

2016 Vermont Research Peer Exchange

Summary Report

prepared for

Vermont Agency of Transportation

prepared by

Cambridge Systematics, Inc.



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100 CambridgePark Drive, Suite 400
Cambridge, MA 02140

date

March 2016

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Executive Summary

The 2016 VTrans Research Peer Exchange was held on February 10th and 11th, 2016 in Montpelier, VT. The panelists included representatives from the Minnesota, New Hampshire, New Jersey, New Mexico, North Carolina, and South Dakota DOTs, as well as from FHWA Vermont Division and the University of Vermont (UVM) Transportation Research Center (TRC). The Peer Exchange intended to inform the development of a Research Program Review and Strategic Plan for VTrans as it undergoes a significant turnover in staff. Specific objectives included:

- **Address Staffing and Resource Deployment:** The Research Program will have a small staff for the foreseeable future. It must therefore explore ways to leverage that small staff using partnerships (e.g., with universities, other State agencies, other States), champions, and contributions from across VTrans;
- **Place the Program in Context:** The Research Program conducts several types of research, including short-term “quick response” projects for in-house staff and longer-term research conducted in-house and through UVM, the New England Transportation Consortium (NETC), National Cooperative Highway Research Program (NCHRP), Strategic Highway Research Program (SHRP 2), Transportation Research Board (TRB), and pooled fund studies with other states;
- **Describe the Program’s Relationship with Partners:** The Research Program’s largest partner is UVM, which currently administrates approximately 40 percent of VTrans’ FHWA SP&R allotment;
- **Focus on Customers and Customer Service:** The Research Program has primarily internal customers, but also serves other Vermont state agencies, UVM, and FHWA, among others. Identifying and communicating effectively with customers is critical for effective implementation.

Recommendations and Findings

The Peer Exchange completed a “Strengths, Weaknesses, Opportunities, and Threats” (SWOT) analysis for the VTrans Program, and drew on these findings to develop recommendations for the program. As presented to the Secretary of Transportation and other executives on February 11th, 2016, they are:

1. Ensure that VTrans has enough research staff to comply with both state laws as well as Federal program requirements, administrative regulations, cost principles and audit regulations applying to research programs, including relevant sections of 23 CFR §420, 23 USC §505, and 2 CFR §200.
2. Document meaningful research results, products and findings, including return on investment (ROI);
3. Establish an Executive Research Review Board (XRB);
4. Apply a collaborative selection process to all ideas, including those prepared in-house, at UVM, and by other external stakeholders; and
5. Actively seek partners with dollars (to leverage resources) as well as the expertise to meet VTrans needs.

A mission statement for the VTrans Research Program was developed by the panelists and will be refined for the Strategic Plan:

Our mission is to deliver high value research serving the needs of our customers...

...from quick-response to in-depth

...from theoretical to applied

...to meet the vision and mission of our agency.

1.0 Introduction

Federal Law (23 CFR §420, Subpart B) defines a “Peer Exchange” as “a periodic review of a State DOT’s RD&T program, or a portion thereof, by representatives of other State DOTs, for the purpose of exchange of information or best practices,” and establishes an obligation for each DOT to periodically both host and attend these gatherings. The Policy, Planning, and Research Bureau of the Vermont Agency of Transportation (VTrans) hosted a Peer Exchange in Montpelier, VT on February 10th and 11th, 2016. The Peer Exchange was intended to inform the development of a Research Program Review and Strategic Plan (the “Strategic Plan”) that:

- Meets statutory requirements for documenting the use of Federal Highway Administration (FHWA) State Planning and Research (SP&R) funding; and
- Establishes a mission and vision for the Research Program that align with VTrans’ strategic goals and define an effective path forward for the program.

Representatives from seven State DOTs attended the Peer Exchange: Minnesota, New Hampshire, New Jersey, New Mexico, North Carolina, South Dakota and the host state Vermont. Staff from the University of Vermont (UVM) Transportation Research Center (TRC) and the FHWA Vermont Division actively participated in discussions and offered guidance. Staff from Cambridge Systematics (VTrans consultants engaged to organize the Peer Exchange) acted as facilitators and recorders.

This report summarizes the objectives and key findings of the Peer Exchange. It first addresses these topics relative to the VTrans Research Program, then addresses each participating state.

1.1 Peer Exchange Participants

The following individuals participated in the 2016 Vermont Research Peer Exchange on behalf of their respective organizations:

- **Vermont Agency of Transportation:** Bill Ahearn and Joe Segale (*Chair*);
- **Minnesota Department of Transportation:** Mark Gieseke;
- **New Hampshire Department of Transportation:** Beth Klemann;
- **New Jersey Department of Transportation:** Camille Crichton-Sumners;
- **New Mexico Department of Transportation:** Randall Soderquist;
- **North Carolina Department of Transportation:** Neil Mastin;
- **South Dakota Department of Transportation:** Dave Huft;
- **UVM Transportation Research Center:** Glenn McRae;
- **FHWA Vermont Division:** Chris Jolly; and
- **Cambridge Systematics:** Chris Porter (*Facilitator*) and Joe Zissman (*Recorder*).

Other VTrans staff participated in appropriate discussions. These included Erik Filkorn and Jaqueline LeBlanc (Public Outreach); Mladen Gagulic (Materials Research); Scott Bascom and Costa Pappis (Policy and Planning); Wayne Symonds (Structures Engineering), and Jonathan Razinger (Research).

Figure 1.1 Peer Exchange Discussion at VTrans



(from left: Joe Segale, Glenn McRae, Camille Crichton-Summers, Dave Huft, Randall Soderquist, Mladen Gagulic, Chris Jolly)

Figure 1.2 Peer Exchange Visit to the Materials Research Laboratory



(from left: Camille Crichton-Summers, Neil Mastin, Beth Klemann, Mark Gieseke, Joe Zissman, Scott Bascom, Randall Soderquist)

1.2 Process

Panel members were invited to participate in the 2016 VTrans Research Peer exchange because of their experience managing agencies with similar resource and staffing challenges (e.g., New Hampshire, South Dakota), managing relationships with universities (e.g., North Carolina and South Dakota), and working as part of multi-state consortia (e.g., New Mexico). Minnesota also participated to support its own strategic planning effort. Participants from Minnesota, New Hampshire, North Carolina, and New Mexico attended their first Peer Exchange.

To prepare for the Peer Exchange, Joe Segale and Bill Ahearn from VTrans held several planning calls with their consultant staff. Potential panelists were contacted by the consultant in December 2015, and confirmed participation in January 2016. Participants managed their own travel, while the consultant arranged lodging and VTrans managed meeting space and meals. VTrans also organized a tour of its Materials Research Laboratory that took place concurrently with lunch on February 10th. Meeting agendas, hand-outs, presentation slides, and other deliverables were prepared by the consultant.

To close the Peer Exchange, recommendations were presented to VTrans and FHWA-VT Division executives, including Chris Cole, Secretary VTrans, Richard Tetreault Deputy Secretary, Michele Boomhower Director Policy, Planning and Intermodal Development Division and FHWA-VT Division Director Matthew Hake.

1.3 Recommendations of the Prior Peer Exchange

VTrans' last Peer Exchange was the first multi-state Peer Exchange co-hosted with New Hampshire and Maine in 2010 (the "Tri-State Research Peer Exchange"). That gathering had three focus areas: 1) soliciting/identifying high-value research problem statements; 2) ensuring quality research reports/deliverables; and 3) implementing research results. The participants reported the following key themes that emerged across all focus areas:

- A culture of innovation facilitates and encourages the adoption of research results;
- There is value in participating in regional and national programs;
- Robust programs engage their clients and stakeholders through all stages of the research cycle;
- Communicating the value of research program and project successes is critical;
- Implementation needs to be considered from the beginning of the process; and
- Ensuring quality and timeliness of deliverables builds credibility and confidence in the research program.

Writing for VTrans in 2010, Jennifer Fitch self-identified the following planned actions. Action taken on each point is noted alongside it:

- Update the procedures manual for our research program. Outline processes from solicitation through implementation. Incorporate recommendations from management and FHWA. – **In progress, will be completed in the 2016 Research Program Review and Strategic Plan.**
- Review RAC (i.e., the Research Advisory Council) membership structure to ensure the needs of the Agency are being met. – **VTrans has essentially dissolved the RAC, but forming a best practice replacement is a key action item of this Peer Exchange.**
- Investigate increasing participation in national and regional research efforts. This includes targeted distribution of pertinent information and opportunities, and increased committee involvement. – **VTrans has been as active in regional and national research as reduced staffing allows, and has chaired the New England Transportation Consortium (NETC) for seven years. VTrans staff participation in NCHRP panels and TRB Committees has increased during the period. VTrans also has served as the lead state for NETC and manages the contract with UVM to provide administrative services.**

- Emphasize the agency's mission, vision, and goals during the solicitation and approval process. Seek management input through RAC membership. Stay attuned to key issues facing the agency. – **VTrans has actively sought to implement the agency's strategic goals and has screened proposals and problem statements on that basis.**
- Review current contract requirements. Consider revising payment structure to base reimbursement on completion of predetermined milestones. Include reporting and formatting requirements. Reference one-page guidance for report writing from TRB. – **VTrans has considered these issues, and has refined contracts as necessary to achieve the best results from individual investigators.**
- Consider establishing project advisory panels of stakeholders to promote involvement and success of research initiatives and subsequent implementation. –**Technical Advisory Committees (TAC) were created for virtually all projects after 2011, though maintaining a single champion has taken precedence over establishing advisory groups.**
- Implementation of research results should be considered throughout the entire process. Revise solicitation form to include actions that will facilitate or inhibit implementation. Consider a brief (1-2 page) implementation plan within the final deliverable or as a separate document. **All subsequent proposals were required to address implementation measures, which was then included in the selection process. A majority of the projects included specific recommendation for implementation of the result, while some projects established a need for further phases of study before full implementation.**
- Consider other project deliverables when appropriate, including posters, folios, and other marketing materials. – **VTrans has produced alternative deliverables for several projects and has begun to engage Public Outreach staff to advertise research work.**
- Clarify leadership expectations and investigate methods to monitor, track, and report implementation. – **VTrans continues to explore these methods, and they formed a significant part of the discussion during this Peer Exchange.**

1.4 Structure of This Report

The remaining sections of this report will:

- List the key objectives, topic areas, and recommendations from the Peer Exchange;
- Provide detail on the Strengths, Weaknesses, Opportunities, and Threats (SWOT) of the current Research Program; and
- Provide key takeaways from each panelist.

2.0 Findings

The 2016 VTrans Research Peer Exchange was planned to focus on overarching objectives and topic areas selected by VTrans staff and their consultants. Once the group had gathered, panelists were active in reconceiving and reorganizing some of these through group discussion. The group formulated key action items for the VTrans Research Program. As presented to the Secretary of Transportation and other executives on February 11th, 2016, they are:

1. Ensure that VTrans has enough research staff to comply with both state laws as well as Federal program requirements, administrative regulations, cost principles and audit regulations applying to research programs, including the contents not limited to 23 CFR §420, 23 USC §505, and 2 CFR §200.
2. Document meaningful research results, products and findings, including return on investment (ROI);
3. Establish an Executive Research Review Board (XRB);
4. Apply a collaborative selection process to all ideas, including those prepared in-house, at UVM, and by other external stakeholders including pooled funds and AASHTO Technical Service Programs; and
5. Actively seek partners with dollars (to leverage resources), as well as the expertise to meet VTrans needs.

A mission statement for the VTrans Research Program was developed by the panelists and will be refined for the Strategic Plan:

Our mission is to deliver high value research serving the needs of our customers...

...from quick-response to in-depth

...from theoretical to applied

...to meet the vision and mission of our agency.

2.1 Objectives

Peer Exchange panelists and participants noted that the VTrans Research Program is the midst of a significant transition. The current director and only full-time staff member is retiring shortly after the Peer Exchange. While the agency is actively seeking a replacement manager and conversion of a second position to permanent status, additional staff are a fiscal possibility but not an immediate reality due to statewide constraints on the number of positions. This transition in staff has provided VTrans with an opportunity to overhaul the program's practices. To this end, VTrans and its consultants presented the panelists with four overarching objectives for the Strategic Plan:

- **Address Staffing and Resource Deployment** – The Research Program will have a small staff for the foreseeable future. It must therefore explore ways to leverage that small staff using partnerships (e.g., with universities, other State agencies, other States), champions, and contributions from across VTrans.
- **Place the Program in Context** – The Research Program conducts several types of research, including short-term “quick response” projects for in-house staff, Federally required projects, such as Experimental Features and technology transfer activities and longer-term research conducted in-house and through the VTrans-UVM Research Collaborative (V-TRC). VTrans also participates in the New England Transportation Consortium (NETC), which is jointly funded by the six New England States. Research Program staff may also engage in, as well as make use of, research conducted by the National Cooperative Highway Research Program (NCHRP), Strategic Highway Research Program 2 (SHRP2), and other programs of the Transportation Research Board, as well as pooled-fund studies with other states.

- **Describe the Program’s Relationship with Partners** – The Research Program’s largest partner is UVM, which currently administrates approximately 40 percent of VTrans’ FHWA SP&R allotment, as shown in Table 2.1. This arrangement leverages UVM staff and financial resources to conduct larger-scale research, but presents challenges for meeting Federal oversight requirements. In addition, VTrans essentially uses UVM as an exclusive university partner, which may lead the agency to overlook expertise and resources at other schools.

The Research program also partners with our sister states in promoting research solutions at the interstate and national levels. Those partnerships are executed through networking and through applying expertise in one of the states to issues of interest across the group. Partners bring issues from AASHTO Committees, Expert Task Groups and other facilitation bodies.

Table 2.1 FFY 2016 Budget Breakdown for the VTrans Research Program

Category	Budget (Dollars)	Share of Budget
UVM-TRC	\$535,006	42%
TRB/AASHTO	\$389,715	31%
NETC	\$100,000	8%
Consultants	\$37,000	3%
VTrans Staff, Equipment and Travel	\$215,850	17%
Total	\$1,277,571	100%

- **Focus on Customers and Customer Service** – The Research Program has primarily internal customers, but also serves other Vermont state agencies, UVM, and FHWA, among others. Identifying and communicating effectively with customers is critical for effective implementation.

VTrans Research Successes

The VTrans Research Program manager noted a number of examples of research and implementation that have led to measurable benefits to the agency and Vermont’s traveling public, including:

- *Research on a high-crash site near Barre that led to more widespread implementation of traffic control measures to reduce the problem of “dilemma zones”;*
- *Testing of the heavy metal content of glass beads (used in reflective markings) imported from China that led to specifications to ensure a limit to heavy metal content;*
- *Investigation of asphalt binders that identified suppliers’ inclusion of recycled engine oil bottoms as a factor reducing pavement longevity;*
- *Implementation of “Bridge in a Backpack,” an composite arch technology developed by the University of Maine that allows for rapid deployment of bridges in hard-to-reach areas; and*
- *Selection of more durable pavement markings that need less frequent repainting.*

2.2 SWOT Analysis

SWOT analysis identifies strengths, weaknesses, opportunities, and threats to a program or organization. Panelists performed a SWOT analysis for the VTrans Research Program on the first morning of the Peer Exchange, with participation from FHWA and VTrans staff as subject matter experts.

Identified **strengths** of the Research Program included:

- Strong support from agency executives and the FHWA regional office;
- Productive relationships with other State agencies;
- A known and reliable budget;
- A track record of successful projects with large ROI for the agency (e.g., “Dilemma Zones”);
- Effective forensic research (i.e., “why did a failure occur?”); and
- A PDF format digital record of research reports since 1973.

Identified **weaknesses** of the Research Program included:

- Limited staff resources (panelists were deeply concerned about this).
- A weak understanding of program priorities and strategy.
- A belief that Vermont needs a “unique approach” to common problems.
- The Research Advisory Council has been allowed to lapse.
- Program managers both actively perform research and manage the program. This “player-manager” status sometimes allows them to get lost in the details of work and neglect big-picture issues.
- Over-reliance on “passive” dissemination of results (e.g., “placing it on a website and hoping someone notices it”).

Identified **opportunities** for the Research Program included:

- VTrans can reinvent its program during the current period of staff transition;
- The smaller size of the Program can make it more nimble and flexible;
- The Program can leverage its support from executives by engaging them directly for guidance;
- Younger, newer staff can innovate and keep research relevant for a VTrans workforce shifting younger;
- The use of UVM’s resources to leverage the limited State funds (e.g., through Federal grants);
- The strong informal “Tri-State” partnership among Vermont, Maine, and New Hampshire could be leveraged and better integrated with the research efforts in the three States; and
- Pooled funds (e.g., NETC) can be used to maximize ROI for VTrans by drawing from multiple programs to complete work with relevance for many DOTs.

Identified **threats** to the Research Program included:

- With its limited staff, the Program may not be able to meet oversight requirements for its Federal funds – there may simply not be enough hours in the week – placing not only its allotment but other related Federal funds at risk. Participation in other funded programs (e.g., SHRP) also may be impossible to manage without adequate staffing.

- Retiring staff are taking a significant amount of personal capital and institutional knowledge with them, and no clear succession plan has been established.
- VTrans has had difficulty finding qualified staff for Research Program positions.
- UVM may not be able to meet Federal administrative standards, notably competitive procurement or Open Data.
- VTrans engineering staff may resist changes to status quo practices. One VTrans participant noted: “Engineers want to follow the rules. What is your process for changing them?”

2.3 Detailed Recommendations

In addition to the action items listed above, the panelists made detailed recommendations for refining and improving the VTrans research program. These are presented below, organized by topic area: 1) contents for the Strategic Plan; 2) developing the VTrans Research Program; 3) leveraging other research activities; 4) implementing research results; and 5) human and technical resources.

2.3.1 Strategic Plan Contents

Panelists and participants generally agreed that the *2016 Research Program Review and Strategic Plan* should begin with mission and vision statements, as well as goals for the program. Examples of goals could include:

- Meeting Federal requirements;
- Supporting the VTrans Strategic Plan while providing value to the agency;
- Leveraging limited resources (e.g., by providing access to existing research, by participating in national and multi-state activities, and by working with partners);
- Communicating results to those who need to know;
- Engaging high-level management in determining priorities and supporting implementation; and
- Serving customers (primarily VTrans staff).

It was strongly suggested that the bulk of the Strategic Plan consist of the Federally mandated SP&R Program Manual. It was suggested and generally agreed that the Program Manual should proceed through the relevant statutes and FHWA requirements point-by-point, describing how VTrans plans to meet the requirements moving forward. New Hampshire provided VTrans with a draft copy of that agency’s Program Manual as an example.

2.3.2 Developing the VTrans Research Program

Recommendations for developing the VTrans Research Program (i.e., for program and project management) included:

- **Solicit ideas widely and on an ongoing basis** – Solicitation should have an internal focus (reflecting VTrans’ strength in forensic and quick-response investigations), but should have the flexibility to include external ideas (e.g., from UVM, other institutions, or the private sector).
- **Share ideas with neighboring states** – While administrative or logistic barriers may exist to a formal joint solicitation process, no barriers exist to simply sending Vermont’s list of ideas to New Hampshire, Maine, Massachusetts, etc. to identify opportunities for collaboration. This informal process can be augmented using NETC, formal pooled funds, and national research.
- **Develop a program-wide annual research needs review, prioritization, and selection** – This process currently exists for ideas managed by UVM through the V-TRC program, but panelists recommended that a refined version be applied to all ideas and be an input to the annual VTrans Research work program. The process should also include

prioritizing participation in pooled fund studies. Ideally, review, prioritization, and selection would be conducted by an Executive Research Review Board that includes high-level decision-makers supported by multidisciplinary technical staff and would consider potential ROI of projects.

- **Support UVM while maintaining flexibility to access skills from other sources** – These sources could include other colleges and universities, as well as contractors and consultants. UVM should not necessarily receive a fixed annual allocation, but should be allowed to provide or compete for research services where UVM's skills and VTrans' needs mesh, and may need a target range of funding to ensure program consistency. The VTrans Research Strategic Plan should explicitly address when competitive versus cooperative agreements (or grants) are to be used – see language from New Jersey.
- **Recognize the distinctions between different types of research** – These include:
 - Full projects;
 - Quick-response (using an annual set-aside);
 - Implementation and technology transfer (possibly using a second annual selection process for projects to implement completed research);
 - Experimental features; and
 - Literature reviews or syntheses of the state of knowledge on a particular topic.
- **Improve contracting procedures to ensure timely, customer-focused delivery** – Improvements could include milestone-based payments, interim reports, and requirements for implementation plans and ROI estimates during the proposal phase, among others.

2.3.3 Leveraging other Research Activities

Recommendations for leveraging other research activities included:

- **Conduct rigorous literature searches** – These provide staff and management with important insight while minimizing duplication of work. Some argued that VTrans should pursue help from a qualified research librarian (i.e., not someone who will simply search a database or Google). Librarians are sometimes retained on contract by other agencies (e.g., from a local college).
- **Maintain liaisons to national programs (e.g., AASHTO RAC, TCCC, TRB, NCHRP, SHRP, Long-Term Pavement Performance)** – This insures that Vermont interests are represented in these institutions, and also maintains professional connections and networking for staff.
- **Formalize a process for prioritizing participation in pooled funds** – These funds are administratively simple when using Federal funds, as FHWA can transfer money between states easily. They also are theoretically cost-efficient, as VTrans can share the burden of research that has shared benefits.
- **Work with universities to leverage VTrans funds** – Universities (in particular, UVM in Vermont) have access to funding sources that VTrans does not (e.g., Federal and corporate grants and the University Transportation Centers program). VTrans can at the least make itself aware of these sources and discuss them with UVM, and possibly could assist with pursuing funding.
- **Resolve the future of NETC** – NETC has started a process to evaluate its future and is not accepting new research proposals in FFY 2016. Panelists suggested that if NETC continues to exist, the chairship be awarded to the state with the most flexible State contracting rules, allowing it to serve as a clearinghouse to distribute funds to universities and other institutions throughout the region.

2.3.4 *Implementing Research Results*

Recommendations for implementing research results included:

- **Require a champion for each project among agency staff** – This is already a strength for VTrans, but must be expanded. Champions should be topical subject matter experts and direct beneficiaries of the research. Ideally, they should be engaged in all phases of the project through contact with the Principal Investigator and with the Research Program; a recognition and rewards system for Champions may increase both participation and engagement levels.
- **Require a formal implementation plan for complex and/or expensive projects** – VTrans should avoid open-ended or long-term research that does not produce “imminently implementable” results within a reasonable timeframe. Panelists indicated that projects exceeding two years are rarely desirable.
- **Use the Executive Research Review Board to evaluate implementation potential** – The XRB can help select research projects and conduct a general evaluation of whether results can be put into practice in whole or in part. Doing so at the highest level provides an opportunity to change agency policy and “give permission” for engineers to change their practices. It should be noted that not all successful results require implementation – a “negative” result that finds a proposed practice undesirable can still save money for the agency.
- **Conduct a second project selection process for implementation projects** – This process would split ideas to implement completed research results from the general pool and consider them separately at a different point in the year. This would focus the XRB’s attention on implementation and ensure that the most innovative implementation concepts are acted upon, not just those from the research team.
- **Measure benefits in meaningful terms** – These include ROI, lives saved, customer satisfaction survey results, etc.
- **Conduct an implementation review after an appropriate period to gauge success** – These results can be feedback for the XRB as it prioritizes and selects work.
- **Ensure that results are shared nationwide** – This both raises the profile of the Program and eases the burden of literature reviews for other DOTs.
- **Engage communication experts** – These include VTrans’ in-house Public Outreach group. They can assist the Program with identifying an audience for publications and telling the story appropriately. They also are capable of “telling the story” through various media (e.g., fact sheets, video, social media, the VTrans Annual Report, Local Technical Assistance Program, listserv messages, an annual showcase). Once these channels are established, the Research Program can use them to solicit feedback.
- **Consider a research summit every one or two years** – This gathering would include researchers, DOT technical and executive staff, executives, and the research community. Principal investigators, VTrans staff, or students would have the opportunity to present findings and take questions. It could be conducted among the Tri-State partners or through NETC.

2.3.5 *Human and Technical Resources*

Recommendations for human and technical resources included:

- **Ensure that staffing capacity permits the Research Program to meet FHWA regulations** – Maintaining compliance with 23 CFR §420, 2 CFR §200, and 23 USC §505 was identified by panelists as the highest-priority action item for the Program. Failure to do so could result in loss of all SP&R funds;
- **Establish an Executive Research Review Board XRB** – The XRB would prioritize and select research and implementation projects while generally supporting and promoting agency research. The group would include high-level management, supported by technical experts;

- **Establish ad hoc technical committees** – The Champion would be encouraged to convene an ad hoc technical panel to provide insight at key moments in the project process;
- **Revise the job description for “Program Manager”** – Panelists enumerated the following key functions for the position:
 - Shepherd the selection process (solicitation, convening the XRB, etc.);
 - Oversee contracts and administrate projects, and conduct risk management on an ongoing basis;
 - Perform quality assurance and editing on reports;
 - Coordinate implementation activities, e.g., communication with management and users, identification of champions, and personal follow-up with stakeholders;
 - Serve as a repository of institutional knowledge;
 - Liaise with multistate and national programs (e.g., through TRB committees and project panels, the American Association of State Highway and Transportation Officials (AASHTO) standing committees and its Research Advisory Committee (RAC), peer exchanges, SHRP 2, LTPP, NETC, and pooled fund studies). Benefits include identifying existing research relevant to VTrans, helping shape the national research agenda, and identifying other States with similar interests to participate in pooled-fund studies; and
 - Ensure that the Transportation Research Information Database (TRID) and Research in Progress (RiP) are updated so that research needs and study outcomes are shared with other States.
- **Establish job descriptions for additional staff** – Panelists suggested the following key functions:
 - Perform literature reviews;
 - Perform in-house and quick response research;
 - Manage the agency’s library; and
 - Communicate with stakeholders and staff.
- **Use UVM for the above where appropriate and desired** – Some functions (e.g., research librarians) may be effectively and efficiently obtained through UVM.

3.0 Key Takeaways

3.1 Minnesota: Mark Gieseke

Minnesota has a larger research program than Vermont and several of the exchange participants, and so we have staff and resources that put us in a better situation to handle some of the issues facing Vermont. In spite of that though, I found a lot of commonality and picked up some practices that I think can improve the function of Minnesota's program and be incorporated into our strategic planning effort that is currently underway.

Action items for VTrans:

- Staff size is clearly a challenge. Barring an influx of resources, VTrans should continue to utilize expertise in their technical areas to work on behalf of research efforts in their respective areas. Even in Minnesota with a much larger dedicated research staff, we rely on experts in the technical offices and districts to play a lead role in research projects.
- VTrans could integrate its research project selection process into the agency with a management-level research program advisory committee.

Opportunities to follow-up/collaborate with other panelists:

- I had requests to share information on MnDOT's Ideascale web site for collecting and prioritizing research project suggestions and MnDOT's research implementation program for selecting and funding research implementation projects.
- I plan to investigate the idea used in other states of a management level research implementation board that would direct successful research to be implemented into the organization. Presently MnDOT uses a management level board only for project selection.
- A stronger literature review process might help to reduce duplication in research activities and increase efficiency. Trained literature reviewers (librarians) have a higher chance of success.
- VTrans has research partnerships with other state agencies, such as natural resources and economic development. Those would be valuable partnerships to create for us in Minnesota.

Suggestions and opportunities for other states' programs:

- There seems to be opportunity to make research more efficient by implementing a stronger literature search effort prior to project selection. There may be opportunity on a national level to create better collaboration sites that track completed and ongoing research so that individual states may find out where similar research is being conducted. In lieu of a traditional pooled fund approach, a state may find that augmenting another state's research project may also be an efficient alternative to solo research.

3.2 New Hampshire: Beth Klemann

NHDOT, like VTrans, has a small research program. We have two full-time employees in a unit within the Bureau of Materials and Research. Our annual SPR2 appropriation is just over \$500,000. Our project solicitation processes are similar in that we gather ideas on a regular cycle and then create a ranking to determine which projects to fund.

The discussions at this peer exchange yielded several ideas that NHDOT will strongly consider adopting:

- Draft a Research Strategic Plan consistent with that of NHDOT to guide project selection and function (VTrans);

- Implement an Executive Review Board (SDDOT) to not only guide project selection, but also support and institutionalize project recommendations (and implementations);
- Consider adding pooled fund participation to the project selection process; and
- Use more active marketing techniques (VTrans) to get the word out (i.e., presentations at bureau meetings). Use more real world examples.

Project summaries and conclusions should include more concrete assessments of project potential impacts: save lives, reduce spending, and increase public satisfaction.

3.3 New Jersey: Camille Crichton-Summers

The NJDOT Research Office is staffed with nine persons out of approximately 3,200 DOT employees and receives an annual appropriation of about \$4.8 million, supplemented with state funds. This allotment allows the unit to initiate 20 new research activities or studies on an annual basis. Our multimodal program is customer-focused, serving NJDOT, NJ Motor Vehicle Commission, and NJ Transit.

Access to numerous in-state and University Transportation Center consortium university partners, as well as to a consultant provides customer-driven transportation research and library services to the State. Research needs are solicited, categorized, ranked, awarded, monitored, implemented and shared broadly. The unit also serves as a means for knowledge and technology transfer and provides coordination among NJDOT and national research entities such as the national academies, TRB, NCHRP, FHWA, Turner-Fairbanks Highway Research Center, and the pooled fund program, as well as with the AASHTO RAC.

Key Takeaways:

- The importance of managing messaging and marketing for the research program, including quantification of ROI. Utilize the expertise in the Communications Office to help brand or share research findings or products. Time-lapsed progression to share research progress is one option.
- VTrans is willing to take risks and has realized some innovative products as a result. Leadership is supportive of this.
- NHDOT uses geographic information systems (GIS) to map research projects.
- As mentioned by SDDOT, consider how to use research oversight committee for the strategic selection of pooled fund studies NJ participates in. Customers may not be getting as much out of these studies and may want more flexibility.
- Consider MnDOT's two solicitation cycles: one for research needs and the second for implementation.

3.4 New Mexico: Randall Soderquist

The Vermont Department of Transportation (VDOT) Research Program currently confronts a set of problems remarkably similar to the New Mexico Department of Transportation (NMDOT) Research and International Programs Division, including:

- Establishing relationships with universities that ensure the quick delivery of projects critical to NMDOT;
- Identifying relationships with other states through pooled funding arrangements to obtain relevant research results; developing organizational frameworks for project solicitation and selection;
- Determining definitions for project implementation and mechanisms to ensure project implementation; and

- Creating viable tools to disseminate research results to NMDOT executive management, staff and other customers.

It is apparent from the discussions at the Peer Exchange that other states confront many, if not all, of these same issues with no identifiable common theme used for their resolution. At present, there are no obvious best practices that can be immediately transferred to other research programs given differences in state institutional structures. However, the Peer Exchange was exceedingly informative in that it provided insight into context-specific approaches used by other states.

Possible Actions:

The following actions could be pursued by NMDOT as we attempt to improve outcomes in our program:

- Work with universities so they have a better understanding of what we need and we understand what they can do, with a focus on implementable results;
- Cooperate with states through pool-funding arrangements on critical transportation problems to more effectively leverage resources and ensure relevance of projects;
- Integrate Executive Management early in the project selection process much earlier to ensure they understand the relevance of the projects to existing and future transportation problems;
- Develop definitions for implementation, develop an implementation tracking system, establish clear cost/benefit and return on investment guidelines, and do annual implementation reports to clearly indicate Research Bureau outcomes; and
- Create final research documents that have a "punch line" – that is, that describe in a clear and concise manner why specific research results matter to executive management and key operational staff.

Suggestions for VTrans:

The most critical issue for VTrans the lack of staff to accomplish tasks considered essential to the FHWA and VTrans. Emphasis should be placed on creating positions within VTrans that allow the program to attain the goals outlined in the VDOT strategic plan.

3.5 North Carolina: Neil Mastin

The VTrans Peer Exchange has provided a valuable forum for discussion on the practices of the participating states' research programs. The varying level of transportation research experience in the room (from less than one year to more than 30) led to an excellent question and answer format and significant openness on how programs are run across the country. I feel that the NCDOT Research Program is strong in several areas, including project selection and vetting and in the general program management structure. However, it's been interesting to listen to discussion on increasing executive engagement and on implementation practices. If I were to pick a single area of improvement for our program, it would be increased implementation tracking and more extensive engagement with champions/business owners in the post-project period.

Ideas from several states warrant special follow-up. Those include:

- **South Dakota** – Implementation committee evaluating whether a research result can be put into practice as a whole or in part or if it is determined to not be practical. This buys greater group participation and makes sure that the potential stakeholders are aware of the research products.
- **New Jersey** – Excellent model for hosting a research summit on an annual basis. This brings together researchers, DOT technical and executive leadership and the research community. Also provides Professional Development Hours for participants. Funding via SPR can be justified due to the explicit technology transfer purpose.

- **Minnesota** – Use of an entirely separate solicitation for implementation and technology transfer projects. This could include research conducted by Minnesota DOT or from outside.
- **VTrans** – Experimental Features program that also is solicited separately from the regular research solicitation and could be used for tech demos (which we don't do a lot of right now).

As a group, discussion on ways to better communicate the value of research proved enlightening. Elevator speeches, quick bullets and pictures and short videos are all great ways to reach to political and executive leaders.

3.6 South Dakota: Dave Huft

The VTrans Research Peer Exchange was a valuable opportunity to consider the role of the research program in a DOT, in part because of the unique need for VTrans to redefine its research program and in part because of challenges common to all states. South Dakota DOT also is a small department, with just under 1,000 employees statewide. SDDOT's Office of Research, which is staffed by eight people, recently participated in another peer exchange with Idaho, Nevada, and Wyoming focusing on many of the same issues, including research quality, communication of research results, and implementation of research results.

Coincidentally, the Office of Research was recently moved from one of SDDOT's operating divisions to a position under the Cabinet Secretary of Transportation, to emphasize a Department-wide research role. In light of these circumstances, many of the questions addressed in the VTrans Research Peer exchange directly related to current, important topics at SDDOT.

Based on the outcome of the VTrans Research Peer Exchange, SDDOT will pursue the following actions:

- Strengthen procedures for tracking implementation progress;
- More systematically select pooled fund study participation, moving away from current practice which considers participation study by study;
- Strengthen marketing of research progress and results by designing a better research summary template, regularly submitting articles to SDDOT's monthly newsletter, and making presentations to key SDDOT meetings;
- Update and enhance "Guidelines for Performing Research for the SD Department of Transportation," which defines procedures and requirements managing and performing research for SDDOT; and
- In collaboration with the SD Board of Regents and the administrations of individual South Dakota state universities, establish procedures for creating and administering data management plans for all SDDOT research projects.

4.0 Conclusions

All participants found significant value in the 2016 VTrans Research Peer Exchange, as illustrated by the individual key takeaways and the comprehensive, detailed, and significant recommendations for VTrans. The agency will consider these closely and attempt to satisfy them in the Strategic Plan.

As a restatement: Panelists established formulated key action items for the VTrans Research Program. As presented to the Secretary of Transportation and other executives on February 11th, 2016, they are:

1. Ensure that VTrans has enough research staff to comply with Federal code and regulations applying to research programs, including 23 CFR §420, 2 CFR §200, and 23 USC §505;
2. Document meaningful results, including return on investment for an active marketing and technology transfer effort;
3. Establish an Executive Research Review Board;
4. Apply a collaborative selection process to all ideas, including those prepared in-house, at UVM, and by other external stakeholders; and
5. Actively seek partners with dollars (to leverage resources) as well as the expertise to meet VTrans needs.

These action items will form the core of the Research Program's strategic approach moving forward.

Appendix A. Peer Exchange Agenda

A.1 Day 1: Wednesday, February 10th, 2016

Agenda Item	Timing	Location
Rides to VTrans	Leave 8:30 AM	Capitol Plaza Lobby
Welcome and Introductions	9:00 – 9:40 AM	VTrans, 1 National Life Drive, Rm. 313
Background Information	9:40 – 10:00 AM	Rm. 313
Strategic Plan Contents	10:00 – 10:15 AM	Rm. 313
Break	10:15 – 10:30 AM	
Topic #1: Managing the Program	10:30 – 11:15 AM	Rm. 313
Topic #2: Identifying Research Activities	11:15 AM – 12:00 PM	Rm. 313
Lunch and Lab Visit	12:00 – 2:30 PM	Materials Lab
Topic #3: Human & Technical Resources	2:45 – 3:30 PM	Rm. 313
Topic #4: Implementing Research Results	3:30 – 4:15 PM	Rm. 313
First Day Conclusions	4:15 – 4:45 PM	Rm. 313
Rides back to Capitol Plaza		
Dinner	6:00 PM	VTrans will arrange a restaurant...
1-page Summaries and Report Outline		Capitol Plaza

A.2 Day 2: Thursday, February 11th, 2016

Agenda Item	Timing	Location
Rides to VTrans	Leave 8:30 AM	Capitol Plaza Lobby
Summary of Day 1	9:00 – 9:30 AM	VTrans, 1 National Life Drive, Dewey 134
PX Report Outline	9:30 – 11:30 AM (w/15 min break)	Dewey 134
Lunch	11:30 AM – 12:30 PM	NL Cafeteria
PX Report Writing	12:30 – 3:30 PM	Dewey 134
Closeout Meeting with Exec. Staff	3:30 – 4:00 PM	Dewey 134
Rides back to Capitol Plaza	After conclusion	

Appendix B. Introductory Slide Presentation



Introductions and Background

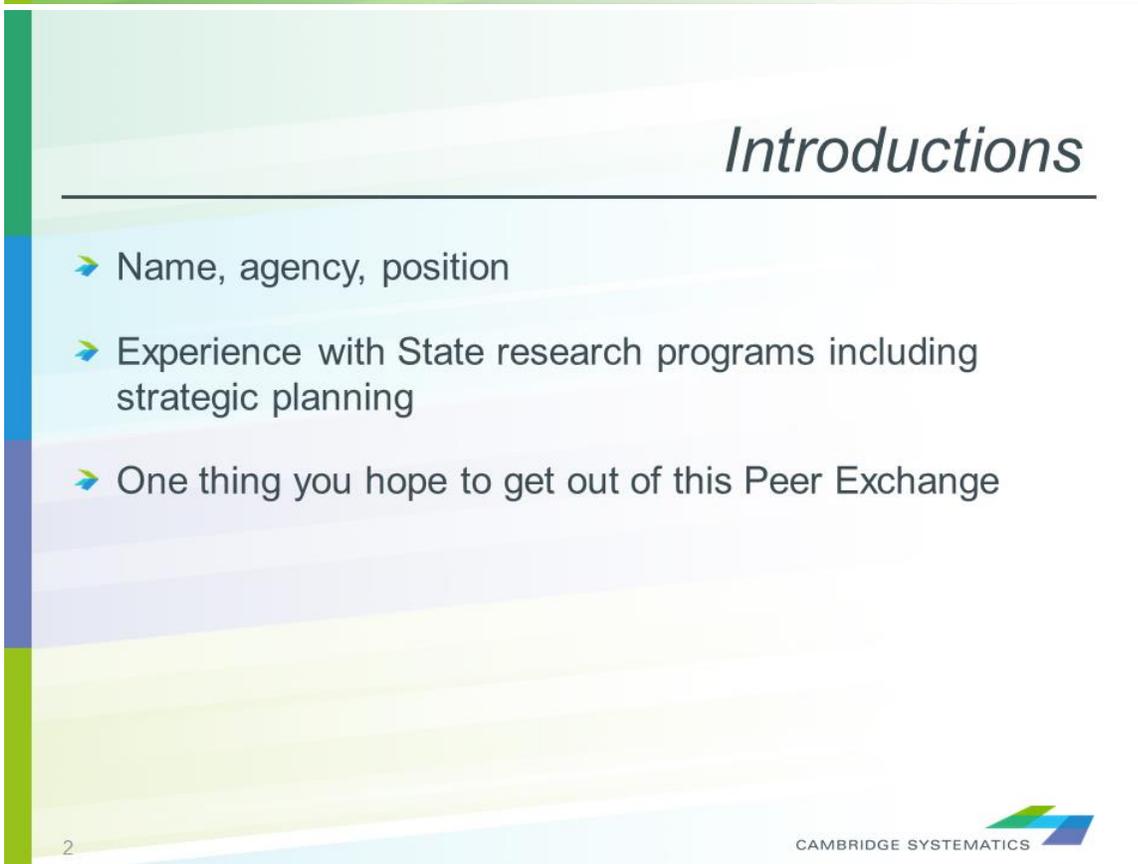
presented to
2016 VTrans Research Peer Exchange

presented by
Chris Porter and Joe Zissman

February 10, 2016

CAMBRIDGE SYSTEMATICS

Think  Forward



Introductions

- Name, agency, position
- Experience with State research programs including strategic planning
- One thing you hope to get out of this Peer Exchange

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CAMBRIDGE SYSTEMATICS

Overview

- Peer Exchange Concept and Outcomes
- Findings from the 2010 Tri-State Research Peer Exchange
- Current Program Status and Key Objectives for the Strategic Plan
- Peer Exchange Discussion Topic Areas
- Agenda

3



Intended Outcomes

- A Peer Exchange Report evaluating VTrans' Research Program and suggesting opportunities for improvement
- Report should also include takeaways for participants to apply in their own programs
- Report findings will serve as a basis for a new VTrans Research Strategic Plan

4



Definitions

- **Research** = Investigation or experimentation aimed at the discovery of new theories or laws and the discovery and interpretation of facts or revision of accepted theories or laws in the light of new facts. (49CFR171)

- **Research Program Review and Strategic Plan** = A document that defines:
 - » A clear vision and mission for the research program
 - » Program governance
 - » Collection and selection of proposals
 - » Project management protocol
 - » Implementation and performance measurement

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CAMBRIDGE SYSTEMATICS 



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2010 Focus Area 1

Identifying High-Value Problem Statements

- Take advantage of NETC partnerships
- Demonstrate everyday benefits of research to staff
- Align goals with agency
- Participate in NCHRP, TRB
- Run and communicate fair and open solicitation
- Engage legislative liaisons
- Keep program current to Federal requirements
- Engage universities to *compliment internal voices*



2010 Focus Area 2

Ensuring Quality Research and Deliverables

- Outline reporting requirements (e.g., formatting and sub-deliverables) clearly in contracts
- Save PDF deliverables in OCR format and use the *Transportation Research Thesaurus*
- Tie payments to tasks, deliverables, or milestones
- Read TRB's one-page guide for CRP authors



2010 Focus Area 3 Implementing Research Results

- Engage appropriate staff from the beginning
- Engage executives
- Implementation ideas on problem statements
- Seek feedback from stakeholders
- Utilize posters, listservs, and newsletters
- “Punch Line” at the top
- Systemically track implementation success
- Offer seed money for implementation

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Research Strategic Plan Objectives

Address Staffing and
Resource Deployment

Place The Program in
Context

Describe Relationship with
Partners

Focus on Customers and
Customer Service

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Staffing and Resource Deployment

- Research Program will experience complete turnover
 - » Retirement of director
 - » Expected to hire one new technical staff member
 - » Not all functions will be replaced (NETC leadership)
- Implications: **VTrans must draw from small operations**
 - » Heavy reliance on research partners
 - » Possible reliance on intra-agency contributors
- **2016 RSP will present and assess approaches to maximizing the output of a limited staff**

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The Program in Context

- Three-level universe for public-sector research
 - » Internal VTrans research: Applied, goal oriented, responsive to requests from staff (\$20-\$100K)
 - » Research conducted with UVM – V-TRC (\$50k-\$150k)
 - » NETC research: Serves needs of six states, so limited subject matter (\$105K)
 - » NCHRP and TRB research: National interest projects that may or may not touch VTrans (\$300K)
- **2016 RSP will place the Research Program in this context, enhanced using other State plans**
 - » Possibility of public impacts

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Relationship with Partners

- Transportation Research Center at UVM
 - » Administrates ½ of Research Program Budget (\$300K)
 - » Partnership reorganized into V-TRC in 2015
 - » All research must be academically-palatable
- Implications: **VTrans must draw from other DOTs that associate closely with universities**
 - » Achieving buy-in from agency engineering staff (sponsors)
 - » Maintaining sponsor interest to completion
- **2016 RSP will present alternative approaches to V-TRC relationship with the Research Program**

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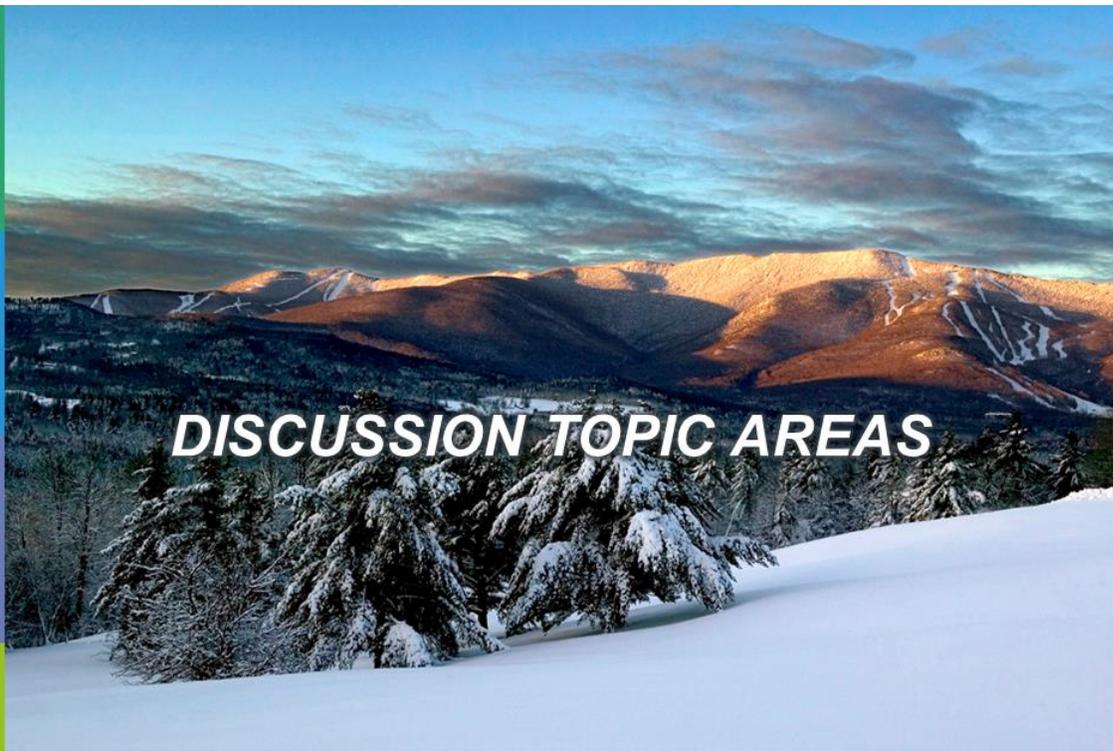

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Customers and Customer Service

- Customers are primarily internal
 - » Engineers, Planners and Policy Makers looking to solve a practical problem
 - » Agency of Natural Resources (ANR)
 - » UVM – Transportation Research Center
 - » FHWA
- No performance metrics currently employed
- **2016 RSP will identify the Research Program's customers and advance strategies for how to maximize customer service**

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CAMBRIDGE SYSTEMATICS 

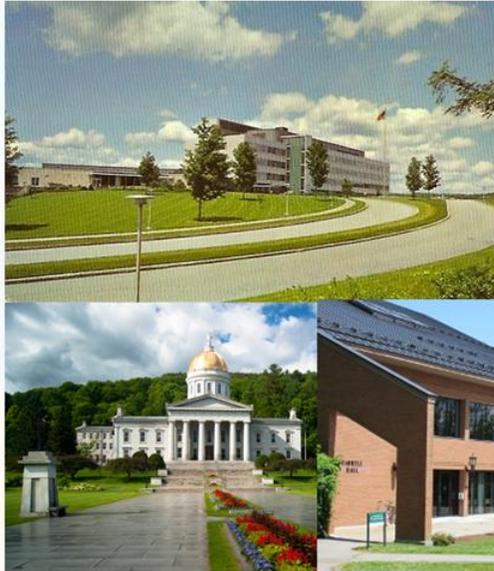


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2016 Topic Area 1 Managing the Program

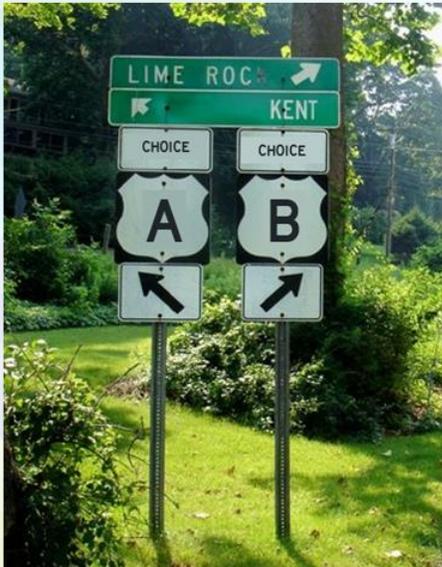
- Who are the customers?
- Structure (i.e., agency, university, and consultant roles)
- Oversight and quality control
- Fiscal issues and funding



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2016 Topic Area 2 Identifying Research Activities



- Process for identifying and prioritizing needs
- Defining and scoping activities
- Scale of activities
- Determining roles and responsibilities for activities

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2016 Topic Area 3 Human and Technical Resources

- Human resources and staffing
- Information and data management
- Facilities and technology



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2016 Topic Area 4 Implementing Research Results

Vermont Rivers & Roads Field Manual



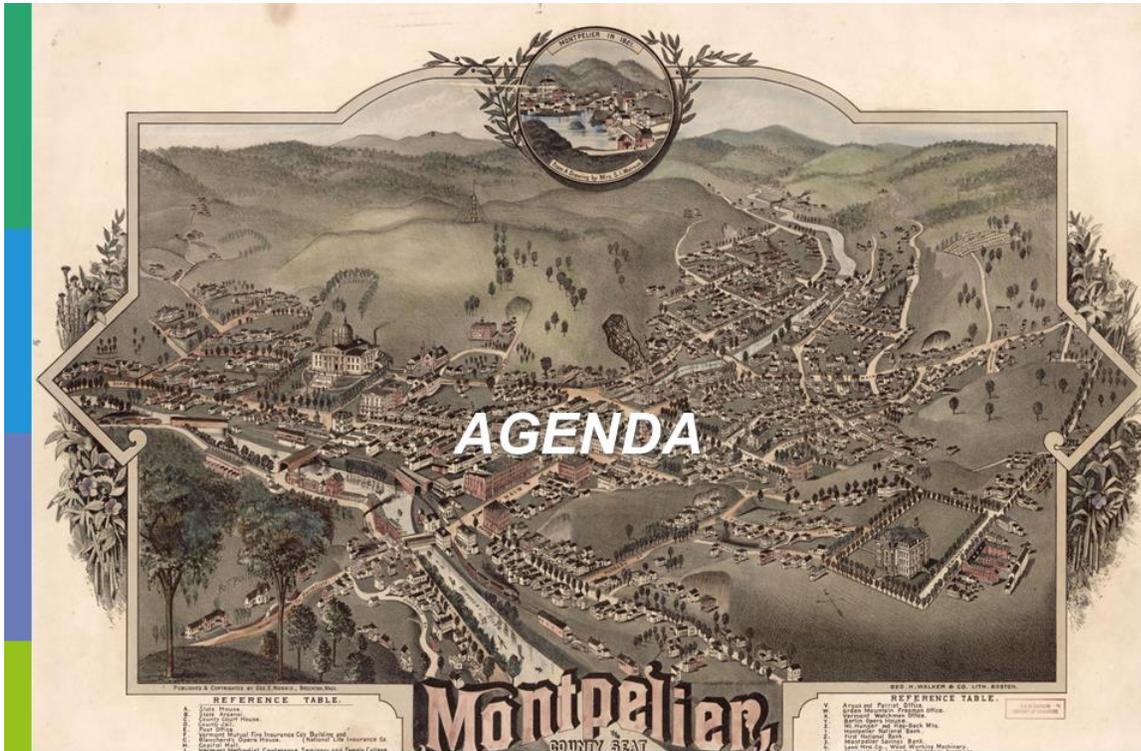
Prepared by the Vermont Department of Environmental Conservation in cooperation with the Vermont Agency of Transportation



- Products and services
- Marketing and communication
- Training and tech transfer
- Performance measurement

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CAMBRIDGE SYSTEMATICS 



Wednesday, February 10

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Closeout Meeting with Exec. Staff	3:30 – 4:00 PM	Dewey 134
Rides back to Capitol Plaza	After conclusion	



Appendix C. Final Presentation to Secretary, Executives

Our mission is to deliver high value research serving the needs of our customers...

...from quick response to in-depth

...from theoretical to applied

..to meet the vision and mission of our agency

Dilemma Zones

Glass Beads

Successes!

Fuel Shrinkage

**WE
ARE**

**WE
DID**



Ensure that we have enough staff to comply with:

23CFR420

2CFR200

23USC505



Document meaningful results, including ROI



Establish an Executive Research Review Board



Apply a collaborative selection process to all ideas

- In-house, UVM, and pooled funds



Actively seek partners with dollars and expertise

WE
WILL

Program manager/staff essential functions:

- ▶ Shepherd selection process (solicitation, convene RAC, etc.)
- ▶ Oversee contracts & projects (technical & administrative); risk management
- ▶ Quality assurance & editing
- ▶ Coordinate implementation activities: communication w/management, users; champion identification; implementation follow-up
- ▶ Repository for organizational knowledge
- ▶ Liase to multi-state and national programs
 - ▶ TRB, AASHTO, etc. committees, project panels, peer exchanges, SHRP2, LTPP, RAC, TRID/RiP updates, pooled fund coordination
- ▶ Literature reviews
- ▶ Library management
- ▶ Communication
- ▶ In-house research projects

**WE
NEED**

**Staffing is our most
critical need!**

What's next...?