Virginia Transportation Research Council

research report

Virginia's Transportation Research Peer Exchange

http://www.virginiadot.org/vtrc/main/online_reports/pdf/11-r8.pdf

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FINAL REPORT

VIRGINIA'S TRANSPORTATION RESEARCH PEER EXCHANGE

July 19–21, 2010

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In Cooperation with the U.S. Department of Transportation
Federal Highway Administration

Virginia Transportation Research Council
(A partnership of the Virginia Department of Transportation
and the University of Virginia since 1948)

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VIRGINIA PEER EXCHANGE TEAM

Panel

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Lorenzo J. Casanova, P.E., Programs & Technology Engineer, Federal Highway Administration–Virginia Division
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Other Participants

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Ann M. Overton, Public Affairs Manager, VTRC
Brian K. Diefenderfer, Ph.D., P.E., Research Scientist, VTRC (workshop recorder)
Lance E. Dougald, Research Scientist, VTRC (workshop recorder)

INTRODUCTION

To be eligible for managing State Planning and Research (SP&R) funds, a state must agree to a peer review of its management process with regard to Research, Development, and Technology Transfer (RD&T^2) efforts. Specifically, the federal regulation regarding this requirement states:

> (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. Travel and other costs associated with peer reviews of the State's program may be identified as a line item in the State work program and will be eligible for 100 percent Federal funding. At least two members of the peer review team shall be selected from the FHWA list of qualified peer reviewers. The peer review teams 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 (23 CFR 420, Subpart B).

The Federal Highway Administration (FHWA) interpreted the required peer reviews to be an exchange of information regarding the various practices a state uses to manage its RD&T^2 programs. The intent of the regulation was to strengthen weak programs and enhance strong programs with a sharing of ideas.

The peer exchange panels are typically composed of state research managers and FHWA, university, or industry personnel, at least two of whom must have received training on peer exchange procedures and guidelines provided by the FHWA and be listed by the FHWA as a qualified peer exchange team member.

Peer exchanges are generally conducted in an informal atmosphere and last from two to four days. Techniques used to gather the information needed by the peer exchange panel include discussion of individual state practices and brainstorming sessions on the focus areas of interest to the host state. Open-ended questions are used during the interview sessions to solicit the strengths and weaknesses of the program from the user's perspective.

From July 19 through 21, 2010, the Virginia Transportation Research Council (VTRC) hosted a peer exchange with state department of transportation research managers/directors from Louisiana, North Carolina, Rhode Island, and West Virginia and a representative from the Virginia Division of the FHWA. Performance measurement and monitoring are becoming critically important for research programs and, thus, particular emphasis in the exchange was placed on implementation of research results and documentation of monetary benefits with respect to individual research projects and research programs as a whole.

PEER EXCHANGE PANEL

The following individuals were a member of the peer exchange panel:

- *Harold "Skip" Paul, P.E.,* Director, Louisiana Transportation Research Center (Panel Chair)

- *Mrinmay "Moy" Biswas*, Ph.D., P.E., Manager, Office of Research, North Carolina Department of Transportation

- *Colin A. Franco, P.E.,* Managing Engineer, Research, Technology and Development, Rhode Island Department of Transportation

- *Donald L. Williams, P.E.,* Section Head of Research, Program Planning and Administration Division, Division of Highways, West Virginia Department of Transportation

- *Lorenzo J. Casanova, P.E.,* Programs and Technology Engineer, Federal Highway Administration–Virginia Division.

CHARGE TO THE PEER EXCHANGE PANEL

Prior to the peer exchange, background information describing VTRC's research program was supplied to the panel members. The charge to the panel was to review the VTRC research program and identify action items to help improve the delivery of the program. Emphasis was placed on implementation, communication, and quantification of benefits. In particular, the panel was asked to provide their thoughts with regard to the following questions:

1. *Implementation:* How do you define implementation with respect to research recommendations? What steps do you take to encourage/support implementation of research recommendations? What mechanism do you use to track implementation?

2. *Quantification of Benefits:* What process do you use to quantify the benefits of your research program? How do you account for non-monetary benefits? How do you use return on investment data to support your program?

3. What opportunities have you identified for strengthening the Virginia research program and the way it is developed, delivered, and implemented?

4. What things have you identified that can be valuable to consider for addressing and enhancing the transportation research program in your state?

5. What is your assessment of the Virginia Peer Exchange and the way it was conducted? How can it be improved?

CONTENT AND FORMAT OF THE PEER EXCHANGE

The peer exchange was conducted from July 19 through 21, 2010, at VTRC in Charlottesville. The agenda is provided in Appendix A. To begin the exchange, VTRC's Acting Director of Research Operations Michael A. Perfater provided an overview of the VTRC program. The panelists followed with overviews of their respective research programs. Open discussions then ensued that centered on the themes of implementation and quantification of benefits. On the last day of the peer exchange, the results of these discussions were summarized and presented to the Commonwealth Transportation Commissioner Gregory A. Whirley and the Virginia Department of Transportation's (VDOT) Chief of Research, Technology, & Innovation Gary R. Allen.

RESPONSES OF THE PEER EXCHANGE PANEL TO THE QUESTIONS

The open discussion period of the exchange focused on implementation and quantification of benefits. *Implementation* was loosely defined as research achieving its intended purpose. The panel discussed various methods by which implementation could be encouraged including (1) explicit consideration of implementation prospects at the onset of a project, and (2) designation of personnel whose sole responsibility is to follow the implementation status of recommendations from completed projects and assist in the calculation of the benefits provided to VDOT as a result of implementing the recommendations where appropriate. It was noted that benefits can be quantified in a number of ways, the most obvious being a direct calculation of cost savings to the sponsoring agency. This calculation can be made for a number of, but not all, projects. The panel cautioned against discounting the importance of projects that might not show a quantifiable benefit but still attain the goals of the research study. Highlights of the answers to each question are provided here.

1. **Implementation: How do you define implementation with respect to research recommendations? What steps do you take to encourage/support implementation of research recommendations? What mechanism do you use to track implementation?**

   - The status of research recommendations should be documented after project completion and should include both those recommendations that are implemented and those that are not. The justification should be recorded for the recommendations that are not implemented by the respective research advisory committee (RAC). When the implementation of research recommendations is documented, a return on investment analysis can often be conducted. The Louisiana Transportation Research Center (LTRC) has established an implementation engineer position that has the primary responsibility of tracking the implementation of each research project for several years after it is completed. This continual tracking of the implementation record aids in estimating benefits by documenting implementation and measuring real cost savings.

   - Implementation should be considered at the same time a research topic is proposed and should be reviewed at significant milestones during the conduct of the study.

- When proposed research topics are prioritized, greater weight should be placed on those projects for which the outcomes have a high potential for implementation.

- VTRC researchers should ensure that project technical review panels consist of VDOT personnel who are capable of getting the results implemented and have a high interest in the topic.

- Not all projects will have implementable results that are quantifiable in terms of dollars saved.

- Not all successful projects will have an implementable result.

- Implementing a new idea or concept involves the appearance of risk. Policy makers need to be made more comfortable with accepting certain levels of risk when the potential for significant gains is apparent.

- Potential barriers to implementation should be identified and considered at the outset of a research project. Examples include the potential for acceptance of a new test method by field personnel, practicality of the new method, ability of existing personnel to perform the new method, and compatibility with industry practices.

- The prospects for implementation can be enhanced by gathering executive level support to assist operations staff in achieving implementation within their respective divisions. *It is important to get the right message to the right people at the right time.*

- A program to fund demonstration projects could assist with getting research recommendations implemented.

2. **Quantification of Benefits: What process do you use to quantify the benefits of your research program? How do you account for non-monetary benefits? How do you use return on investment data to support your program?**

- Some project benefits are qualitative, and some are quantitative. Some projects are undertaken purely for the knowledge gained. A finding that a proposed method will not work is still a beneficial finding.

- To quantify benefits, sometimes a number of assumptions must be made, depending on the nature of the study.

- Potential quantifiable benefits should be discussed at project initiation.

- In some cases, it may be several years after a project is completed before the benefits of the research can be calculated.

- There are various types of cost savings, including one-time and long-term (annual), that accrue to the agency, and there are also savings that accrue to users.

- Communication can be aided by creating and distributing a fact sheet for each completed project where benefits can be quantified. Fact sheets typically include what was done, why it was done, and the fiscal impacts of the recommendations. The sheets are completed as projects are completed so they are available as needed.

- In those states where benefit calculation is conducted, it is typical to report an annual accrual of monetary benefits over a specified time period (ranging from a few years to more than five years).

- The comparison of benefits between projects can be used as an indicator of the quality of project selection, whereas benefits calculated and aggregated over a longer time period can be used to show the benefit of the research program.

- Projects with quantifiable benefits can be marketed as a means of showing the value of research. Examples given included a pavement accelerated loading facility and use of high strength concrete projects; 3:1 and 13:1 benefit/cost ratios, respectively, were calculated.

- Websites can be utilized to help deliver the message regarding the benefits of research.

3. **What opportunities have you identified for strengthening the Virginia research program and the way it is developed, delivered, and implemented?**

Marketing and Communication

- Improvements to the development and delivery of outreach documents could lead to improvements in implementation by getting the word out about research results with the potential to improve practice, reduce cost, or increase service life. Examples of outreach documents used in other states include short project summary documents, reports on the implementation of research recommendations, and periodic updates quantifying the benefits of implementation over time.

- The establishment of a periodic statewide engineering conference and a local seminar series could be conduits for information and opportunities to disseminate findings of research studies and demonstrate the value of the research.

- To further the awareness of VTRC research programs and results, VTRC researchers should seek opportunities to present the findings of their research studies at monthly/quarterly meetings of VDOT Central Office and district-level personnel, meetings of local FHWA officials, and industry meetings.

- Communications staff should be involved in producing the implementation message across VDOT via the use of research project initiation and status documents. Tools should also be used to effect deployment such as training manuals, training videos, seminars, demonstrations, and the like.

- Get out and about. Engineer supervisors, managers, and administrators usually will not spend time reading research reports. Give it to them in small bites so they can see the utility of the recommended solutions. Go to their meetings to present implementation strategies and deployment ideas. This can be an excellent opportunity to take proposed demo projects to them and get VTRC research staff known to field personnel.

- Consider half-day or one-day research workshops, seminars, and outreach sessions for VDOT personnel. Focus on one specific area every six months. This can be an opportunity to highlight research and technology transfer efforts.

Funding

- VTRC could better utilize the various funding opportunities available to make its research program more effective. Examples include the use of more than the 25 percent minimum state earmark of SPR dollars for research, use of Surface Transportation Program (STP) funding for training and implementation, and more aggressive pursuit of external competitive grants.

- LTRC has augmented its funding stream by establishing a non-profit foundation that can provide additional research monies beyond the traditional resources. In one example, a private corporation can make a donation to the foundation that could be used to conduct additional testing or purchase equipment.

Quantification of Benefits

- A process or method for calculating the return on investment from research should be developed for consistent use by VTRC scientists. Most VTRC scientists do not possess the "know-how" to compute the return on investment for research studies. Until a process becomes more ingrained in the VTRC culture and the requirements for research outputs include this assessment, this lack of know-how could continue to be an obstacle to sharing the benefits of research. VTRC should consider holding a series of short courses to assist scientists with quantifying the return on investment by using examples related to the studies undertaken by the respective research teams.

- VTRC should develop a process to follow implementation of research over a specified period of time (e.g., a five-year moving window) to help track accumulated benefits over time. Creating a dedicated Implementation Program Manager position would enhance this process and help VTRC scientists by making implementation more a part of the research culture than is now the case.

- To improve the implementation process further, VTRC associate directors should allocate a large portion of their time to implementation activities. At LTRC, all research engineer administrators spend 50 percent of their time on implementation. This is written into their position descriptions, evaluation expectations, and performance measures.

- VTRC should develop an implementation summary document to keep a running tally of the benefits of the research program to VDOT. This document should be updated on a continual basis. Included in this summary should be documentation of the results of those projects that benefit VDOT's program but that may not have a monetary benefit.

- As research topics are proposed, an estimation of the potential return on investment from each should be part of the discussion in the project prioritization process within RACs.

4. **What things have you identified that can be valuable to consider for addressing and enhancing the transportation research program in your state?**

Harold "Skip" Paul, P.E., Louisiana Transportation Research Center (Panel Chair)

- Initiate a Knowledge Management (KM) Program to assist the Louisiana Department of Transportation and Development (LADOTD) in its succession planning process. In addition, there are a number of technical assistance projects involving LADOTD processes that would be appropriate for a KM unit to undertake.

- Develop a research culture within the LADOTD technical and operational leadership through communication and the history of success. The North Carolina DOT (NCDOT) has an outstanding attitude about research and implementation that is driven from both the top and the bottom.

- Look at the Virginia Tech Transportation Institute's Smart Road business plan. Consider hourly day/rate charges for our Pavement Research facility.

- Consider some "risky" research. Not everything has to be implementable. This could be modeled after the "futuristic" NCHRP 20-83 series or the Florida DOT's Workshop on Future Needs. Instead of labeling these efforts as basic research, consider calling them advanced technology research.

- Discover the opportunities offered by the FHWA Resource Centers.

Mrinmay "Moy" Biswas, Ph.D., P.E., North Carolina Department of Transportation

- Consider rest area commercialization/privatization. Review literature work already completed by the VDOT Research Library.

- Emulate VTRC's library management process. Have the new NCDOT librarian visit VTRC and meet with the library staff.

- For NCDOT's next research peer exchange, consider transportation research library management as the primary theme.

- On a case-by-case basis, require professional editing for final research reports and provide funds to pay for the service.

- Consider using more video conferences and webinars.

- Consider soliciting new research need statements from contractors, consultants, and resource agencies.

- Attend meetings of NCDOT's operational groups, such as maintenance, operations, and construction.

- Develop a listing of what we [the NCDOT Office of Research] do for universities.

- Consider initiating and financially supporting Senior projects (capstone), such as LTRC's Transportation Institute for Research and Education (TIRE) Program.

- Review some of the LTRC's project progress documents, and develop key ones for NCDOT research projects such as Research Capsules for ongoing projects and two-page format technology summaries. The writing and editing of these documents would be the responsibility of the research manager.

- Develop a consistent Research Implementation Status Report.

- Learn the benefit/cost analysis process. Consider using concepts such as benefit metrics and performance indicators—not necessarily dollar value.

- Consider more web-based applications of NCDOT's research program development and research project management process (follow the LTRC model).

Colin A. Franco, P.E., Rhode Island Department of Transportation

- Follow the example of VTRC and LTRC in establishing and leveraging relationships between the DOT and universities. The Rhode Island DOT has recently signed a memorandum of understanding (MOU) with the University of Rhode Island Transportation Center to establish a joint research program that leverages University Transportation Centers (UTCs) funding with SPR funding.

- The involvement of young researchers and students who work closely with VTRC scientists on projects is envied by many DOT research programs and UTCs.

- Implementation is a process that begins with marketing, that is, communicating the findings and recommendations to the right stakeholders. Creating tools that the stakeholders can use (e.g., guides, specifications, protocols, practices) is also key. Establishing a method to track implementation and the performance of that implementation is also critical.

Donald L. Williams, P.E., West Virginia Department of Transportation

- Use technical review panels throughout the research project process.

- Develop a dashboard for project tracking.
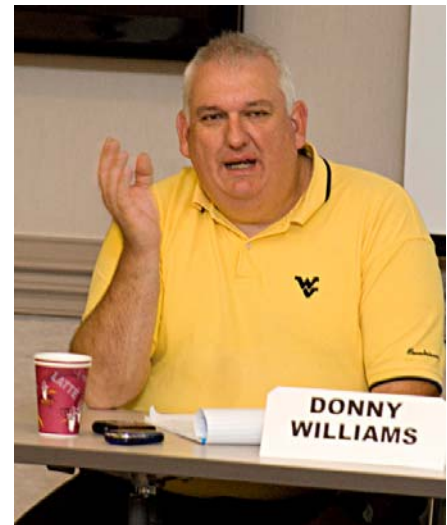
5. What is your assessment of the Virginia Peer Exchange and the way it was conducted? How can it be improved?

- The combination of states with different-size staffs and programs was very useful.

- Something was learned from each participant.

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- Each participant has a better appreciation for the other programs and how they do business.

- The agenda and evening events were well planned and executed. Much information was covered, and yet time was still available to develop the reporting out brief.

- The opportunity to mingle with and get to know some of your staff was a great experience.

- The read-ahead materials provided a great introduction of VTRC's organization and program.

- Because of the different program and staff sizes, the discussion on implementation was very fruitful. That topic could have extended another day.

COMMENTS BY LORENZO J. CASANOVA, P.E., FEDERAL HIGHWAY ADMINISTRATION–VIRGINIA DIVISION

- *Implementation* means "change," which is hard to achieve when you have to overcome obstacles such as gaining endorsement from decision makers averse to the potential risks associated with change. The three major challenges to research implementation are:

  1. The highway industry is decentralized: one federal government; 50 states; two territories; and thousands of counties, cities, and MPOs—each one with its own set of rules and requirements.

  2. The procurement practices of the highway industry provide very little incentive for innovation.

  3. There is considerable aversion to risk in the public sector.

- The FHWA is very supportive of VTRC and is willing to help it in any way possible to accomplish its mission and goals.

- The FHWA has been changing its focus from projects to process to programs (current focus) to performance (future focus). Performance is dependent on research, and, as such, VTRC and its staff are a vital part of FHWA's success.

- Not every project undertaken has to have an objective of being implemented. Sometimes research is performed to verify or to speculate—or to answer questions. One of the remarkable things about VTRC is its capacity and flexibility to answer the "what if" questions that so often are asked by politicians and policy makers.

- Because VTRC staff are known nationally, it enhances the ability of the Council to successfully compete for grants and to be connected with a network of top researchers around the country.

- The 25 percent of federal SPR funding received by VDOT for research is a mandatory minimum and not a set figure. VDOT has the option to change that percentage to 30, 50, or even 100 percent.

- The quality of work produced by the researchers at VTRC makes VDOT and the Virginia Division of FHWA look good.

- The success of the Council is due to the hard work of each one of its employees.

- Although VTRC is often evaluated on the basis of how much money the research program saves the Commonwealth, the true value of VTRC goes far beyond that.

COMMENTS BY COMMONWEALTH TRANSPORTATION COMMISSIONER GREGORY A. WHIRLEY

Introductory Remarks

- VTRC has some of the best people in VDOT—and people are the cornerstone of an agency.

- I am very supportive of research and am a strong believer in the value the Research Council brings to VDOT.

- Regular peer exchanges such as this one are very important activities that provide opportunities for self-evaluation and the exchange of lessons that can be learned from other research organizations.

- The legislatively mandated review that is underway has looked at some of the same issues that this peer exchange has considered, and both have been very complimentary of VTRC's program.

Implementation

- The development of an effective means for achieving implementation is of great interest to Secretary of Transportation Sean T. Connaughton.

- Given the high-level interest, it is extremely important for us to develop a formal mechanism for taking results from the research reports, through the research advisory committees, and then to VDOT executives to promote and achieve implementation. A key component to make this happen is communication.

- A key finding of the legislatively mandated review of VTRC is that implementation is lagging. A recommendation has been made to establish an incentive program for implementation, but it is unclear at this time what that program will consist of.

- Research programs often fall into one of two categories: executive driven or grassroots. VDOT must determine how best to encourage research and involve executives more without losing the input and buy-in from the field.

Communication

- The development of brochures or other information briefs would improve the communication of research accomplishments, the potential for implementation, and resulting benefits to VDOT. This concept needs to be explored.

2010 VIRGINIA PEER EXCHANGE AGENDA

Virginia Peer Exchange Agenda
July 18, 2010–July 21, 2010
VTRC Auditorium

Day 1—Sunday, July 18, 2010

3:00 PM   Check-in at the Best Western Cavalier Inn

6:30 PM   Pick up for get acquainted gathering and dinner at Vivace

Day 2—Monday, July 19, 2010

Continental Breakfast on your own at the Best Western Cavalier Inn

8:00 AM   Pick up at Best Western

8:15 AM   Coffee and bagels at VTRC

8:30 AM   Welcome/Introductions/Agenda Overview—All
- FHWA Expectations—Lorenzo Casanova
- Goals of the Peer Exchange—Mike Perfater
- Panel Chairman's Remarks—Skip Paul

9:00 AM   VTRC Program Overview—Michael Perfater/Donna Cognata/Maureen Hammer
- Organization—Mike
- Funding—Donna
- Program—Mike
- Knowledge Management and Library—Maureen
- Challenges and Opportunities—Mike

10:45 AM   Break

11:00 AM   Facilities Tour
- Library
- Laboratory Facilities in Shelburne Hall

12:30 PM   Working lunch (provided)

1:15 PM	Panel Members Overview of Their Research Program
	• Skip Paul—Louisiana Transportation Research Center
	• Moy Biswas—North Carolina DOT
	• Colin Franco—Rhode Island DOT
	• Donald Williams—West Virginia DOT
2:30 PM	Break
2:45 PM	Open discussions focusing on the following two topics guided by the bulleted questions. VRTC will share its processes and seeks to learn how these important functions are addressed in each state. Additional topics from the Peer Exchange Panel are welcome.

Implementation

- How do you define implementation with respect to research recommendations?

- What steps do you take to encourage/support implementation of research recommendations?

- What mechanism do you use to track implementation?

Quantification of Benefits

- What process do you use to quantify the benefits of your research program?

- How do you account for non-monetary benefits?

- How do you use return on investment data to support your program?

5:00 PM	Adjourn
6:30 PM	Pick up for informal discussions and dinner at the Shebeen Pub and Braai

Day 3—Tuesday, July 20, 2010

Continental Breakfast on your own at the Best Western Cavalier Inn

8:00 AM	Pick up at Best Western Cavalier Inn
8:15 AM	Coffee and bagels at VTRC

8:30 AM	Continue discussion from previous day
10:00 AM	Break
10:15 AM	Resume and finalize discussions
12:00 PM	Lunch (Cookout with VTRC staff)
1:00 PM	Develop report and recommendations (Peer Exchange Panel only with assistance from workshop recorders and VTRC Leadership Team as needed)
3:00 PM	Break
3:15 PM	Resume final report preparations
5:00 PM	Adjourn
6:30 PM	Pick up for informal discussions and dinner at The Biltmore Grill

Day 4—Wednesday, July 21, 2010

Continental Breakfast on your own at the Best Western Cavalier Inn

8:00 AM	Pick up at Best Western Cavalier Inn
8:15 AM	Coffee and bagels at VTRC
8:30 AM	Report of the Peer Exchange Panel to Commissioner Gregory A. Whirley; Chief of Information Technology, Research, & Innovation Gary R. Allen; and VTRC staff
10:00 AM	Close out and final remarks (All)
	Adjourn

**BRIEF TO COMMONWEALTH TRANSPORTATION COMMISSIONER WHIRLEY
AND CHIEF OF TECHNOLOGY, RESEARCH, & INNOVATION ALLEN**

1. Peer exchange
   a. Welcome and introduction
   b. Why do we do the peer exchange?
   c. Objective / What are we trying to achieve?
2. Introduce peer exchange panel members
   a. What have we done for the past 2 days (agenda)?
   b. What did we ask the panel members to do?
   c. Peer exchange member sharing ideas on implementation and return on investment
3. Strengths of VTRC
   a. People
      i. Recognized local and national experts
         1. VDOT depends on VTRC staff
         2. sought after on national level to solve national problems
      ii. Consolidation of VDOT and university resources at one location
         1. creates efficiencies with respect to laboratories, etc.
         2. multidisciplinary staff addresses complete spectra of transportation business
      iii. Collaboration of VTRC with universities—partnerships
         1. joint agreement with UVa
         2. extension to Virginia Tech and other universities to utilize effectively all resources existing within Virginia to solve transportation problems in Virginia and nationally
         3. use of VTRC personnel as adjunct faculty assistants in the development of additional resources in the form of undergraduate and graduate students and potential future employees for VDOT and other agencies
            a. allows a mutually beneficial resource sharing
            b. ability to attract more highly qualified personnel because of opportunity and additional salary
      iv. Established job classification of "scientist" for some VTRC staff
      v. Many upper administrative positions are held by current and former research advisory committee (RAC) members
   b. Program
      i. Research driven to solve VDOT problems
      ii. Research results are directly incorporated into VDOT business practices
      iii. Research program is mature and robust: diversity and interaction of field and central office personnel on RACs
      iv. On-call immediate response for technical assistance
      v. VDOT Research Library and information services
      vi. Knowledge Management
      vii. Strong technology transfer through the dissemination of research results

       c. Diversity of funding
          i. SPR
          ii. State funds
          iii. External funding
             1. competitive programs (NCHRP, SHRP2, other grants, etc.)
             2. pooled fund studies
             3. extensive non-competitive grants

4. Opportunities for VTRC
    a. Enhance implementation
        i. Executive level support to assist implementation at respective divisions
        ii. Incentive programs—pilot demos and funding for them
        iii. Implementation leader (e.g., Louisiana Transportation Research Center's Implementation Engineer)
        iv. Develop and formalize implementation strategy at project initiation
        v. Follow-up after project completion
    b. Communication
        i. Improve development and delivery of outreach documents: initiation and status documents
        ii. Participate in monthly/quarterly meetings of VDOT Central Office and district-level personnel
        iii. Important to get the right message to the right people at the right time
    c. Expand use of federal funds
        i. STP (training & implementation), creative use thereof
        ii. Increased use of SPR dollars in lieu of other sources

5. Take-aways for panel participants
    a. Rhode Island
        i. Follow example of VTRC and Louisiana Transportation Research Center with DOT/university relationships
        ii. Implementation (methods to quantify)
    b. North Carolina
        i. Consider rest area commercialization/privatization literature work
        ii. Emulate library management process
    c. West Virginia
        i. Use of technical review panels throughout research project process
        ii. Project tracking dashboard
    d. Louisiana
        i. Initiate KM program to assist LADOTD in succession planning process
        ii. Develop a research culture within technical and operational leadership through communication and history of success

6. FHWA comments
7. Remarks by Commonwealth Transportation Commissioner and VDOT's Chief of Technology, Research, & Innovation
8. Closing remarks