnerships so the department is prepared to use it when the opportunity arises for partnership projects.
- ❑ A trend for which research functions within agencies must prepare is the requirement for public/private partnerships to become more like those now seen in the private sector. Such partnerships must foster a commercial value for the private sector partner; must deal with intellectual property rights, must incorporate means to handle hard money (not just soft money), and other similar items. A strategic investment for an agency is to begin to develop policies and processes to facilitate these new partnerships.
- ❑ Put substantial effort into planning and building the partnership relationship so that the university faculty will know how to be responsive to the agency's needs and so the agency will know what it can reasonably expect from the university. In particular, work closely with university research partners to help them more effectively understand the department's strategic directions, so research problems are more directly tied to them.

### **PROBLEM OR IDEA SOLICITATION – NEEDS IDENTIFICATION**

#### **Idea Prioritization**

- ❑ An economic analysis of potential research benefits would help prioritize research problems.
- ❑ Develop criteria to evaluate research suggestions to facilitate prioritization by the appropriate review body. Include items on this criteria list such as, does the idea address items detailed in the strategic plan or solve mission-critical problems, does the project have a champion, and others.
- ❑ Promptly advise those who suggest research projects of the results of the project prioritization process.

### **Long Term Needs and Horizon Issues**

- From time to time bring researchers together with operational employees in a function area like maintenance to discuss the research program. Use a symposium or workshop format. Have one session specifically committed to identifying long term strategic research needs.
- Meet with program areas on a periodic basis to review past and present research efforts and to brainstorm future research needs. This meeting is strategically oriented, deals with quality improvement, and allows the research unit to see horizon issues – helping research be anticipatory rather than reactive.
- Consider including horizon research issues as an agenda item for the annual research advisory committee meeting. What are the future issues that confront transportation which could be addressed by near to mid-term research, longer-term research. Include selected stakeholders in this discussion.
- Conduct a facilitated brainstorming event. Desired outcomes might be identification of topical areas that are not fully addressed by the research program, horizon issues that will require research in the future, strategically important areas that bear prioritization, and more.

### **Needs Identification**

- Facilitated focus groups involving research staff and other levels of the agency have been found to be an effective means of identifying research needs. Focus groups can be organized to address priority topics. Provide a state-of-the-art synthesis on the priority topics as background information for the focus group members prior to the meeting.
- Ensure university and other major partners receive a copy of the agency's strategic plan -- this enables them to link their research ideas to the agency's goals and objectives.
- Develop a business innovations program within the RD&T function: specifically provide research funds for non-engineering efforts under a program element identifying it as such; include areas such as policy, planning, economic, and financial research, focus on areas of interest to the agency decision-makers. Solicit senior managers and non-engineering managers for ideas for business innovation concepts.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- ❑ Perform market research studies among the agency employees to ensure the research program gets the maximum involvement of those who can benefit from new technology and innovation.
- ❑ Some staff are reluctant to suggest research projects because they do not want to be given the additional workload of managing the project. Use a facilitated focus group approach for idea generation to lessen the feeling that one must be the project manager just for suggesting a research idea.
- ❑ The approach for involving senior management in development of a policy research agenda differs from methods used for general problem solicitations. Group meetings, focus groups, or other general techniques usually aren't as effective as one-to-one discussions or participation in policy and strategic planning sessions where horizon issues may be discussed and ideas expressed. Personalized solicitations followed up with a one-to-one or small group discussion with other senior managers may provide a similar forum for ideas generation.
- ❑ Use the LTAP Center to identify research needs from local governments.
- ❑ In a research unit that performs its research in-house, the solicitation of research problems is an "oral proposal" which is presented to a decision making body. A decision is made at that time whether to fund the project or not. (As preparation for presentation, decision making body is provided with project objectives, scope, time frame, and estimated cost information.)
- ❑ Formal visits to district and division offices to discuss research needs and develop research problem statements is an excellent customer service tool and enhances the quality and quantity of research problem ideas submitted.
- ❑ Institutionalize the practice of making regular visits to key customer groups that show likelihood of providing research ideas in the future.
- ❑ Use the agency's quality councils as a resource for generating research problem ideas.
- ❑ Provide the university system with emphasis areas for research or general ideas of need prior to the formal solicitation of research ideas. This will enhance the quality of the research problems proposed.
- ❑ Concept of "looking to the past to define the future" by assessing trends of past research projects to define concepts that should be researched at the present time or in the future.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- Identify strategic research emphasis areas and invite research suggestions to fit these topics. These topics correspond with elements of importance from the agency strategic plan/objectives.

**Problem or Idea Solicitation**

- A continuous process for submitting research needs seems to allow easier input of research ideas from all areas of the agency, yet customers also indicate a need for an annual solicitation so that they have a reminder to submit their problem ideas.
- Create a research hotline for, among other items, submitting research problem ideas – phone or email.
- Develop an on-line suggestion box for submission of research topics/ideas.
- Add an explanation of how to submit a research project idea on the agency intranet and announce the availability of information using email.
- Incorporate “desired outcomes” as an element of the problem idea solicitation.
- Include a space for implementation concepts on the research idea solicitation form.
- Field staff are not used to writing problem statements and proposals. A training seminar can help field staff formally identify problems that warrant research and assist them in creating problem idea submissions.
- Invite research suggestions from industry associations. Prepare the associations for the types of research efforts that would be applicable for the agency.
- Universities can be an excellent resource for facilitating the annual research needs solicitation.
- Simplify the problem submission mechanism, make it less intimidating.
- Use “checked boxes” where possible on the solicitation form to ease the problem submission process.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- ❑ Develop one solicitation form for all project recommendations, direct the problems received to the various programs, state, regional, national, NCHRP, pooled fund, depending on the scope, benefits and complexity. Develop a time line for each research program's schedule to facilitate submission of problem statements to each program. Prepare a log of problem statement submitted that documents the follow up activities: submission to another research program, disposition of the research problem, acknowledgment of receipt of the statement, etc.
- ❑ Encourage greater involvement by local government agencies, cities and counties through formal invitation to suggest research topics.
- ❑ Create a field operations research council that will provide research ideas and recommendations that are specifically oriented to field operations issues.

## **PROJECT SELECTION**

- ❑ Make the estimate of "implementability" a factor in selecting research projects.
- ❑ Initiate prompt and personal contact with those who suggest research projects and advice to them on project prioritization process.
- ❑ Use the DOTs strategic plan as a vehicle to screen research needs and select research projects.
- ❑ When a research proposal is rejected for funding, send back a formal reply to the proposer with suggestions of other avenues for funding.
- ❑ Use a formalized problem statement ranking system with among others, criteria developed based on the agency's strategic plan. The strategic plan should act as a screen for project ideas to determine whether the research will contribute to the agency's mission and objectives.
- ❑ An advisory group that crosses all functional areas would be advantageous in the process of prioritizing multiple discipline project ideas.
- ❑ Make sure that senior management reviews the list of prioritized research projects -- through a process that is recognized by the senior managers. This allows their input to the list of projects to be researched as well as holds them accountable for having approved the work to be done. The goal is to make sure the projects to be researched address senior

management needs. Include sufficient flexibility in assigning priority to projects to assure these needs are being met.

## **PROJECT MANAGEMENT**

### **General Project Management**

- ❑ Contractors perform a show and tell of research-in-progress; consider preparation of short video presentations of projects on periodic bases. University contractors may have media departments readily available to assist with this type of effort.
- ❑ Use a performance-based approach as an alternative method for payment of research services: The DOT could reserve the right to withhold payment to the researcher until an acceptable product was delivered. Leveraging payment against on-time and acceptable deliverables can be a deterrent to lagging performance and can be incentive to adhere to on-time, quality product delivery.
- ❑ Long duration projects should be phased to establish definite milestones, report interim results, and allow planning for and implementation of interim findings.
- ❑ Have the affected division or bureau manager review the work plan for a research project to assure it is worthwhile and on target before the project continues to the next phase.
- ❑ Adopt standardized forms to document each step of the research project process from concept to implementation. Forms with checklists simplify the project tracking process.
- ❑ Make some agency staff member accountable for each research project's progress. Establish clear lines of responsibility, consider interim reports, include budget and research status.
- ❑ Every quarter the university sets aside a half day or more to examine progress on every active project (no exceptions). The DOT research project manager and technical advisory committee members attend the briefings. The RD&T manager can encourage these types of reviews at the academic institutions that perform research for the agency.
- ❑ Establish a customer satisfaction review process at the completion of research projects to critique and evaluate the efforts of the researcher and the worth of the project.

### **Project Champions**

- ❑ A champion must exist within the agency in order for the project to be selected for the annual program.
- ❑ Not only must a project have a concept champion to forward the research, but a division must “sponsor” the research project. Such sponsorship requires the division/bureau management support needed to free staff to participate in the technical project oversight committee and lays a foundation for management commitment to implementation of the research results.

### **Technical Oversight Committees**

- ❑ Appoint or create research technical panels that stay with a research project from beginning through to implementation.
- ❑ Establish a technical oversight committee prior to the development of the request for proposal (RFP) or the work plan. The members of this committee should be involved with shaping the RFP/work plan and in determining the most responsive researcher.
- ❑ Encourage the participation of FHWA personnel on research project technical panels.
- ❑ The inclusion of peer faculty members and representatives from private industry groups and trade associations in the project technical advisory groups could enhance the overall effectiveness of the research project.
- ❑ Create project oversight panels of users to define and monitor research projects and to recommend and aid in implementation.
- ❑ Give greater autonomy/responsibility to those who fill the role of technical oversight manager. The greater delegation of authority works well with the typically highly qualified, committed technical overseer of research projects.
- ❑ For operational personnel, provide incentives to be a project technical overseer.
- ❑ Develop and distribute guidelines for conducting and managing research projects to the chairs of the project oversight technical committees.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- ❑ Operational divisions must allocate time for assigned technical advisors to be involved in the technical oversight of the research effort.
- ❑ Actively involve the project technical liaison by requiring a “sign-off” on invoices, contract extensions, and other similar requirements.
- ❑ Conduct a lessons-learned session at the conclusion of each project. Seek information such as research results compared to expectations, including negatives and positives and possible solutions. Likewise, conduct a close-out interview with researchers.

## **PROGRAM MANAGEMENT**

Advice from a DOT senior manager: –*“Pay your way and link costs to benefits.” “Be aggressive in looking for projects to extend service life and help with asset management.” “Focus on projects with high potential for savings.”*

### **Agency Research Advisory Committee**

- ❑ One of the most influential keys for an effective research program is an enthusiastic, influential, and committed advisory group that has a clear appreciation of the research unit and totally supports the research effort. This advisory committee can serve as an agency coordination group for RD&T efforts.
- ❑ Involve the Research Advisory Committee of the agency in establishing emphasis areas or broad directions for the annual research program. If the committee is not comprised of senior managers, promote senior manager involvement in the emphasis area development along with the state RAC. A primary resource for identifying emphasis areas will be the agency strategic plan. Such emphasis areas assist in focusing the annual program on mission critical research and provide guidance for those submitting problem ideas for research.
- ❑ Add a member of the executive staff to the state Research Advisory Committee.
- ❑ Encourage the state Research Advisory Committee to meet more than once a year and keep members more informed of activities. Ask for their assistance in management of the research program.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- Include the Local Technical Assistance Program technology transfer center director as a member of the Research Advisory Committee (voting or non-voting member). Such representation would be an effective means to incorporate local opinion into the research program and to communicate planned and in-progress research.

### **General Program Management**

- Develop the capability to add a few very “hot” projects to the current federal fiscal year work program so it is not necessary to wait until the annual update of the work program to do such a project. Build in the flexibility to be responsive to critical needs. Institutionalize this capability by including a line item in the RD&T budget that will allow for such funds to be reserved.
- To attract issues of concern to policy- and decision-makers (upper management), develop a top-down policy-based component of the research program. Reserve funds to use specifically for policy research.
- Share research program concerns with neighboring state DOT RD&T managers. Create a network for solving program management issues. This activity is in addition to efforts that seek coordination of technical research among neighbor states.
- As a streamlining process, secure authority for approval of small research efforts by the RD&T unit manager. Smaller projects’ administrative processes often have less complexity based on dollar limit, tasks to be done, time frame, and cost. Reduce the administrative processes to match the risk involved.
- Formal tying of research program goals to the agency’s strategic goals will enhance the overall effectiveness of the research program. Furthermore, having “Technology and Research” as a major goal articulated in the agency’s strategic plan shows a depth of understanding within the agency regarding the beneficial contribution that research makes in the day-to-day operations of the agency. Linking research products to the agency’s strategic agenda directly results in program strength and relevancy. Such is the basis for creating a culture of innovation in an agency.
- Consider performance rating of researchers as a contractor accountability tool. Keep it simple and emphasize only key criteria you will be interested in measuring. Be clear on performance measures up front – past performance, administrative, management, outcome, deliverable, quality, and others. Provide narrative review, rather than letter or number grade.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- ❑ For programs that directly award projects to a select group of contractors (e.g., universities) a written policy should be developed to establish a threshold or ceiling for when a project must be selected through the RFP process.
- ❑ Use a multi-tier research committee structure that involves agency top management as the upper tier, allows buy-in at this high level, and links research to the current management direction.
- ❑ Sponsor a balanced program. Select a mix between short-term and long-term program components, e.g., fast-turnaround technical assistance, synthesis efforts, and complex longer-term research projects. Technical assistance solves immediate problems and shows responsiveness of the RD&T unit. Longer-term projects often are more costly and take greater time for results to be implemented, yet present a greater opportunity for substantial benefits to be realized by the agency.
- ❑ Space and appropriate staffing is needed for an agency library, and these are particularly valuable assets for the research unit. The RD&T unit should be a one-stop shop for information searches, technology transfer, and other information services.
- ❑ Consider funding the library function with SP&R Part I funds.
- ❑ The research unit provides informational services for the agency, thus increasing its service component to the full organization.
- ❑ Add a program element to the RD&T unit. Work with the faculty of the university and with agency retirees to do syntheses and topical summaries and report summaries. Provide this as a service to the agency.
- ❑ As a program management technique, consider workload leveling, rather than automatically increasing the number of projects. Options may be to enhance implementation or performing synthesis rather than simply adding more research projects.
- ❑ The research unit has the responsibility for the agency's training courses and workshops. The research unit has staff to manage this responsibility. The involvement in training provides an integrated approach to researcher capacity building, implementation of research results, and technology transfer at the state and local level.
- ❑ There is an economy of scale in having LTAP program managed through the research unit. With an agency that has training as part of its responsibilities, there is a link

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

between the new technology training (resulting from implementation of research products), training for LTAP services, and department technical capacity building. The fit is appropriate, and the integration enhances the technology transfer of research products within the agency.

- ❑ The research unit fully supports the agency's commitment to its quality program and has incorporated the continuous improvement strategies for the performance and administration of research efforts. More closely aligns research unit with strategic plan.
- ❑ University overhead rates bear strict scrutiny – many of the peer exchanges recommended that university overhead rates be reviewed and reduced or eliminated. Some programs do not allow overhead for in-house employees of major contractors (e.g., universities)
- ❑ Look at high cost centers within the agency to identify areas of potential need for research. It is reasoned that implementable research directly impacting these high cost areas provides a high payoff and one that is measurable.
- ❑ Robust RD&T programs have outstanding and highly innovative technology transfer capabilities.
- ❑ The RD&T program pays close attention to strategic outcomes of the research and implementation of its results. Evaluations focus on service to customers, construction program outputs and delivery, operations program output and delivery, and employee attitude about organizational sufficiency.
- ❑ Develop a strategic plan for the research program. The Research Strategic Plan would be a blueprint of how the research unit will tie its efforts to the support of the day-to-day production capacity of the department. The strategic plan will also be a structure to allow such activities to become incremental steps aimed at fulfilling the longer term mission of the department. For this plan to maximize its contribution to the department, its goals and objectives must be developed through applying the vision and guidance of upper management.
- ❑ Consider the role of the research unit within the department's strategic plan/vision. Volunteer for participation in the next update of the plan so that research has the opportunity to become an integral part of the vision of the department.
- ❑ Establish research coordinators in the field region/district offices and in central technical offices. These coordinators will provide liaison between operational areas and the research office/program.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- Investigate expanding the technical assistance services aspect of the RD&T program to professional disciplines other than engineering. This requires having access to expertise for support of such assistance.
- The research unit can track which agency strategic goal performance indicators are being affected by products of the research program. This will provide an easy way to link the research program and the agency's strategic plan.
- Seek legislative relief and recognition that research contracting is distinctly different from other types of engineering and construction contracting.
- Create a multi-functional team to study and improve the fiscal administration of all research jurisdiction projects. Team members would be drawn from DOT research, fiscal, legal, procurement units, FHWA, and other relevant partners.
- For programs that are fully managed by a university partner, strong recommendations were given to create a functional area within the DOT dedicated to promoting and managing transportation research. Such a function provides a sustained presence for the research program within the agency.
- Add a line item for technology transfer in the budget.
- A technical assistance line item can be the annual work program to more accurately describe some of the services provided through the research unit.
- Establish budget items for non-project specific elements of the work program. Itemized breakouts might be helpful in identifying relative commitment of staff resources and funding for such activities and for demonstrating that these activities are integral to the program – e.g., implementation tracking, problem statement and proposal review, and others.
- Consider moving evaluation of new products from a research function to the materials division.
- Face-to-face peer contact is considered the most cost-effective means to research management to maximize the use of research resources. Participation in technical conferences, symposia, and other professional activities prevent research organizations from re-inventing the wheel (duplicating research). Such contacts also allows the

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

research function to better qualify its opportunities to make alliances with others that could leverage research resources.

- ❑ As a relief for programs having difficulty raising the SP&R match funds, encourage a financial commitment from researchers – partnerships universities or other divisions in the agency. This increases the commitment of the researchers and users and aids in implementation.
- ❑ As an internal information service, direct research results of quality, relevant work performed by other agencies to technical staff within the DOT.
- ❑ Consider adding synthesis studies to the program where applicable information is gathered from relevant sources on a topic of interest. Reduce the report to a short responsive paper.
- ❑ Publish the RD&T program manual in a 3-ring binder format to allow for periodic updating the manual without having to replace the whole document.
- ❑ Departmental focus on the contractors that are currently providing research services can severely limit the type of the problems that can be addressed by the program. To be fully responsive to agency needs, other avenues for research performance should be made available, such as private sector organizations, pooled fund opportunities, enhanced efforts by information specialists to find existing solutions, and other sources.
- ❑ Collocation of agency research staff with primary researchers from contracted organizations is often beneficial. There are increased occasions for staff to identify opportunities for the benefit of both partners. Location at agency sites may provide for broader knowledge of agency operations and a deeper understanding of agency needs.
- ❑ In agencies where a decentralized management structure is in place, it is beneficial to have a coordinating research engineer/research manager position defined. Administrative functions could be accomplished with a minimum of duplication. The converse is attractive as well, in agencies where the program is highly centralized, it is advantageous to distribute the research function to the operational areas, it avoids having to get a major division up to speed each time implementation is needed. The users are more directly responsible for the oversight of the research project.
- ❑ Use SP&R moneys to fund agency's participation in AASHTO SCOR and RAC committees.

### **Performance and Value of the Program**

- ❑ The ultimate measure of value of the research program is the relevance to agency mission and goals of the research results produced, the ability to efficiently apply these results to practice, and the continued support and interest by the DOT. Criteria to measure value should include: matching results to strategic goals/objectives; quality and number of research ideas proposed, level of involvement of operational parts of the agency, and more.
- ❑ It is difficult to estimate the value of the RD&T program quantitatively. This can be done with a number of projects, yet such valuation must also tell the story of the research, capturing decision makers' imaginations and explaining science in a way that makes sense to most people, including politicians and other stakeholders.
- ❑ Differentiate between performance measures for programs and projects. Programs support the agency's mission, goals, and objectives, improve the agency's ability to do its job, save money, or protect the health, safety, and welfare of the public; projects are on time, within budget, have deliverables, and present conclusions.
- ❑ Program performance measures should be evaluated over a specified time period: three or five years. Perform a common sense evaluation of the program in terms of the goals identified for it rather than try to attach numbers.
- ❑ Customer satisfaction is the primary performance measure for the research unit.
- ❑ Establish a quality team consisting of the research manager and selected other personnel to evaluate and quantify potential items for inclusion as performance measures – such as specification changes, recommendations implemented, monetary savings, and other items. Include users of research products in this team.
- ❑ See also section on Cost/Benefits of Research Results, page A-7.

### **STAFFING AND RESOURCES**

*“People are our key resource. I need to look for new ways to recognize, support, and develop my staff.”*

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- ❑ With many agencies having a top limit on complement, it is important to find a means to accomplish administrative processes with resources other than highly trained technical expert staff. Contract out some of these processes to a partnership university or to private contractors who are experts in the respective administrative area.
- ❑ Sponsor a basic contract management course for future and existing research contract managers and other appropriate research unit administrative staff.
- ❑ Develop training course with the agency training division for project technical committee leaders/technical monitors to teach project management procedures and responsibilities. Include instruction on how to identify and determine dollar cost savings of benefits.
- ❑ For understaffed RD&T units, consider forming small groups or task forces to investigate problems in the field. Draw on operational/field unit staff to serve on the task force and contribute to the investigation.
- ❑ Sponsor business management training for research managers and for staff being groomed to move into management positions. Consider, management, marketing, finance, economics, and other business courses. Researchers must be better at “talking” the language of senior management and being able to meaningfully discuss problems and their solutions in business terms such as risk, return-on-investment, and more.
- ❑ If the agency can not provide RD&T related training, contract for such capacity building in technical expertise development and technology transfer services.
- ❑ Ensuring sustainable research staffing, both within the research unit and operational units. This may require innovative reward mechanisms such as dual career ladders, career path planning, recognition, and other professional development opportunities.
- ❑ Technical liaisons to projects and technical oversight committee leaders are critical to the success of the research projects. Their duties should be part of their formally defined responsibilities. Adequate time and skills training should be provided to them to do their jobs.
- ❑ For programs having close associations with specific universities, utilize graduate students more effectively as an engineer and researcher recruiting and development tool. The research program can contribute to the agency’s professional capacity building efforts through the introduction of bright young students researchers, who at the end of their education, may be attracted to work for the agency.

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- A core competency of the research unit may be providing technical assistance to department staff for the solution of day-to-day operational problems. Such capability provides a valuable service to the department, yet this work often takes a considerable percentage of the research staff's time to accomplish. Needs for such services may increase due to successful past experiences. Use academic expertise, familiar to the operational staff, to augment the capacity of the research unit to continue to meet growing needs for such services.
- Use university research associates – non-academic staff: Research associates can conduct independent research, serve as technical experts, conduct trouble shooting assignments, and help in the implementation of research. They can help relieve the main research staff to have more time to work on research projects. The position of research associates can be funded through contract research with the universities. They can also work with the university principal investigators to increase the efficiency of the research activities.
- Staff rotation between the DOT and universities: Staff rotation between the agency and university staff has the potential of not only increasing the efficiency of project delivery but also creating an atmosphere of better understanding and knowledge of the department's mission and goals and can be of mutual benefit to both the DOT and the universities. On-site access to DOT staff and university faculty promotes better communication and project oversight so projects can proceed more efficiently thereby increasing productivity.
- Researchers tend to work in narrowly defined technical areas. Give in-house researchers a good view of the big picture so that they can understand the link between their work and the goals of the organization. Such exposure to many facets of agency operations helps the researchers to produce results that are more mission oriented.
- A task order for technical assistance from university personnel for up to a specific dollar value or time limit is effective for solving immediate problems. Having a contract with the university in place that allows task orders to be executed through an expedited process (signature authority by research manager or other senior official) enables quick turn-around of solutions.
- To augment research results implementation or enhance technical assistance responses, set up an on-call agreement for technical consultation limited to a specific number of hours (with private sector or university researchers/experts).

*Concepts, Methods, & Recommendations of Research Peers  
for Management of State RD&T Programs*

- For research units that perform research in-house, there is a constant need to cultivate personal relationships between the younger/less experienced researchers and the agency customers in the operations offices.
- Often awards or rewards are given for superior research efforts, but similar incentives should also be planned for those staff performing non-technical responsibilities, implementation activities, teaching courses, and other items.
- Understaffing of the RD&T program is a major concern in a number of agencies. Understaffing prevents the program from being robust and threatens its ability to be either effective or efficient. Overcommitments are silently undermining the strategic opportunities that research could accomplish, forcing the program to become increasingly tactical in its research results production.
- Travel opportunities are professional development experiences for researchers.
  - ◆ Networking
    - creates relationships with peers in other programs;
    - reduces duplication of research efforts;
    - national and international recognition of staff can bring additional research funds to the program.
  - ◆ Technical Development
    - increase understanding of state-of-the-art and state-of-practice;
    - increase knowledge base of staff;
    - increase flow of information to operational units within department.
  - ◆ Increase Morale of Staff
    - staff works hard to perform good research, develop expertise, get committee appointments, and then can't accept awards for their efforts.
- Develop research project manager training course.
- Train appropriate research and technical staff in abstract writing and preparation of synthesis reports. Winter assignments of operational staff, summer interns, research contractors, and technical writers can productively supplement the research staff.
- Use Department statisticians for review of data collection and analysis for research projects. Include a statistician on research staff. Consider hiring this talent for the research unit.