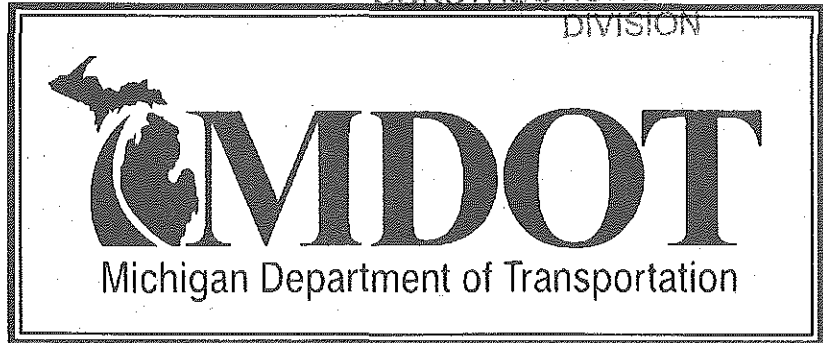


***MARKETING AND IMPLEMENTATION  
OF RESEARCH RESULTS  
(MIRR)***

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MARKETING AND IMPLEMENTATION  
OF  
RESEARCH RESULTS (MIRR)

BEST PRACTICES REVIEW

FINAL REPORT

*PREPARED BY*  
MICHIGAN DEPARTMENT OF TRANSPORTATION  
MISSOURI DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION - MICHIGAN

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## ACKNOWLEDGMENTS

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Dr. Sudhakar R. Kulkarni  
University Research Administrator  
Michigan Department of Transportation  
October 17, 2001

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## EXECUTIVE SUMMARY

During the month of August 2001, under the auspices of the Federal Highway Administration, research managers from the Michigan Department of Transportation (MDOT), Missouri Department of Transportation (MoDOT) and Michigan Technological University (MTU) visited the transportation departments of the states of Virginia, North Carolina, Connecticut, Louisiana and Arkansas. The main objectives of this study tour were to see how these states are marketing and implementing research results, and at the end of the study tour prepare a report listing of the best practices.

The successful research program seems to have marketing and implementation practices as a part of the business process. This integration has helped the programs to best utilize the available funding, and human resources.

The research program needs to focus on the customers needs. Use of electronic tools (web site, e-mail) for communication has helped to a great extent. Active participation in the regional and national research efforts through pooled fund studies has helped the agencies to stretch available dollars to meet the local needs. The call for projects can be prioritized by local, regional and national need criteria. Timeliness and cost effectiveness must be a part of the business process. Last but not the least *do not re-invent the wheel*. Use available research results through literature research, and networking with Transportation Research Board (TRB) and National Co-operative Research Program (NCHRP), is essential for an excellent research program. The civil and environmental engineering department of the universities in the states are working as partners/contractors to provide research expertise. Organizational set up, and working relationship between the universities and the transportation departments have several variations.

## 1. INTRODUCTION

Marketing and Implementation of Research Results (MIRR) is an important function MIRR function should be aligned with the Transportation Department's strategic goals to receive the maximum benefit of this activity. Not every research project can produce the results that can be implemented, but the results can be added to the knowledge database.

In order to learn more on this issue and how other Departments of Transportation perform this function, We formulated a team under the auspices of the Federal Highways (FHWA). The Michigan Department of Transportation (MDOT), and Missouri Department of Transportation (MoDOT) along with FHWA offices in these states took part in deciding strategy how to go about this effort. We requested the Michigan Technological University's (MTU) participation from the very beginning as MTU is one of the universities that provides support in the areas of material and structural research. MTU also has the Local Technology Transfer (LTAP) center.

The process of fact finding and summarizing the key business practices in MIRR is as follows:

1. Selection of other DOTs to collect information of MIRR
2. Develop a set of questionnaire that can be sent to collect information.
3. Visit to few lead states DOT with strong and well known research programs
4. Summarize the findings with focus on best practices of MIRR
5. Make recommendations to the management to adopt a few of the best practices of MIRR, as resources permit.
6. Distribute the report to the ten DOTs which are members of the region three of Research Advisory Committee (RAC III). The questionnaire was sent to all the RAC III member states.

### 1.1 **TEAM MEMBERS:** The following members took an active role in the above process:

Dr. Sudhakar R. Kulakrni, University Research Administrator, MDOT,  
Lansing, MI

Dr. George Dewey, Associate Professor, Dept of Civil Engineering, MTU,  
Houghton, MI

Mr. Fred Orloski, Engineer of Planning and Technology Transfer, FHWA,  
Lansing, MI

Mr. Ray Purvis, State RDT Engineer, MoDOT, Jefferson City, MO

Mr. Mike Shea, Director, Technology Transfer, MoDOT, Jefferson City, MO

Mr. Glenn Fulkerson, Bridge Engineer, FHWA, Jefferson City, MO

## 1.2 **FORMULATING QUESTIONNAIRE**

After some discussion with the team members, it was decided to follow the seven keys of robust research to formulate the questionnaire. The seven keys are as follows:

- Key1: Found it on Trust
- Key2: Market Boldly
- Key 3:Root it in Economics
- Key 4: Make Deals Unabashedly
- Key 5: Insist on Accountability
- Key 6: Embrace policy research
- Key 7: Empower your staff

For the complete set of questionnaire Section 4.2, page 5.

## 1.3 **COLLECTING INFORMATION**

The strategy to collect information included not only the mailing the questionnaire, but also visits to few DOTs to talk to the research teams. All the team members decided to visit the Virginia Transportation Research Center, in Charlottesville, VA as this is one of best research facilities, located on the campus of the University of Virginia. This visit helped the team to fine tune the questions, and set new goals for this effort.

The team had selected state DOTs of Arkansas, Louisiana, North Carolina and Connecticut for the visits. Due to travel involved, we decided to make two teams to cover these states. The Missouri team went Arkansas, and Louisiana, and the Michigan team went to North Carolina and Connecticut.

The initial visit to Virginia and other DOTs was completed during August 2001. At the same time, we had mailed the questionnaire to RAC III member DOTs. These DOTs are from the states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Wisconsin.

This report briefly summarizes the above outlined synthesis type report on MIRR practices.

## 2. GOALS AND OBJECTIVES

The primary goal of this study is to find out how other states implement the research findings and what are the major benefits of such efforts, based on the past experience. And how these findings can be adopted to benefit other DOTs.

The objectives of the study included a review of the questionnaire sent to the departments of transportation and analysis of the information collected by the two team during the state visits.

The final product of this study should be a review of the best practices for MIRR, and a list of key business practices that will enable us to improve research program.

## 3. NEED

The traveling public is demanding improved safety and mobility. The transportation infrastructure which is important to economic development and growth, is aging and needs repairs, rehabilitation and in some cases replacements. Durability of materials and fixes needs to be improved. These conditions have placed transportation research in the fore front to solve these problems.

Many of the agencies are going through down sizing, and reorganizing. The agencies are faced with increased work load and demand from the public for quicker response to address the needs. Privatization of work is helping to meet these challenges. The universities are playing a key role in the area of research to help DOTs to carry on the research in transportation areas such as policy, planning, environment, design, construction, maintenance, materials, automation, etc.

Marketing and Implementation of research results is key to successful performance of the research program. It shows to the management that investment in this area has good return and benefits to the customers. Learning from the successful research programs can save time and money, this issue is the main focus of this report.

## 4. PROCEDURE

The procedure to conduct this MIRR activity is some what custom made. We are attempting to follow the process for synthesis type study and reporting. Considering the subject matter it is a good choice.

- 4.1 Team: The team members represented DOT, FHWA, and University back ground and many years of professional experience. Initial communication between the team members was facilitated by Fred Orloski of FHWA.



- 4.2 **Assembling Questionnaire:** The questionnaire was designed to collect more information than what is required only for MIRR activities. This complete set gave overall picture of research program and then focus on MIRR. There are forty four questions covering the seven keys for the robust research. A complete set of questionnaire is as follows:

**MIRR Review Team Questionnaire:**

**Key 1. Found it on Trust**

How do you know that you have your management's support for your research and development program?

How do you know that you have your management's support for marketing and implementation?

Does management use research findings as a business tool to achieve the goals of the department?

**Key 2. Market Boldly**

Do you have a written policy regarding implementation of research findings?

Is there dedicated staff and funding for the marketing and implementation functions?

If so, how many staff and what dollar amount is allocated per year?

Define the purpose and activities of your department's research marketing and implementation program.

Explain how you market your research and development program through various stages of the research and development process.

How is your marketing effort for new product development different than your marketing for research results?

How long has your department had an active marketing and implementation component to the RD&T program?

How has your marketing and implementation efforts evolved over time, i.e., changes in tracking methods, performance measures, reporting to management, etc.?

What forms of media are used to communicate your research to your customers? (i.e., U. S. mail, e-mail, department website, TRIS etc...)

Are you utilizing the website for Research Ready To Implement for your successful research and development projects?

**Key 3. Root it in Economics**

How are your research projects identified, prioritized and selected?

What is your department's annual budget for research, development and technology?

What percentage of your budget is earmarked for marketing and development?

How do you account for life-cycle costs, benefit/cost ratio or value-added for your research or development projects?

Who does the life-cycle costs, benefit/cost ratio or value-added analysis of your research or development projects?

How are the life-cycle costs, benefit/cost ratio or value-added amounts verified within the implementation efforts?

What percentage of your RD&T budget is typically spent in the area of Policy? Structures? Pavements, Pooled Funds Studies? Others?

What percentage of your marketing and implementation effort is typically spent in the area of Policy? Structures? Pavements, Pooled Funds Studies? Others?

#### **Key 4. Make Deals Unabashedly**

What groups in general have been the customers for research and development in your department? (i.e., DOT staff, FHWA, industry, academia, etc...)

Are these same groups your primary customer for implementation?

What percentage of your research projects is performed in-house?

How do you address the issue of "risk of failure?"

#### **Key 5. Insist on Accountability**

Does your department use project management software to schedule and/or track your research projects?

If yes, how does the system track research marketing and implementation?

What performance measures does your department use to track the success of your research program?

Is the implementation of all research (in-house, contract, pooled funds studies) performed and tracked in the same manner? If not, how does it differ?

How successful has your department been with respect to your established performance measures, reporting to management, etc?

What marketing and implementation strategies have been most effective for you?

What marketing and implementation strategies have not been effective for you?

#### **Key 6. Embrace Policy Research**

What policy research have you undertaken?

Have you been successful in implementing it?

Which areas are you more likely to successful in implementing research results? (Design, bridges, materials, construction, maintenance, traffic, policy, etc.)

#### **Key 7. Empower Your Staff**

How are you successful in providing training and education for your research and development staff?

How much staff do you have dedicated to implementation efforts?

Does your department employ a public affairs staff?

If so, how do they help you in marketing your research to your customer base?

Do you share research failures as well as research successes?

How are universities involved in the implementation process? (Training, field monitoring, etc.)

How do the universities assist in the technology transfer role following successful research projects?

What percentage of research results in no tangible benefit?

What percentage of research results in increase in knowledge bases only?

What percentage of research results in implementation changes completed?

- 4.3 **Visits to Selected State DOTs:** During our visit, we met with the Management of the DOT as well as the research program, and project managers. We also had an opportunity to see the research, and materials laboratories. Some states like Virginia has all the roads and bridges under the state's jurisdiction, where as in Michigan has only responsibility of the State trunk line system, and cities and counties have responsibility for the local transportation network (bridges and highways). The answers to some to the questions may depend upon this administrative responsibility, for example areas such as budget and T<sup>2</sup> efforts.
- 4.4 **Collect and Analyze Information:** We have collected significant amount of information and our attempt here is to give an executive summary of the information collected. Adopting few of the best practices of MIRR can make significant improvements. The answers to questions are presented in a format, that combines the responses from each state for the same question. This will give the reader an overview of answers to the same question.
- 4.5 **Extract Best Practices:** We have listed the best practices that we observed from the discussions with the research managers. Even though there are some common threads in managing the research program, there are some unique practices that were observed. There seems to be a common agreement on the importance of implementation of research results. The following are some of the common themes, as we observed:
- Communication is a key to a successful research program. Research showcase, one page Research briefs, and Web sites can be effectively used.
  - Keep the customer focus by considering the customer needs, involvement in the project selection and implementation process. Resulting process/product need to be better, faster and cheaper, and must be provided to meet the customers deadlines.
  - In the Call for Research project process, involvement of customers( users of the product) and stakeholders( all those who are impacted by product implementation) is essential.
  - Provide technical assistance, and use T2 centers to promote results.
  - Participation in the regional, national Pooled fund studies. Active participation in the activities of TRB and NCHRP.
  - Implementation process is a phase of the project. Use of advisory committees, DOT and Industry experts helps this process.

- Key phrases to guide the process: Create value for customers through research. We bring Innovation to transportation. No shelfware( a research report on the library shelf that no one uses). Find a niche nobody likes to do and do it good.

## 5. Analysis of Information

- 5.1 **Key Role of Research:** It seems that all the DOTs have research as a key component of their strategic goals. The research has helped the departments to make significant improvements in the areas of planning, environment, traffic and safety, and highway infrastructure maintenance and rehabilitation. The research activities span both administrative and operational areas of DOT.
- 5.2 **Funding:** The DOT's source of funding for research is a SPR funding category. Depending on the program and need for a high impact project, other source of funding is made available. Use of Pooled fund, and use of results from national/regional research project can extend available money for the state specific projects.
- 5.3 **University Participation:** The civil and environmental engineering departments of the universities located in the state are playing a key role in conducting research. This partnership between the universities and DOTs has a few variations in the organizational setup. One of the most successful program seems to be where the DOT has core expertise in conducting its own research, as well as, manages the research projects contracted to the universities.
- 5.4 **Reporting:** The research administrator either reports to the Planning or to the Chief Engineer of Operations. In one case the research administrator reported to the Director of the department. It seems that reporting (chain of command) does impact the main focus of research.
- 5.5 **Staffing:** Staffing for research activities seems be a difficult. Career advances in the research area are limited as compared to other areas of the DOT organization. Most of the DOTs have developed partnerships with the universities within the state to carry out the research. DOT research staff performs the project management activities, as well as, in-house research in the core competency areas.
- 5.6 **Emphasis on Implementation:** The successful implementation starts from the very beginning of the research program formulation. Involvement of the customers and stakeholders, timely completion of the project, technical help in implementation and final evaluation are the key steps in this process. All the DOTs are keenly aware of this phase of the research. The dedicated staff for this Technology Transfer (T<sup>2</sup>) function can add more to the timeliness and statewide application of the research results.

5.7 **Technology Transfer (T<sup>2</sup>)** : This is an important activity in research area. Human resources training, technical assistance and communications are required for a successful T2 activity.

## 6. **Best Practices of Marketing and Implementing Research Results**

Based on the information collected during tour of above mentioned DOT and consultations with the research administrators and staff, the following practices are the best ones we observed. Depending upon the state's needs, geographical location, past practices and organizational culture and its development , research administrator can select few of the following practices. These are as follows:

1. Implementation should be a phase of the research project.
2. Communicate research results to the customers quickly and effectively. Use of one page research summary, Showcase of research projects.
3. Use of electronic media ( e-mail, web site, etc) is a growing trend, and shows promising results.
4. Focus on national and regional high value research results.
5. Participate in the National/Regional Pooled fund studies.
6. Address customers needs in a timely fashion.
7. Implementation is a high priority and used as one measure of the success of the research program.
8. Make full use of TRIS and RIP.
9. Utilize and learn from Peer Exchange.
10. Make benefit/cost ratios or value added calculations a requirement of all research and implementation efforts.
11. Require (and enforce) quarterly reports of research and implementation projects.
12. Encourage publication of research in TRB, FHWA, and NCHRP publications.

## 7. **Conclusions**

This study tour has been an excellent learning process. MDOT and MoDOT research programs will benefit by adopting these best practices. Other DOTs can select a few of the Best Practices, depending upon their needs.

APPENDIX A

## Marketing and Implementation of Research Results (MIRR) Best Practices Review

### MIRR Review Team Questionnaire Combined Answers

The answers to the MIRR questionnaire are compiled in the following document. These questions were developed using seven keys for a robust research program.

### Key 1. Found it on Trust

#### 1.1 *How do you know that you have your management's support for your research and development program?*

**Arkansas** - Through years of work with management and through conversations with managers.

**Virginia** - Explicit support from top management, continuous stable funding over a 50-year life span, rich tradition of being an integral component of VDOT operations, R&D Director is a member of VDOT Executive Team. (Gary Allen sits on Executive Team). Team comprises of commissioner, Deputy Commissioner and VTRC director.

**Louisiana** - RPIC Process. – Upper Management  
Policy Committee  
Letter From Secretary backing the Research Effort  
RAC – Upper Level Management  
Strong Budget > 25% SPR Share  
\$4 million State Fund

**Missouri** - Transportation Research Committee (TRC) and Technical Advisory Groups (TAG's) include district and functional unit representation. These individuals report to the senior management of the districts and functional units. These members are also involved in the research management and implementation roles.

We have access to Senior Management because of a previous supervisory role over the Planning Unit which includes our Research, Development and Technology (RDT) unit.

**Ohio** - I meet occasionally with Executive Leadership to discuss our R&D program. So far I have received positive feedback, which is also evident by the increase in funding we received this year.

**North Carolina** - If management or your customers don't complain, then you will continue to have their support.

If customer demands are met, then there are no complaints.

It gets funding every year, so we assume management supports it.

"Find a niche nobody likes to do, and do good at it."

An evaluation survey was recently cancelled because management didn't see the need for it because they felt confident in the program already.

"We build trust through competence, genuine interest, and mutual care. "

"We visualize success and don't plan to fail."

**Nebraska** - In July 2000, NDOR's management reorganized and reassigned the research function to the Materials and Test Division and renamed the Division to Materials and Research.

**Indiana** - Continued involvement and funding, repeat customer asking for research, verbal affirmation, asking research personnel to attend strategic meetings, etc.

**Kansas** -

1. participate in person on research committees.
2. approve increased funding for traditional research programs.
3. support numerous additional (ad-hoc) research projects that arise on short notice with minimal "red tape" (all discussion and approvals by e-mail).
4. communicate directly with research director and research staff.
5. verbally support the benefits of research at public and KDOT meetings.
6. have delegated additional authority to research director for certain business functions.

**Michigan** - Research results are reviewed by the Engineering Operations Committee (EOC) and approved for its implementation. Research is one of the key component of decision making in continuous improvement process.

**Minnesota** - Management continues to provide funds to conduct and administer research. Management also shows interest in certain research findings.



1.2 ***How do you know that you have your management's support for marketing and implementation?***

**Arkansas** - The Implementation Task Force of the department makes our implementation decisions. This task force is made up of the Transportation Research Committee Chairman and the Assistant chief Engineers. When they decide it has the effect of the boss telling one to get it done. It think this shows management's support.

**Virginia** - Same as above.

**Louisiana** - Same as above.

**Missouri** - Same as above.

**Ohio** - We have discussed this and agree that it is an area that needs to be emphasized.

**North Carolina** - They support most research projects and don't complain about the results. The Research and Development Unit (directed by Moy Biswas) is under the Director of Planning & Programming, which is under the Chief of Planning & Environmental Quality who reports to the Deputy Secretary of Environmental Planning & Local Government Affairs who reports to the Chief Deputy Secretary of Transportation. Research at one time was under the State Highway Administrator.

**Nebraska** -NDOR management provides administrative and monetary support, e.g., the establishment of a Nebraska Transportation Initiative at the University of Nebraska-Lincoln (UNL) as an "umbrella" organization to coordinate and meet Nebraska's transportation needs.

**Indiana** - Participation, funding and assigning their staff personnel to be responsible for identifying research needs, serving on Study Advisory Committees and being responsible for implementation of research results. Implementation is a high priority for INDOT and is used as one measure of the success of the research program.

**Kansas** - Implementation is strongly encouraged by the Research Program Council that has Secretary of Transportation as Chair. Bureau Chiefs are authorized to implement findings deemed appropriate within existing budgets and to request additional funds as needed. Usually funds are found in existing budget year for implementation. If amount is too large, a white paper to request funds in the next budget cycle may be necessary.

**Michigan** - EOC support and Technology Transfer activities of the department. New research re-engineered process.

**Minnesota** - Management continue to emphasis implementation and ask for example of implementation. We have invested as much resources as needed to this activity. Only 10% of our research projects have implementation plans developed for them. We are, however, committed to increase our efforts.

1.3 *Does management use research findings as a business tool to achieve the goals of the department?*

**Arkansas** - Yes. This is effected by selecting department personnel concerned with the results for sub-committee oversight of each project.

**Virginia** - Absolutely, on numerous occasions (i.e., Cash Flow Model, Water Quality Survey, Governor Plan on Policy).

**Louisiana** - Executive Level RPIC is being developed for the 1<sup>st</sup> Time. -- Will Evaluate Policy Proposals.  
Overweight Vehicle Study.  
Outsourcing.  
Mowing Operation for Interstate

**Missouri** - Yes. On several occasions senior management has asked RDT to lead studies to support the current business plan, (i.e., Pavement Rehabilitation, Work Zone Impacts, Employee Suggestion System, etc.).

**Ohio** - Yes, this year all new projects were evaluated in terms of their responsiveness to the department's strategic initiatives. The goal is to ensure that project's are developed to support ODOT's top priorities.

**North Carolina** -Yes, indirectly which are not always visible to staff.

**Nebraska** -Not formally, but supports the activities involving "partnering" and "leveraging technology" which are some of NDOR Director's "Vision".

**Indiana** - Yes (supports INDOT's Strategic Plan, funding issues, pavement management, infrastructure performance, policy decisions, etc.)

**Kansas** - Yes in a broad sense. We have a management goal to implement all technology that will be beneficial to the overall agency mission. Research is one component of this effort. The measure is the BCR of the K-TRAN Program.

**Michigan** - Yes. For example: Superpave Implementation.

**Minnesota** - Yes, this year 100% of or funded projects address some office or department strategic or business goal.

## Key 2. Market Boldly

### 2.1 *Do you have a written policy regarding implementation of research findings?*

**Arkansas** - Yes. This is effected by selecting department personnel concerned with the results for subcommittee oversight of each project.

**Virginia** - Not specifically.

**Louisiana** - Research and Implementation Manual  
January 1999 Letter from Secretary of Transportation

**Missouri** - Yes. Chapter 6 *Implementation Process* of the MoDOT RDT Manual.

**Ohio** - We are in the process of developing one. We have received a number of responses from other states to an inquiry I placed on the AASHTO RAC listserv for information. The vast majority of respondents did not have a formal policy and many of the one's that do, have policies that are not very comprehensive.

**North Carolina** -The written practice consists of annual review of implementation.

**Nebraska** -Yes. It is described and outlined in the NDOR Research Management Manual.

**Indiana** - Yes

**Kansas** - Yes

**Michigan** - No, but as a part of business process implementation is emphasized.

**Minnesota** - We have performance goals related to implementation of our research projects. We also have established selection criteria for implementation funding.

**2.2** *Is there dedicated staff and funding for the marketing and implementation functions? If so, how many staff and what dollar amount is allocated per year?*

**Arkansas** - Yes. We have established a Research Information Specialist position. There is a full-time Research Information specialist position and they can draw upon the remainder of the research staff, as needed. The position has just recently been vacated. We are in the process of finding a replacement for the job. FY2002 budget has allocated \$45,000 for implementation activities. FY2001 budget had allocated \$65,000.

**Virginia** - Not specifically. We have a Technology Transfer (T2) Center with a general mission to market technology externally but scope includes VDOT as well as local cities and towns. T<sup>2</sup> Center consists of a little over 4 FTEs and about \$300,000 annual budget. (In general all of research staff spends time in implementing our research efforts).

**Louisiana** - T<sup>2</sup> & Implementation Engineer  
Strong T<sup>2</sup> staff Participation (17 FTE's)  
Videographer and Webmaster  
\$330,000 per year budget

**Missouri** - Yes. One person is currently charged with the marketing and implementation as part of the Technology Transfer role. Current budget is \$200,000 per year.

**Ohio** - We have \$15,000 budgeted for stand-alone implementation activities for FY02. We do not have staff dedicated solely to implementation or marketing. I am encouraging a team approach to marketing, i.e. everyone involved in the process should take the opportunity to promote the program. We encourage our researchers and technical liaisons to do presentations on our projects and to publish articles in technical journals, etc.

**North Carolina** -Use resources of NCDOT Public Affairs, NCDOT IT, and ITRE Publication Group.

\$100,000

A contingency item exists in the SPR work program. Also, there is leeway in the budgets for many research projects to support these activities.

**Nebraska** - No. However, implementation is included as a funded-task in each research project. NDOR technical monitors, research staff, and researchers market and implement research. (Average cost per project is \$2000.)

**Indiana** - There is dedicated staff (albeit some work on marketing and implementation along with other research related duties) and loaned staff. As all of our research professional staff can be involved in such there are 14 dedicated staff members. We spend approximately between \$250-\$500k per year on marketing and implementation activities.

**Kansas** - No full time staff are dedicated. Each PI/project monitor has the responsibility to assist with this effort.

**Michigan** - No. Marketing and implementation function is done by our research staff who are in contact with the Region and Transportation Service Centers - field engineering staff.

**Minnesota** - Yes, there are about 3.5 FTEs doing marketing and implementation (this includes 2.4 FTEs devoted to publication). In addition to this, \$150,000 per year are devoted to fund implementation efforts.

**2.3**      *Define the purpose and activities of your department's research marketing and implementation program.*

**Arkansas** - Our goal is to get project results into use within the department.

**Virginia** - No specific program as such. Most research project results are reported to research sponsors through standing research advisory committees, task forces, written reports, web services, and *Research Briefs*. VTRC staff assist/support implementation of research results through education, training, presentations and technical assistance. (Never missed any technical assistance request).

**Louisiana** - Department mission; To solve problems and meet the mission of LDOTD Research T<sup>2</sup>, Education and Training

**Missouri** - The purpose of our marketing and implementation is to apply research, best practices and new product results within the department. Planning for implementation needs to begin with the work plan.

**Ohio** - One of the reasons our implementation budget is so low is because all projects for the FY02 program have an implementation component built into the scope. The goals are two-fold 1) to ensure that the program office sponsoring the research has examined mechanisms for implementing potentially beneficial results and 2) to help speed up implementation by having the researcher do some of the preliminary work. For example, instead of ODOT developing a specification that incorporates new research findings on a certain material, this would be one of the deliverables for the project. We could then modify the spec, adopt it as-is, or choose not to adopt it at all.

**North Carolina** - Motto: "Create Value for Customers through Research"

Mission: "Promote, Manage, and Implement Research and Analysis"

Mind-set: "Be Driven by Customer Demand"

**Nebraska** - Purpose is to use results of research and share results with others. Activities include change design standards, incorporate into construction plans, and report activities on NDOR's web site.

**Indiana** - Loosely defined marketing includes the identification of research needs and promotion of the research program services and benefits derived to various entities. Implementation, as the name implies, is the successful implementation of good research findings. Assisting the department in translating research results into practice.

**Kansas** - The purpose is to implement all research findings that are cost effective. Our policy is that each formal university research project will have Research Implementation Plan written.

**Michigan** - To inform MDOT managers and engineers about potential advantages of using new products or research results.

**Minnesota** - Its purpose is to provide support and resources so that we get a return on our investment in research.

**2.4** *Explain how you market your research and development program through various stages of the research and development process.*

**Arkansas** - The Research Information Coordinator is involved and published newsletters and briefs from progress reports. Transportation Research Committee meetings are conducted so as to provide Professional Development Hours for those interested. Various projects are highlighted at one or another on the department web.

**Virginia** - No specific program as such. Research sponsors are kept apprised of research progress and results through advisory committee process, periodic contact with researchers, progress reports, and steering committees where applicable. Future leaders set on Advisory Committees).

**Louisiana** - Put out publications, put on workshops, bi-annual reports, getting to locals.

**Missouri** - Projects are identified in the Annual SPR Work Program. Principal investigators communicate with research sponsors through proposals, work plans, meetings and quarterly progress reports to the assigned TAG's. Final Reports and Technical Briefs are prepared and distributed according to a standard distribution within and outside of the Department. RDT produces an Annual Summary Report that highlights major research, development of technology assignments completed or ongoing for the Fiscal Year.

**Ohio** - My current external marketing efforts consist of the following: 1) a series of presentations describing our program and specific projects that I've given at conferences around the state, 2) a series of "meet and greet" sessions with the Deans, professors, and grants administrators at Ohio universities that allow my staff and me to highlight our program as well as exchange ideas on how to improve transportation research in Ohio, 3) a newsletter whose first issue is scheduled to come out in November, 4) updating TRIS and RIP databases, and 5) expanded use of our website. I hope to have our entire program (RFP's, active and completed projects, reviews, etc.) on the web within a year. Internally, I am in the process of having a Windows-based application (similar to what the NJDOT uses) developed to manage all phases of our R&D program - from strategic plan to implementation of results. This will allow us to provide more accurate and timely information to DOT employees involved in the process.

**North Carolina** - Front-end implementation: Research projects originated and selected based on NEED, urgent or strategic. In addition, selection based on customer demand.

Follow up of implementation.

Meetings are usually held on the customers' turf.

We let the customers do the talking. Customers are the NCDOT. Stakeholders are the paying users (trucking industry and motorists), commerce and industry, national transportation agencies, and FHWA.

Communication is the key.

The typical stages of research and implementation are:

Customer awareness

Initiate university contract research projects

Conduct project specific in-house research

Arrange to send customers and R&A staff to national conferences or "schools"

Conduct in-state "schools" for managers and workers

Select construction projects (for implementation)

“Sell” the project to field management  
Orient field management and staff to the new technology  
Develop “Project Special Provisions”  
Participate in Pre-bid meetings  
Participate in Pre-construction meetings  
Participate in actual construction (Hands dirty and feet wet)  
Develop interim specifications  
Inclusion in the SHA standard specifications  
Mainstreaming  
Hands off!

**Nebraska** - Every two years, sponsor a Nebraska Cooperative Research Conference (NCRC) (showcase of research capabilities in-house and at UNL and results of current research), hold periodic meetings and schedule presentations of technologies being researched and tested, e.g., Crumb Rubber Workshop.

**Indiana** - Focus groups, development of a Long-Range Research Plan, annual solicitation, User’s Guide, etc.

**Kansas** - We do not have a formal marketing plan beyond creation and distribution of one page summary reports to staff with full text reports available on the intranet. We feel that having project monitors with expertise in the subject being researched that usually work in the Bureaus that will implement the results is an effective means of marketing. A number of research findings have been implemented before the final report publication.

**Michigan** - Marketing involves getting the end user involved from the very beginning, publishing the results to a wide user-base, and formation of a research advisory group to guide the research project.

**Minnesota** - It is fair to say that implementation is considered throughout our research process. This includes research needs identification, research proposal evaluation and selection, conduct of the research and (obviously) implementation planning.



**2.5**      *How is your marketing effort for new product development different than your marketing for research results?*

**Arkansas** - New Product Evaluation has been moved back into the Materials Division. It uses a standing subcommittee to oversee the program and report to the Specifications Committee.

**Virginia** - No distinction. (New Products Committee resides in the Materials Division).

**Louisiana** - New Products Evaluation handled by the materials Division, It can get back to LTRC.

**Missouri** - We have a similar process for marketing for new products. Distribution is typically within the department.

**Ohio** - Right now there is no difference.

**North Carolina** - Our research is product development oriented. Basic question is "What is the product?"

This is part of the request form for submitting new research proposals.

A new product committee decides which product to conduct further research on.

**Nebraska** - We do not do new product development. However, we do report our "approved product list" and "research activities" on NDOR's web site.

**Indiana** - We have a separate New Product's Evaluation Committee with their own set of guidelines. However, we do have cross representation between the New Products Committee and the Research Committees.

**Kansas** - Basically, the same if university based research. Certain new products might require test sections prior to full implementation or additional development work in our lab before full implementation.

**Michigan** - New product development is evaluated by our new materials evaluation process.

**Minnesota** - All research projects produce results and those results get published in total and/or in summary format. There is a contractual (legal) requirement to do so. Often research projects do not produce new products that are ready to use by department practitioners or professionals. University researchers are often not qualified to produce commercially viable products and therefore are not required to do so. There is a lack of a legal imperative to do marketing for newly developed products.

**2.6**      *How long has your department had an active marketing and implementation component to the RD&T program?*

**Arkansas** - Only for 4 years.

**Virginia** - Since VTRC inception 50 years ago. Implementation has always been the ultimate goal of our research.

**Louisiana** -        Since the inception of LTRC in 1986.  
Secretary Letter has help a great deal  
Research office has always been there to solve problems for department.

**Missouri** - Since the inception of the Research Program at MoDOT. This is part of the technology transfer duties.

**Ohio** - Less than a year.

**North Carolina** - Six years.

**Nebraska** -Five years

**Indiana** - Over 15 years.

**Kansas** -Assessment and implementation component since 1993.

**Michigan** - It has been an integral part of the RD&T program since its beginning, but needs to move up a level or two.

**Minnesota** - 8 years

**2.7** *How have your marketing and implementation efforts evolved over time, i.e., changes in tracking methods, performance measures, reporting to management, etc.?*

**Arkansas** - Our program has been constantly evolving. The establishment of the Research Information Coordinator and a formalized tracking method are our most recent changes. We are now trying to push web-browser technology.

**Virginia** - More emphasis is placed on marketing and implementation than in the past due to increased focus on organizational performance/accountability but no specific marketing initiatives/programs are in place other than methods mentioned in other responses, re: Dissemination of research results. (Reflecting the national dialogue.)

**Louisiana** - TQM effort, peer exchange, Secretary letter

**Missouri** - RDT was given Division status in 1996. Up until that time research resided with the Materials & Research Division with considerably less emphasis on research efforts. More emphasis has been placed in each element of research, development and technology transfer as a result of the division status. Emphasis areas for focusing RDT efforts were determined from a Focus Meeting of major transportation stakeholders in 1997. A partnership agreement was executed in 1998 to form the Missouri Transportation Research and Education Center (MOTREC) with MoDOT and the two major Missouri engineering universities for providing contracting services with these universities. Our first Peer Exchange was conducted in 1998 addressed numerous suggestions for advancing marketing and implementation strategies. The TAG's were created in 2000 to improve communication and general management of the RDT activities.

**Ohio** - A study was done several years ago that indicated a high percentage of our research was actually implemented. There was still a perception that research results were "sitting on the shelf." Part of this problem was lack of marketing. We are now emphasizing this important element of a successful research program. See following response for specific examples.

**North Carolina** - More reliance on ITRE staff since many position within NCDOT are vacant and are not being readily filled.

Focus on national and other highly visibly and recognizable research results for implementation within North Carolina. These include Superpave, and LTPP.

Primarily through annual survey and customer satisfaction reports.

Questionnaires have been periodically sent out to users, which have responded favorably in the past.

**Nebraska** - Have included an implementation/marketing funded-task in each research project. Research staff has been increased from one to three, so have more staffing to assist NDOR technical monitors in implementing/marketing/tracking research.

**Indiana** - All of the above. We are continually refining the process. Latest improvement includes developing a website to convey some of this information.

**Kansas** - A major change was made in 1998. We had been assessing all projects during the research effort until 3 years after the report was published with a standard form. In 1998, we began to look only at completed research projects. A formal research implementation plan (RIP) giving costs, schedule and responsible parties to implement pertinent findings is now required for each project at the time of publication of the final report. The RIP also documents those projects without any implementation potential. An annual progress report form was developed and is used to track progress and document the BCR for the project.

**Michigan** - Implementation involves few experimental project. These projects are evaluated annually and performance is monitored for five to ten years as the project will require. A periodic evaluation report is sent to the management on few high value implementations, for example: Superpave, concrete pavements (European Design), steel bridge coating, etc.

**Minnesota** - Although we still publish full research reports we now also make great efforts to develop and target summaries to improve our marketing capabilities. Performance measures have been added that help insure that the research program meets department's needs, focuses on implementation, and has desirable impacts. Senior management is more involved in the project selection process than in the past. Implementation is looked at as a shared responsibility that includes the researcher, the department sponsor/user of the research, and the office that administers department research budget.

**2.8** *What forms of media are used to communicate your research to your customers?  
(i.e., U. S. mail, e-mail, department website, TRIS etc...)*

**Arkansas** - We regularly use everything listed and are currently hopeful for web-browser technology to reach more users.

**Virginia** - Internally published papers, VTRC websites, e-mail, Research Briefs, TRIS, refereed publications, periodic personal contact, etc.

**Louisiana** -  
Research Reports  
Tech Summary  
Research Capsules  
Conference and Publications  
Web Site Download  
Engineering Conferences

**Missouri** - Internal and external distribution of hard copy reports. We are beginning to use the internet and the Web to store and distribute reports.

**Ohio** - In addition to all of the above, I spend a significant amount of time on the phone and giving formal as well as informal presentations on our program. We have received some very positive coverage on the local news (T.V. and newspaper) for the positive results on our SHRP test road. Finally we are encouraging our technical liaisons and researchers to write articles for publications such as TR News and Better Roads and to do presentations at professional conferences, the TRB annual meeting, etc. to publicize our R&D projects.

North Carolina - Little bit of all.

The CTE (described later on) uses several techniques including:  
Research Profile on ongoing research in a Newsletter  
Teleconferences, including EPA distance learning sessions  
Video Forums on preliminary and final results of research projects  
College Student Seminars  
Graduate Fellowship program  
Web site

**Nebraska** - Through the use of all of those listed above, plus our NDOR Roadrunner Magazine which is published every two months and is available on NDOR's web site.

**Indiana** - All mentioned plus other multi-media tools such as video-conferencing, CD-ROMs, etc.

**Kansas** - US Mail for full text reports to out of KSDOT/state/country customers, US/Building Mail One-Page Summaries to KDOT managers, e-mail notification with One-Page Summaries to business partners, Abstracts and electronic copy to TRB for TRIS Online, Full text reports and One-Page Summaries are available on KSDOT Intranet, Internet site under development.

**Michigan** - Official communication, letters, research publication with wider circulations, changes in the special provisions of construction and material specifications.

**Minnesota** - TRIS, TRIS RiP, department websites, e-mail, paper reports, U.S. mail, videos, software, one-page summaries, department newsletter, university center for transportation studies newsletter, newspapers, television, research and other conferences, annual meetings with department office directors and their staff, daily communication with research coordinators, etc.

**2.9**      *Are you utilizing the website for Research Ready To Implement for your successful research and development projects?*

**Arkansas** - Yes, on a relatively selective basis.

**Virginia** - Not presently. (Is this the same as High Value DOT Research? We do participate in that site.)

**Louisiana** -      Not using at this time  
                         Literature search site in future  
                         High value research

**Missouri** - We have submitted projects for inclusion in the Research Ready to Implement and for the High Value Research but have failed to utilize what is shared from others.

**Ohio** - No, I saw a printed document with this title but I was unaware that there was also a website.

**North Carolina** - Not yet.

**Nebraska** - We have listed a project on the "High Payoff" RAC Research web site. That same project is also included in the report "Technology Ready for Deployment" authored by SDDOT.

**Indiana** - Some use our own website more.

**Kansas** - No

**Michigan** - Not yet, but the future plans will include the use of electronic media.

**Minnesota** - Yes

## Key 3. Root it in Economics

### 3.1 *How are your research projects identified, prioritized and selected?*

**Arkansas** - This we covered pretty well in the meeting. Briefly, potential projects are prioritized by a group of industry representatives and that priority list is further refined by the department's Transportation Research Committee. Projects are then selected in order according to the funding level.

**Virginia** - See Attachment A, VTRC annual work program development flow chart.

**Louisiana** - Committee structures

**Missouri** - Projects are identified through Research Idea Statements that are submitted to or created by the 7 TAG's (New Product, Safety/Traffic Geotechnical, Pavements, Project Development/Bridges, and Social/Economic/Environmental).

**Ohio** - Program offices develop strategic research plans that guide their selection of proposed annual projects. Program offices develop problem statements (RFP's are preferred), which the Office of R&D distributes to potential researchers. (We do not encourage unsolicited proposals because they usually don't respond to our strategic initiatives. However, we do review them when submitted.) Preliminary proposals from researchers are evaluated by the appropriate program offices who then submit comments to R&D. The comments are attached to the proposals and the entire package is sent to members of the RCC for review and prioritization. The following 20-point rating system is used:

- 1) What is the overall value of this research? 0-5 points
- 2) Does the project respond to one of the department's strategic initiatives? Y=2, N=0
- 3) Does the project respond to a strategic research initiative of the sponsoring office? Y=2, N=0
- 4) Does the project respond to an emergency/safety concern? Y=1, N=0
- 5) Does the project have defined deliverables that potentially could be implemented **within**:  
1 year = 5, 1-3 years = 4; 3-5 years = 3; 5-10 years = 2; over 10 years = 1; none defined = 0
- 6) What is the sponsoring office's priority ranking for this project?  
1<sup>st</sup> = 5; 2<sup>nd</sup> = 4; 3<sup>rd</sup> = 3; 4<sup>th</sup> = 2; 5<sup>th</sup> = 1; 6<sup>th</sup> and higher = 0

The Office of Research and Development assigns values for Items 2 – 6. Item #6 is important because it forces each office to look at its priorities rather than taking the "shotgun" approach to submitting problem statements. Members of the RCC vote on Item 1 and the votes are averaged. All of the points are then added to determine the prioritized ranking. The top priority projects are added to the annual program in accordance with the amount of money available to start new projects.

**North Carolina** - An R&D subcommittee meets twice a year for selection of research projects.

An annual call for research is made only to DOT customers.

Promote research ideas and not research problem statements.

They have a Web site for research idea solicitation.



**Nebraska** - Statements of Need are identified and submitted by all partners (i.e., NDOR personnel, UNL researchers, county and city personnel, contractors, consultants, and private construction-related organizations, e.g., AGC.) The Nebraska Transportation Research Council (NTRC), of approximately 50 members which include representatives from the partners listed above, annually meets, selects, and prioritizes the top research statements of need. NDOR requests proposals for these prioritized statements of need, to include estimated costs. NDOR's Research Advisory Committee then reviews the proposals and sets the next FY Research Program based on the budget restraints.

**Indiana** - Focus Groups (part of the Long-Range Research Plan development), annual solicitation, identifying research components of the departmental strategic plan, follow-up research needs flowing from implementation plans, etc.

**Kansas** - Formal university research (K-TRAN) program is based on this schedule:

Solicit Research Ideas from KDOT staff, local govt staff, KTA, university faculty, & industry associations. . . . .	June 15
Deadline for Ideas . . . . .	Aug. 15
Program Council Meeting to Reviews Ideas, Program Status, Set Policy . . . . .	Sept. 1
Area Panels Begin Interaction with Faculty to Discuss Ideas Submitted . . . . .	Sept. 8
Request for K-TRAN Research Project Statements from KU and KSU . . . . .	Nov. 1
Deadline for K-TRAN Research Project Statements . . . . .	Dec. 1
Technical Committee Meeting to Categorize and Assign RPS to Area Panels . . . . .	Dec. 15
Area Panel Evaluations Completed . . . . .	Feb. 1
Technical Committee Formulates Recommended K-TRAN Research Program . . . . .	Feb. 15
Program Council Approves K-TRAN Program and Budget . . . . .	Mar. 1
List of Project Monitors Provided to KU and KSU . . . . .	Mar. 8
Training and Instructions Provided to Project Monitors . . . . .	Mar. 8
Response Memo Sent to Submitters of Project Statements and Ideas . . . . .	Apr. 1
Detailed Proposals Prepared for Each Project and Approved by Project Monitor . . . . .	Apr. 1
Agreements Prepared and Signed for Each Project . . . . .	May 1
Joint FHWA/KDOT Research Review Day . . . . .	May 1
Draft SPR Work Program and Cost Estimate Submitted to FHWA . . . . .	May 12
Create Project Numbers, Notify appropriate bureaus/units . . . . .	May 15
Request Research Implementation System Annual Progress Report From Project Monitors (due Aug. 15 <sup>th</sup> ) . . . . .	June 1

Pooled fund, experimental features, other university and in-house projects are generally done on an ad hoc basis with the recommendation of the Bureau Chief responsible for the topic area proposed and approval of the Assistant Secretary of Transportation and State Transportation Engineer.

**Michigan** - Formally, the biennial Call for Research Projects is issued to the central divisions, regions, TSCs, and to the university research partners.

**Minnesota** - Focus groups and office meetings are the primary sources for identifying prioritized research needs. Research proposals are reviewed and prioritized by university research councils and department staff. Based on this, senior management approves a recommended research program.

**3.2 What is your department's annual budget for research, development and technology?**

**Arkansas** - FY2002 = 3,951,346; FY2001 = 3,673,856

**Virginia** - About \$8 million (using narrowest definition of *research*).

**Louisiana** - \$7.2 million annual budget

**Missouri** - \$5.5 million

**Ohio** - It averages around \$6 million, with approximately \$2 million available to start new projects and the rest to sustain continuing studies. This year, however, our budget is closer to \$8 million.

**North Carolina** - \$3,919,000 includes state match but not \$750,000 for ITRE administration. Research is a minor budget item, it is a rounding factor of the total DOT budget.

Don't search out more funding, just look at better managing existing funds.

The ITRE is trying to develop a "Transportation Founders Fund" (TFF) to support additional research. It would provide for more university involvement and staff enhancements at ITRE. It would be part of ITRE with additional funds coming from the private sector.

**Nebraska** - \$1.5 Million

**Indiana** - Approximately \$5,000,000.

**Kansas** - \$3.7M

**Michigan** - SPR II budget for FY 2002 is \$5,539,846 and for FY 2003 is 5,024,420.

**Minnesota** - A recent average would be about \$12 million per year. It has ranged between 1.4 to 1.6 of DOT budget.

**3.3 What percentage of your budget is earmarked for marketing and development?**

**Arkansas** - FY2002 = 5.9%; FY2001 = 6.9%

**Virginia** - None specifically (other than LTAP). Is considered integral to conducting research program.

**Louisiana** - 5 to 10% dedicated. Approximate \$400,000 line item.

**Missouri** - \$385,000 (7%)

**Ohio** - We don't have a line item in the budget specifically for this.

**North Carolina** - It is difficult to determine since flexibility is provided in most project budgets.

**Nebraska** -No percentage is "earmarked". However, marketing is included in funded-tasks in each research project.

**Indiana** - No particular percentage.

**Kansas** - Not available

**Michigan** - There is no line item provided for this activity in the budget, but it is a part of the total budget.

**Minnesota** - Less than 5%

**3.4 How do you account for life-cycle costs, benefit/cost ratio or value-added for your research or development projects?**

**Arkansas** - So far we don't have to. Our program is needs driven and the results either do or do not have value.

**Virginia** - Not specifically considered in project selection/program development process.

**Louisiana** -       Implementation Assessment Form  
                          T<sup>2</sup> Implementation Engineer  
                          TQM Implementation Study

**Missouri** - On Applicable Research LCC and B/C are calculated to show economic justification.

**Ohio** - This is supposed to be included in the final report of each project.

**North Carolina** - Currently not being done since it hasn't been asked for.

**Nebraska** -These calculations/findings are reported in the implementation plan.

**Indiana** - We perform a benefit-cost and analysis on select projects annually. As implementation projects are underway and nearing completion we identify the value-added components.

**Kansas** - BCR is based on a 3 year benefit divided by the cost of the research project and its implementation. Staff administrative costs are not typically included because they are not tracked. (K-TRAN projects only.)

**Michigan** - Life-cycle cost has become a tool in the area of pavement design and selection criteria. In the other area, such as structures and materials, long-term performance and reduction in maintenance costs are the value-added components.

**Minnesota** - Ideally all research projects would have implementation plans which by definition identify how to measure the impact(s) of implementation. We have only been able to develop implementation plans for about 10% of our research projects. We have been able to identify measurable impacts on only about 13% of the projects that we have evaluated for value of implementation.

**3.5 Who does the life-cycle costs, benefit/cost ratio or value-added analysis of your research or development projects?**

**Arkansas** - Research staff when they are needed.

**Virginia** - Typically not done unless it is an integral part of the project (i.e., a project task).

**Louisiana** - T<sup>2</sup> Implementation Engineer

**Missouri** - All projects are required to show a quantification of the benefits yielded from the research. Examples of net value increases are calculated life cycle costs, labor cost savings, material cost savings, equipment cost savings, facilities cost savings, changes in personal injury/property cost savings, etc. The research staff conducts these calculations.

**Ohio** - The researcher is responsible for detailing the benefits (including cost savings) in the final report. A preliminary treatment of this is also required in the detailed proposal from the researcher. An estimate of potential savings is sometimes done by the sponsoring office when it develops the RFP or problem statement.

**North Carolina** - No answer

**Nebraska** - The researcher and the NDOR technical monitor perform this analysis.

**Indiana** - Who does the life cycle costs, benefit/cost ratio or value-added analysis of your research or development projects? We can do value-added analysis in-house, we could do benefit-cost analysis in-house, but prefer a 'third party' do it to add unbiased credibility to the results.

**Kansas** - The project monitor and/or PI.

**Michigan** - In the area of pavements, the pavement management engineer along with the pavement selection committee is responsible for this activity.

**Minnesota** - Staff from the office responsible for administering the department's research program with input from the office sponsoring/using the research. As performance measures are more widely used through out the department this should get easier to accomplish.

**3.6** *How are the life-cycle costs, benefit/cost ratio or value-added amounts verified within the implementation efforts?*

**Arkansas** - N/A

**Virginia** - Typically not done.

**Louisiana** - No information

**Missouri** - We are trying to become better at this but have significant room for improvement. It is our intention to use experience from the Department's Value Engineering program to help in measuring verifiable savings.

**Ohio** - The new implementation plan will have a tracking component to help verify this.

**North Carolina** - No answer

**Nebraska** -The NDOR technical monitors calculate these amounts.

**Indiana** - Benefit-cost analysis is primarily done after substantial implementation, verified with persons performing the implementation, reviewing cost records, etc.

**Kansas** - They typically are not verified. The assumptions used by the PM are supposed to be stated on the form.

**Michigan** - Use of engineering judgement, impact on the final project cost where research results are used, field performance and maintenance cost data.

**Minnesota** - Having two different offices involved in these measurements is the method that we use to verify these numbers.

**3.7** *What percentage of your RD&T budget is typically spent in the area of Policy? Structures? Pavements? Pooled Funds Studies? Others?*

<b>Arkansas -</b>	<b>FY2002</b>	<b>FY2001</b>
Policy?	7.85	12.93
Structures?	5.95	6.8
Pavements,	37.28	31.96
Pooled Funds Studies?	13.88	12.7
Others?	33.53	29.72

<b>Virginia -</b>	Materials	22%
	Structures, Pavements and Maintenance	18%
	Socio-economics and transportation systems	20%
	Safety and Planning	15%
	Administration	19%
	T2	1% (excl. LTAP funds)
	Media Center	4%

<b>Louisiana -</b>	Materials 21.2%
	Pavements 27.3%
	Environmental 15.4%
	Management 1.1%
	Geotechnical 18.2%
	Structures 6.4%
	Planning 8.3%
	Hydraulics 2.1%

<b>Missouri -</b>	Safety 12%
	System Preservation 49%
	Traffic Mobility 2%
	Innovation 29%
	Social/Economic/Environment 8%

**Ohio** - Without the tracking program I mentioned above it is very difficult to provide this information. In general terms, I can say that historically we have spent most of our R&D funds on Pavements, Structures and Traffic projects. We are expanding our program to include other areas such Freight Impacts, Archaeological Study Methodologies, Safety, etc. We are the lead state for four pooled fund studies and we are participating in eight others. We also have five active IBRC projects.

**North Carolina** - This varies from year to year. They look at what is missing in existing program and try to fund research in these missing areas.

**Nebraska** - Policy 0% Structures 70% Pavements 20% Pooled Funds Studies 10%  
Others?

**Indiana** - 10% Structures? 30% Pavements, 40% Pooled Funds Studies? 5-10% Others?  
The rest.

**Kansas** - Pooled funds studies including NCHRP—22%, Breakdown for other categories not readily available.

**Michigan** - SPR II funding is not used for policy research, which is included in the SPR I program.

Percentage of SPR II budget for: Structures - 17%, Pavements - 32%, Pooled-fund Studies - 1%, NCHRP and TRB subscription - 18% and Other - 32%. This is based on FY 2002 budget.

**Minnesota** - Of course these change from year-to-year but some typical numbers might be:

Pooled fund projects:	17%
Traffic research:	30%
Pavement and materials:	21%
Policy related:	18%
Bridge and structures:	9%
Environment:	9%
Everything else:	13%



**3.8** *What percentage of your marketing and implementation effort is typically spent in the area of Policy? Structures? Pavements? Pooled Funds Studies? Others?*

**Arkansas** - Our marketing and implementation efforts are more or less ongoing from the very earliest stages of a project. We are unable to establish a cost specific to implementation. We do provide a lime item for implementation that may be used in any area as needed.

**Virginia** - No data at this level of detail.

**Louisiana** - Same as above.

**Missouri** - Same as above.

**Ohio** - It is hard to quantify this, but I would say that the effort is proportional to the amount of research, i.e. more on pavements, structures and traffic and less on other areas.

**North Carolina** - Over time there is usually an even split of funds for all these areas.

**Nebraska** -Policy 0% Structures 80% Pavements, 15% Pooled Funds Studies 5% Others?

**Indiana** - Not available or broken down by these categories.

**Kansas** - N/A

**Michigan** - No breakdown of these data is available.

**Minnesota** - It is hard to provide hard numbers but in general the percentages here would be close to the percentages of the research budget (above).

## Key 4. Make Deals Unabashedly

### 4.1 *What groups in general have been the customers for research and development in your department? (i.e., DOT staff, FHWA, industry, academia, etc...)*

**Arkansas** - All of these listed are involved in our problem solicitation and project selection process.

**Virginia** - VDOT Central Office and field staff, FHWA, other DOTs, NCHRP, other state agencies.

**Louisiana** - All

**Missouri** - MoDOT functional units, construction industry, FHWA, in-state engineering universities.

**Ohio** - Executive Leadership, program (sponsoring) offices, Districts, FHWA, other DOT's, industry, local governments, academia and other private research facilities.

**North Carolina** - Industry representatives are not included on committees or subgroups. Stakeholders affected by research products is the main focus of research.

**Nebraska** - All of those listed above, plus Nebraska is the lead state in two regional pooled fund projects. The Midwest States' Crash Test Program has members from 10 states, and each year we solicit input from an additional 10 states. The Work Zone Initiative involves five states and work zone technology suppliers.

**Indiana** - All mentioned. Prime customer is DOT staff.

**Kansas** - DOT staff, FHWA, industry associations, academia, local governments.

**Michigan** - Our customers are the traveling public, industry, DOT staff, FHWA, and academia.

**Minnesota** - Our primary customer groups are internal to the department. Senior department management is the primary customer for the R&D program since it is meant to support the goals of the department. On the project level our primary customers are department functional area managers, research program for local (city and county) governments with a value of a little over \$2 million per year.

**4.2 Are these same groups your primary customer for implementation?**

**Arkansas** - Yes. Our primary customer is AHTD itself.

**Virginia** - Yes, typically.

**Louisiana** - All except academia

**Missouri** - Yes. Primarily MoDOT functional units.

**Ohio** - Actually the ODOT groups listed above are the primary customers for our research.

**North Carolina** - Customers are the users of research products.

**Nebraska** - Yes

**Indiana** - Yes

**Kansas** - Yes

**Michigan** - Yes

**Minnesota** - Yes

**4.3 What percentage of your research projects is performed in-house?**

**Arkansas** - FY2002 = 37%; FY2001 = 45%

**Virginia** - About 70%

**Louisiana** - 1/3 In House  
1/3 In House Contract  
1/3 Contract with University  
Some Do Not Work  
Learning Experience

**Missouri** - 50% in-house

**Ohio** - I estimate this at less than 2%. We contract for practically all of our research.

**North Carolina** - Most research (90 percent) is done through a master agreement between NCDOT and the Institute for Transportation Research and Education (ITRE). This agreement cover all 16 universities in the state that must all go thru ITRE. The University Research System, which all universities are part of, provides funding for ITRE. NCDOT submits research problem statements to ITRE who then administers contracts with universities to perform the research. Once research starts a technical committee is developed for each project that has a project coordinator assigned by ITRE. The technical committee does not include industry or other university researchers.

Within ITRE there is another section called Center for Transportation and the Environment (CTE) that is a USDOT University Transportation Centers (UTC) funded program. This section is responsible for all environmental research.

Projects are awarded to the universities by ITRE in April/May of each year to enable universities to recruit graduate students.

**Nebraska** -5%

**Indiana** - 25%

**Kansas** - 41% (includes administration and technology transfer)

**Michigan** - Less than twenty percentage.

**Minnesota** - 46%

#### **4.4 How do you address the issue of "risk of failure?"**

**Arkansas** - We believe that a failure is a positive result in that we gain additional knowledge of how not to go about doing something. Our failures more commonly result from developments outside the scope of the project which cannot be avoided.

**Virginia** - Failure is considered an opportunity for learning and not something to be feared per se. In some politically sensitive cases we pay more attention to details, published language, etc. so as to avoid potential criticism/negative fall out.

**Louisiana** - Some do not work; learning experience

**Missouri** - Failure of some research is anticipated. No funding is provided to offset any additional costs that may arise from the failure. Knowledge is gained and shared from the failures as well as the successes.

**Ohio** - It depends on how you define "failure." We recognize and accept that all research will not result in things that we want to implement; however, to us this is not considered a failure. It is a success because it helped us to make an informed decision. Failure would be getting bad results because a project was not well defined or the researcher was not qualified to do the project or the project did not have support from Executive Leadership. We minimize the risk of this type of failure by requiring: 1) long range strategic research plans in program areas, 2) well defined RFPs, 3) review of all proposed projects by a research coordinating committee (RCC) that ranks each one to determine its priority in our annual work program, 4) monitoring of the project by technical liaisons, 5) quarterly reports from the researchers, 6) annual research project review sessions, 7) approval of all major modifications to the program by the RCC, and 8) approval of the entire annual work program by Executive Leadership. In addition, we have a very strong relationship with our FHWA office that helps to ensure the success of our program.

**North Carolina** - We do not plan experiments (research) to fail.

**Nebraska** - We do not address this issue; however, we understand that this may occur.

**Indiana** - Strength of need, proposal and anticipated benefits.

**Kansas** - Our management is very open to risk taking. If a senior manager(s) (bureau chiefs) supports a new technology, product or procedure, then top management almost always supports the effort to try it in a pilot project. Research projects, pooled fund studies, etc. that are recommended by senior managers are nearly always supported within budgetary limits.

**Michigan** - There is a certain amount of risk in implementation. This can be minimized by initiating an experimental or demonstration project before full scale implementation, which monitors and evaluates the key features over a certain period.

**Minnesota** - 2 or 3 questions on our Research Proposal Evaluation Form (RPEF) get at this issue.

## **Key 5. Insist on Accountability**

### **5.1 Does your department use project management software to schedule and/or track your research projects?**

**Arkansas** - Generally not.

**Virginia** - No we use an in-house developed PC database for tracking expenditures, project status, completion dates, etc. Monthly exception reports are produced to keep tables on expenditures, projects overdue coming dues, etc.

**Louisiana** - Not yet; partially from implementation processes

**Missouri** -No. We use various spreadsheets and databases. We are interested in finding or developing a better tracking system.

**Ohio** - See response to 4<sup>th</sup> item under Key 2.

**North Carolina** - No

**Nebraska** -Not currently; however, we are establishing a formal system to track research projects.

**Indiana** - Yes

**Kansas** - We use agency-wide comprehensive program management system (CPMS) to track research project expenditures. Additional tracking information maintained in Excel spreadsheets.

**Michigan** - Yes, we are using a spreadsheet program to track the research phase of our work and track where the money is spent.

**Minnesota** - Yes

**5.2 If yes, how does the system track research marketing and implementation?**

**Arkansas -**

**Virginia -** It doesn't per se.

**Louisiana -**

**Missouri -** Currently by a spreadsheet. It too is in a development stages.

**Ohio -** I have defined an implementation tracking component, but I had not considered doing something similar for marketing.

**North Carolina -** N/A

**Nebraska -** The system we are establishing will be updated with all research project activities.

**Indiana -** Implementation only

**Kansas -** Implementation related information maintained in an Excel spreadsheet.

**Michigan -** We are planning to track these activities in the future.

**Minnesota -** A related database tracks implementation and marketing milestones as well as relevant historical commentary for these efforts.

**5.3 What performance measures does your department use to track the success of your research program?**

**Arkansas** - No response

**Virginia** - See Attachment B.

**Louisiana** - Projects started  
Projects completed  
Feedback early and throughout from policy committee

**Missouri** - Performance measurements are tied to the Department's business plan and our RDT unit business plan. RDT measures progress on how well it addresses the core business functions of the department, i.e.,(Safety, System Investment, Planning, etc.).

**Ohio** - Currently, acceptance by Executive Leadership and FHWA is the primary measure of performance. Changes to the research management process will consider the following: 1) number of projects completely or partially implemented, 2) cost savings, 3) percentage of projects completed on time and within budget.

**North Carolina** - There is usually an interest in the product that keeps it on schedule. Evaluation surveys have been cancelled because management already was confident in the research program.

They look at customer satisfaction that is predominately by word of mouth rather than by dollars or benefit savings. A matrix analysis is done comparing who is involved versus the activities. This produces a win – win situation for everyone looking at it geographically and by organization.

Flexibility of funding may be a future measure and also the ratio of work to staff (for ITRE).

**Nebraska** - We do not currently have any performance measures identified to track the success of our research program. However, we are strongly considering this for future action.

**Indiana** - Planned vs. accomplished schedules, benefit-cost analysis, etc.

**Kansas** - BCR of K-TRAN Program.

**Michigan** - We do not have a specific set of performance criteria that are documented and tracked on a continuous basis, but feedback from the MDOT staff, and performance of the projects built using the research results are very useful as performance measures.

**Minnesota** - We have 3 performance measures. First we track the percentage of selected projects that address department goals. Second we track the number of research projects for which implementation plans have been developed. Third we rate the impact of research implementation on a scale from 0 to 3. (For example: research results in no tangible benefit or is not useful, research results in increase in knowledge base only, research results in implementation changes without measured benefits, and research results in implementation changes with measured benefits.



**5.4 Is the implementation of all research (in-house, contract, pooled funds studies) performed and tracked in the same manner? If not, how does it differ?**

**Arkansas** - We do not track pooled fund implementation.

**Virginia** - No differences.

**Louisiana** - Yes, except pooled fund studies

**Missouri** - No difference.

**Ohio** - No answer

**North Carolina** - N/A

**Nebraska** - These are tracked in the same manner. All implementation needs to be tracked and monitored, some requiring more documentation than others.

**Indiana** - Largely the same. Pooled fund studies (if not performed by INDOT) not tracked.

**Kansas** - No. Only the K-TRAN research program projects are tracked using our formal procedure. Effectively, implementation occurs in the same manner on all types of projects but is not formally tracked.

**Michigan** - No, not well documented.

**Minnesota** - No. In-house research implementation for the most part is not tracked. Only if we are the lead state will be track the implementation of pooled fund research. We will attempt to track the implementation of all contract research.

**5.5 How successful has your department been with respect to your established performance measures, reporting to management, etc?**

**Arkansas** - We have drafted performance measures and forwarded them for consideration. We have not heard back from management.

**Virginia** - Still in its infancy.

**Louisiana** - Committee structures

**Missouri** - Performance measures have been in use for 2 ½ years. It has improved our production and accountability.

**Ohio** - No answer

**North Carolina** - Currently not required or an issue.

**Nebraska** - We have no formal performance measures. We constantly keep management informed of our research activities, through formal and informal means.

**Indiana** - Pretty successful. Always a need to *sell* the research program, even in *good* financial times.

**Kansas** - Management has been satisfied with the status reports provided although recently requested only summary information i.e. less detailed information on BCR calculations than we had previously provided. We are not 100% successful at getting project monitors to complete RIP's and the annual progress reports because it is "an other duty as assigned" so there is always room for improvement.

**Michigan** - Somewhat successful, additional work needs to be done in this area.

**Minnesota** - Our research performance is mixed. 100% of our selected research projects address department goals (great!). Only 10% of our recently completed research projects have formal implementation plans (poor!). On a scale of 0 to 3 the impact of our implementation is 1.67 (OK!). Like other offices we report our performance numbers (good to bad) to management. Management is not just interested in the current numbers but also is interested in trends – are improvements being made or not.

## ***5.6 What marketing and implementation strategies have been most effective for you?***

**Arkansas** - Going through our formal research project process has proven effective.

**Virginia** - Use of steering committees, tasks groups, etc. consisting of decision-makers, research advisory committee process, Research Brief, demonstration projects, VTRC web site, day to day customer contact consulting (technical assistance).

**Louisiana** - Workshops, seminars, hands-on  
Video's  
Get it into the field  
Tech program and support (200 people)

**Missouri** - Word of mouth, final reports, technical briefs, TAGs, annual reports.

**Ohio** - No answer

**North Carolina** - Are providing short-term technical assistance by university staff limited to 80 hours per semester on 3 to 4 activities. There is no compensation for this.

Are putting research reports on CDs for distribution.

Use the T2 Center to promote results to local agencies.

**Nebraska** - Having the researchers work very closely with the NDOR technical monitors in the development of the research project, in the conduct of the research and in formatting the implementation of the results so NDOR users can readily use them. Also, some of our researchers heavily coordinate with FHWA at all levels to ensure the acceptance of the .

**Indiana** - Good and broad identification of research needs, development of a long range plan, large involvement in research program, high visibility, identification of anticipated benefits and actual benefits, formal benefit-cost analysis, performance measures, etc.

**Kansas** - We have Area Panel Leaders that are typically Bureau Chiefs or Unit Heads in the work area that determine the research needs and implement the research results. Project monitors are assigned by them from their staff to work directly with the University PI on the project.

**Michigan** - Support from the upper management and field staff; national initiatives to use research results; new product and/or specifications; implementation that solves the high priority needs, improves safety and saves money.

**Minnesota** - The concept of a shared responsibility for implementation is an important strategy for us however, the most critical element in any such strategy is to have an active/committed champion from the sponsoring/user office.

### ***5.7 What marketing and implementation strategies have not been effective for you?***

**Arkansas** - Implementation that is expensive has proven to be difficult to accomplish. Having a champion on board from early on in the project has worked well for us.

**Virginia** - None in particular. (Full Blown Research Reports are necessary step to make sure you are competent and have credibility with your colleges. But reports are not adapted well for implementation.

**Louisiana** - Research reports without follow-up.

**Missouri** - None noted.

**Ohio** - It is too early to tell.

**North Carolina** - Customer surveys.

**Nebraska** - Just publishing and distributing a report.

**Indiana** - Trying to control and oversee all implementation activities through the research program.

**Kansas** - When we don't have user involvement from the beginning, we typically have a much harder time with implementation.

**Michigan** - Implementing products that were not tested in Michigan's environment for a reasonable length of time.

**Minnesota** - Although the delivery of a detailed final research report is necessary contractually, helps build consensus/understanding of research results, and services to further the knowledge base it is often not a good marketing/implementation tool. Still we spend a lot of resources on publishing final reports and consider it part of the research/ implementation process. However, we do not feel we get a lot of implementation bang for our publication buck.

## Key 6. Embrace Policy Research

### 6.1 *What policy research have you undertaken?*

**Arkansas** - ITS

**Virginia** - Many such studies conducted over the years. Too numerous to mention.

**Louisiana** - Outsourcing  
Overweight Vehicles  
Transportation Infrastructure  
Tort Liability (80 – 120 Million Per Year Liability Claims)

**Missouri** - A Constituent Service Quality Survey and a Truck Warning Light Policy are good examples of policy research used by Senior Management. The Social/Economic/Environmental TAG is new to RDT and will produce the bulk of the Department's soft research.

**Ohio** - No answer

**North Carolina** - They conduct part 1 SPR funded research also.

**Nebraska** - Have not conducted a formal policy research; however, have done a few "investigations", (e.g., over-weight permits).

**Indiana** - Examples included: cost allocation study, permitting, creative financing, pavement and asset management strategies, etc.

**Kansas** - Some examples:

- Economic Impacts of the Kansas Comprehensive Highway Program, Dr. Babcock, KSU
- The Impact of Highway Infrastructure on Kansas Production and Employment, Dr. Burress, et al., KU
- Super Single Truck Tire Effects on Pavement Performance and Vehicle Regulatory Legislation, Dr. Moore, KU (now at University of Nebraska)
- Transit Needs Assessment for Major Cities in Kansas, Dr. Stokes, KSU
- The Economic Impact of General Aviation Airport Deterioration on Kansas Communities, Dr. Babcock, KSU
- Case Studies of the Economic Impact of Highway Bypasses in Kansas, Dr. Babcock, KSU, (underway)
- The Impact of Kansas Grain Transportation on Kansas Highway Damage Costs, Dr. Babcock, KSU

**Michigan** - N/A

**Minnesota** - The full answer to this might best be found by doing a TRIS or TRIS RiP search for our department, however there have been an number of policy related research projects initiated recently under Transportation and Regional Growth (TRG) – a \$1.85 million program. We have also invested lot of resources on the issue of Road Pricing.

## **6.2 Have you been successful in implementing it?**

**Arkansas** - It is still too early to tell how successful we will be, however, with the interstate rehabilitation program currently underway, the department is using (ended).

**Virginia** - Yes, in many instances, too numerous to enumerate.

**Louisiana** - Yes

**Missouri** - Yes, but it requires substantial efforts from RDT to push the implementation through the affected functional units or throughout the Department. We are preparing for a second Quality Survey using the first as the benchmark for future survey results.

**Ohio** - No answer

**North Carolina** - Yes

**Nebraska** - NDOR personnel and management reviewed our findings/data collection of other states' "over-weight permits"; however, no implementation was done. Sometimes the results are not "implementation" but just a "thanks, for the information".

**Indiana** - Users have wanted the studies and welcomed the results; therefore there was successful implementation.

**Kansas** - Yes

**Michigan** - N/A

**Minnesota** - For many of the TRG projects it is too early for implementation to have occurred. Policy research implementation is very hard to track. In many cases policy research creates new knowledge but often it is very difficult to track how/when knowledge is used. Often policy makers look to many sources of information to help form sound policy decisions. Pricing work also continue to provide the information so that we keep the issue on the table.

**6.3 Which areas are you more likely to be successful in implementing research results?  
(Design, bridges, materials, construction, maintenance, traffic, policy, etc.)**

**Arkansas** - Design, Materials, Maintenance

**Virginia** - None more than any other.

**Louisiana** - Bridges; policy

**Missouri** - No significant difference. Probably depends more on RDT's success in getting the buy-in early in the development stages of the research.

**Ohio** - No answer

**North Carolina** - Over time there is usually an even split for all these areas.

**Nebraska** -Bridges and Roadway Design – Our NDOR technical monitors work very closely with the researchers, contractors, suppliers, and FHWA personnel in the development of the research, its conduct, and the implementation of the results.

**Indiana** - We have been successful in all areas, no area stands out.

**Kansas** - Equal chance—depends on quality of research results.

**Michigan** - Pavement design, materials and construction, followed by maintenance and bridges.

**Minnesota** - Design, bridges, materials, construction, maintenance, traffic, policy, etc. Transportation research related to the environment (70% successful).



## Key 7. Empower Your Staff

### *7.1 How are you successful in providing training and education for your research and development staff?*

**Arkansas** - Very successful. We have had no trouble in getting the training that we require. Some courses are SPR funded. Some are LTAP funded.

**Virginia** - Staff is encouraged to continue professional education through VDOT Learning Partners program. Staff is encouraged to attend conferences, meetings to develop professional networks.

**Louisiana** - In House Training Capabilities  
Communication\  
Tech Writing Classes  
Statistics  
NHI Courses  
Mgt Development Course  
Interpersonal Skills  
Dual Career Path

**Missouri** - We encourage post secondary education, short courses and seminars to develop employees.

**Ohio** - No answer

**North Carolina** - Limited funds are available for travel to conferences.

**Nebraska** - We have been very successful. Again our management at the division and deputy/director levels is very supportive and "empowers" the research staff to seek and use many sources for training and education, i.e. computer classes, NHI courses, and administrative and technical conferences/workshops.

**Indiana** - Somewhat successful. Most of our research staff have a PhD. and, therefore, come with significant research skills already. We are successful in attending out-of-state meetings, etc. and provide needed computing hardware, software and training.

**Kansas** - Successful because staff is encouraged to take advantage of training and tuition reimbursement for college course work provided by the agency in any topic area that is related to their current job. Profession staff is encouraged to attend at least one national meeting each year and serve on national level panels. Adjusted work schedules to accommodate classes offered during the workday usually can be accommodated.

**Michigan** - Training through NHI classes and in-house training classes are very useful. Also, training provided by university researchers.

**Minnesota** - The department has been increasingly successful in hiring, internal researchers with more advanced degrees. Workload is high for R&D staff, but generally training and education that can increase productivity is available.

**7.2 How much staff do you have dedicated to implementation efforts?**

**Arkansas** - Only one position directly, however, the Project coordinator is involved with implementation during the course of the project.

**Virginia** - 30+ full-time researchers, 5 joint appointee faculty conduct research and implementation activities.

**Louisiana** - 9 personnel depending on projects  
4 from T<sup>2</sup> (LTAP)  
4 from research

**Missouri** - None dedicated to this role. It is the responsibility of the RDT Directors and the principal investigators to follow up on individual studies to assure the implementation is completed.

**Ohio** - Four employees, including myself, currently manage the overall program. We have approximately 40 liaisons in other offices who monitor the technical elements of individual projects and play key roles in ensuring that the results are implemented.

**North Carolina** - Use ITRE staff of 35 full-time and 15 part-time positions.

**Nebraska** -No staff is “dedicated” to implementation. The research staff coordinates with all partners in the development of the research, its conduct, and the implementation.

**Indiana** - All the staff (10 research engineers participate in implementation efforts).

**Kansas** - None full-time, almost everyone some of the time.

**Michigan** - Implementation is a phase of the work plan, no dedicated staff for marketing or implementation of research results.

**Minnesota** - About 1.1 FTE.

**7.3 Does your department employ a public affairs staff?**

**Arkansas** - Yes. They have no time for research activities.

**Virginia** - VDOT Central office does but not Research Council.

**Louisiana** - No - LDOTD Staff - They use LTRC. LTRC has publishing, presentation skills.

**Missouri** - Yes

**Ohio** - Yes, we have an Office of Communications.

**North Carolina** - No

**Nebraska** - No

**Indiana** - Yes

**Kansas** - Yes

**Michigan** - Yes, our Office of Communications, Region staff and Transportation Service Centers managers support this function.

**Minnesota** - Our office uses the services of an account manager from the Office of Communications. The department has a strong capacity in this regard. Account manager is responsible to access the resources needed for our office.

**7.4 If so, how do they help you in marketing your research to your customer base?**

**Arkansas** - We don't find them in this area.

**Virginia** - On occasion will spotlight VTRC research in internal newsletters (VDOT Bulletin), Friday Report (biweekly email newsletter), or in media at large.

**Louisiana** -

**Missouri** - We have access to Public Affairs staff to assist us in marketing our services. Publications are generally prepared in our unit with major publications reviewed by PA before distribution.

**Ohio** - To date, the only assistance I have asked them for is to develop a logo for our office and suggest names for our newsletter.

**North Carolina** - N/A

**Nebraska** - However, we have a "Communications Division" to aid in communicating our research activities e.g., NCRC, NTRC activities and Implementation of Research.

**Indiana** - In the sense of highlighting and promoting good research results. Raises awareness.

**Kansas** - Our public affairs staff work primarily with the general public rather than our business partners that we consider our primary customers. The Division Directors and Bureau Chiefs attend regular meetings with business partners in their technical areas. Other technical staff, including those from Research, attends some of these regular meetings, field tours, association meetings, etc. as necessary. Most of our "marketing" is done with business partners through this manner. All new specifications are sent to business partners for comments and discussed before implementation. Our interaction with public affairs is usually to respond to questions raised by the public about subjects in our knowledge base. Potentially, we could address issues raised by the agency biannual external survey in formal research projects.

**Michigan** - Two Region engineers act as a liaison to support marketing research to their peers and staff.

**Minnesota** - They are helpful in targeting audiences that are not (or are not aware that they are) end users of research results. For example: senior management, policy makers, legislators, the private sector, and the traveling public.

**7.5 Do you share research failures as well as research successes?**

**Arkansas** - This is not a strong point of our research program.

**Virginia** - Absolutely

**Louisiana** - Not as Much  
Still Do Report  
Normal Distribution

**Missouri** - Generally, yes

**Ohio** - If we continue with my previous definition of “failures” then no, we don’t share these because once we recognize them we will either correct them or kill the project.

**North Carolina** - Yes, but we try not to fail or make it a success story.

**Nebraska** - Activities of all research projects are available.

**Indiana** - Probably selectively, although we expect and allow for some ‘failures.’

**Kansas** - Yes, but we consider few to be total failures. Just because the initial goal was not accomplished does not mean that additional knowledge was not created that may be useful to someone else.

**Michigan** - Yes

**Minnesota** - Research performance measures that are shared with senior management demonstrate both strengths and weaknesses in the department’s research program.

**7.6 How are universities involved in the implementation process? (Training, field monitoring, etc.)**

**Arkansas** - At 6 months prior to the completion of a project the university is brought in to present tentative implementation recommendations and coordinate with the concerned department personnel.

**Virginia** - Generally not involved.

**Louisiana** - Minimal  
Project Specific/Workshops  
More of LTRC role

**Missouri** - Usually only used in an advisory or interpretation role when they have performed the research.

**Ohio** - Both

**North Carolina** - Through ITRE

**Nebraska** - Researchers at UNL are involved in implementation through training, seeking SHWA approval and rewriting specifications.

**Indiana** - Sometimes participate in formal implementation efforts, in informal implementation efforts the researcher is to make him/herself available to the implementers for questions or needs that may arise.

**Kansas** - Mainly development related activities such as accelerated pavement testing, monitoring and evaluation of field test sections or bridges. Also, faculty assists with development of research implementation plans from the research project statement (preproposal) stage to the writing the recommend implementation section in the final report.

**Michigan** - Universities do help with this process. The major responsibility is on the research project manager, Region and Transportation Service Centers field staff.

**Minnesota** - At times university researchers include any number of activities that support implementation in their research contract or may support implementation after the research contract is complete. The LTAP center (at the university) sometimes will include research results in their products and services.

**7.7 How do the universities assist in the technology transfer role following successful research projects?**

**Arkansas** - We bring them in as necessary using the line item implementation.

**Virginia** - Generally they are not involved in the sense of the question asked.

**Louisiana** - Same as above.

**Missouri** - These services would have to be included with the contract research. They often provide workshops or seminars to explain in support of their research.

**Ohio** - Our LTAP program is handled by contract with the Ohio State University. They help with much of our T<sup>2</sup> efforts with local governments.

**North Carolina** - No answer

**Nebraska** - UNL posts its research activities on their web sites. Also, researchers share results with technical personnel in other state DOTs, conduct workshops, and assist in implementation.

**Indiana** - Developing training/multimedia tools, providing seminars and training, providing resources on websites, etc.

**Kansas** - Faculty provides technical advice and presentations at meetings and to staff. Also, LTAP.

**Michigan** - Publication of papers to be presented at the national TRB and NCHRP conferences.

**Minnesota** - The LTAP center (at the university) sometimes will include research results in their products and services.



**7.8 What percentage of research results in no tangible benefit?**

**Arkansas** - Less than 45 percent.

**Virginia** - Less than 5%

**Louisiana** - See last response.

**Missouri** -No data

**Ohio** - Not sure at this point.

**North Carolina** - No answer

**Nebraska** - We feel all of our research results have a *tangible* benefit. Maybe, sometimes that is just, *what we're currently doing is right - no need to change.* 5%

**Indiana** - 10-15%

**Kansas** - Some but we do not measure.

**Michigan** - A very small percentage of research results produce to intangible results, but these may enhance the knowledge database.

**Minnesota** - 17%

**7.9 What percentage of research results in increase in knowledge bases only?**

**Arkansas** - Less than 10 percent of our research effort.

**Virginia** - 5-10%

**Louisiana** - There is some research just for knowledge.

**Missouri** - No data

**Ohio** - Our department is strongly committed to supporting applied research, so we do not have very many projects that fall into this category. However, I recognize the long term benefits of supporting some basic research. One option that I will propose to Executive Leadership is to allocate a small amount of money (approximately \$50,000) to fund basic research. The program would be set up like a mini-IDEA program for ODOT. We would accept proposals, including unsolicited ones, that would be reviewed by a selection committee. Preference would be given to proposals with matching funds.

**North Carolina** - No answer

**Nebraska** - 10%

**Indiana** - 10%

**Kansas** -As of March 2001, 38% of completed K-TRAN projects had no implementation reported.

**Michigan** - Very small percentage of the research dealing with long-term and basic research, for example: Long-Term Pavement Performance (LTPP).

**Minnesota** - 45%

**7.10**      *What percentage of research results in implementation changes completed?*

**Arkansas** - In FY99 there were four new contract projects totaling \$307,000 (annual budget) initiated, 3 in-house projects totaling \$135,000 (annual budget), and 7 continuing contracts totaling \$324,894 (annual budget).

Of the new contracts, one is continuing, one resulted in full implementation (it was to this effort that we lost our Research Information Coordinator) and the remaining two reached conclusions resulting in changes in our asphalt and base specifications.

Of the continuing in house projects, two resulted in a major contract efforts as we found they both had greater manpower requirements than we could meet, and one is continuing with a broader scope than originally planned.

Of the continuing contracts, two yielded little for usable results, one has run into problems in going to the field environment, two resulted in tweaking our Superpave specifications, one was of such broad scope we will be waiting for the outcome for years, and one resulted in a project of broader scope.

In summary 5 of 14 have had results implemented and there is hope that an additional 5 will eventually yield results that can be implemented.

**Virginia** - 30%-50%

**Louisiana** -      Short Term – Highly Implementable  
5 – 8 – 10 yr – Reasonable Rate  
TQM – 47% Implemented  
Some constraints are manpower

**Missouri** - 40%

**Ohio** - No answer

**North Carolina** - No answer

**Nebraska** - 85%

**Indiana** - 80%

**Kansas** - As of March 2001, 41% of 100 completed K-TRAN projects were reported as implemented in 21% with implementation in progress.

**Michigan** - Majority of the research projects follow in this category, as the projects are need based.

**Minnesota** - 38%

**APPENDIX B**

## **Marketing and Implementation of Research Results (MIRR)**

### **Best Practices Review**

**By Fred Orloski**

#### **Common Themes from Reviews Conducted in Virginia, North Carolina, and Connecticut**

Communication is a key – research showcase

Newsletters are effective – research briefs

Consider customer satisfaction – need a customer for a product

Provide travel budget to support and promote technical expertise

Effective Web sites

Annual calls for research projects

We do not plan research projects to fail

T2 centers are used to promote results to local agencies

Media group assistance valuable

Technical assistance projects support value and expertise of researchers

Need to respond quickly – cheaper, faster, better

Meet deadlines

Data collection and analysis is a continuing process

Build trust through competence, genuine interest, and mutual care

Be highly visible

Build credibility, not organization

Implementation through advisory committees

Advisory committees have future experts and industry observers

Show benefits of research projects - \$ savings

Focus on successes – 3-4 items, keep updating

Participate in national studies – Pooled fund, NCHRP, TRB

Have DOT champions involved in project selection

#### **Key or Unique Phrases**

Create value for customers through research

“We bring innovation to transportation”

Shelfware

Research is a rounding factor in the total DOT budget

Find a niche nobody likes to do, and do it good.

Transportation Founders Fund

# APPENDIX C

## Quotes from Missouri Dot for MIRR Articles

In Missouri, our Research, Development and Technology (RDT) unit recognizes the importance of the seven keys for a robust research program and are striving to implement such strategies into our program. This partnering effort with Michigan DOT allowed us to learn firsthand some of the successes others have found in making their research efforts robust.

Our RDT unit management team intends to go through the material in detail to identify those successes found and make plans to implement the best practices identified that will offer the best help for MoDOT in implementing and marketing research. We also intend to use what we learned to guide our peer exchange in 2002.

The MIRR review allowed us the opportunity to learn from the leaders in our field on research implementation. Our findings have indicated that a common thread between all states visited. "When top management links the department business plan objectives to the research program there is a buy in and an expectation for department implementation"

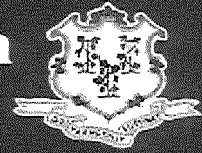
CONNECTICUT  
DEPARTMENT  
OF  
TRANSPORTATION

POWER POINT PRESENTATION



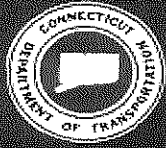


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Office of Research and Materials**

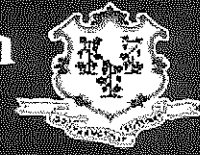


*Overview of the  
Research Program  
at the Connecticut  
Department of  
Transportation*





Connecticut Department of Transportation  
Office of Research and Materials

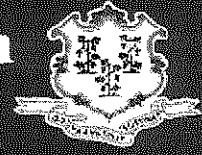


Division Sections:

- Research, Technology Transfer & Implementation
- Product Evaluation
- Technical Data Services
- Computer Support Services

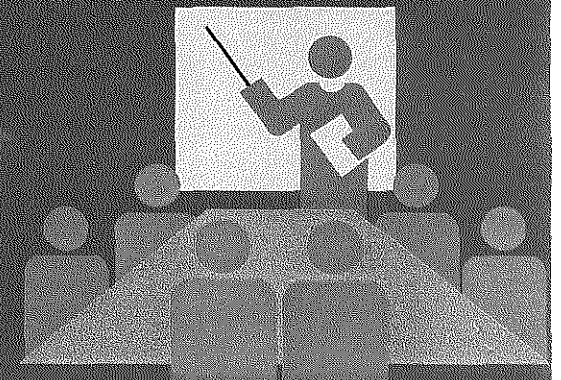


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# Research Program Objectives

- **Conducting, coordinating and supporting research**
- **Developing and applying innovative technologies**
- **Encouraging a positive problem-solving approach**
- **Implementing research results**
- **Disseminating findings of research**





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# Research needs drive the program

## Transportation Research

### Subject Areas:

Design, Construction, Materials,  
Safety, Soils, Hydraulics, Traffic,  
Planning, Public Transportation...  
(too many to list)



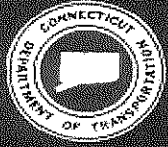
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# Literature Search of Research Need Statements



"...BUT OUR MOST USEFUL PUBLICATION IS THE 'JOURNAL OF  
DON'T-DO-IT: IT'S-ALREADY-BEEN-DONE'."



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# **Transportation Research Needs Addressed at Five Levels**

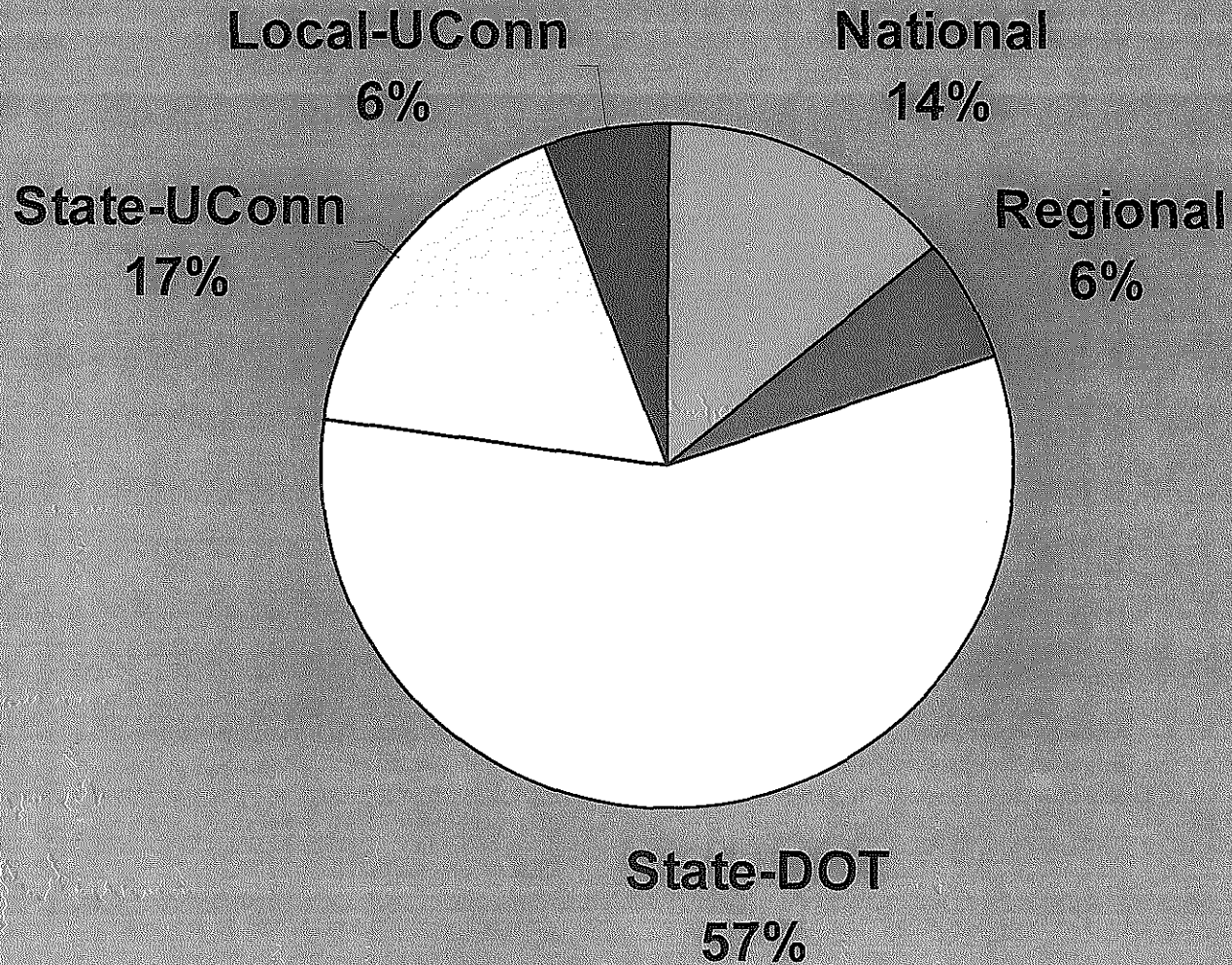
- Local**
- State**
- Regional**
- National**
- International**



# Connecticut Department of Transportation Office of Research and Materials

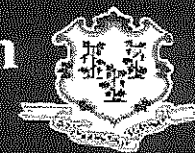


## ConnDOT's Transportation Research Budget by Need Category





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Office of Research and Materials**



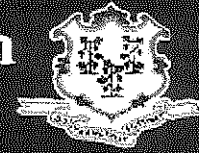
# **Local Transportation Research Resources available to Connecticut**

- Local Transportation  
Assistance Program  
(Technology Transfer Center)**



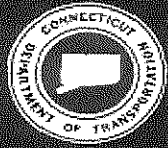


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# State-Level Research Resources

- **State Planning & Research**
- **State-funded Research Projects**
- **CT Cooperative Research Program**

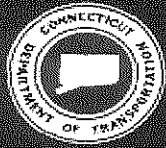


**Connecticut Department of Transportation  
Office of Research and Materials**

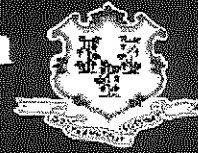


# **Division's Research Themes**

- **Applying computer technology**
- **Bridge Structure Monitoring**
- **Pavement**
- **Crash Attenuation**
- **Ground-based Data & Image Acquisition**
- **Weigh-in-Motion**
- **Use of Waste Materials**



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Office of Research and Materials**



# **State-Level Research Resources**

## **CT Cooperative Research Program**

**Established in 1961 by State Statute**

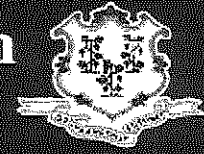
**Program run jointly by Council of Eight**

- Four from UConn CEE Dept.**
- Four from ConnDOT**

**(2 to 5 new projects per year)**

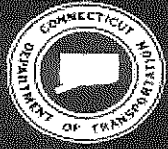


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Office of Research and Materials**



# **Regional Transportation Research Resources Available to ConnDOT**

- **FHWA Pooled Fund Program (Regional)**
- **New England Transportation Consortium**
- **Other -**
  - **University Transportation Center**
  - **Northeast Alternative Vehicle Consortium**



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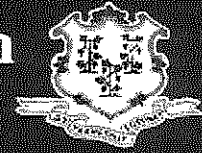


**★ New England Transportation Research Consortium ★**

- Connecticut joined in 1994
- Connecticut became Lead State in 1995
- 4 to 8 New Projects per year
- Implementation Activities

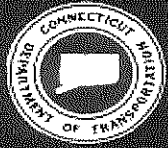


**Connecticut Department of Transportation  
Office of Research and Materials**

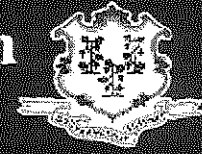


# National-level Research Resources

- **AASHTO**
  - **TRB (CT \$94,000)**
  - **TRB - NCHRP (CT \$414,000)**
- **FTA, TDC & TRB**
  - **TCRP**
- **FHWA**
  - **Pooled Fund Program**
  - **FHWA Direct Federal**



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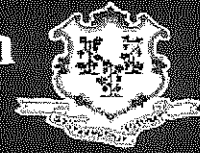
# **International-level Resources**

- **International Publications**
- **International Scanning Tours**
- **World Road Association**





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# **Division of Research**

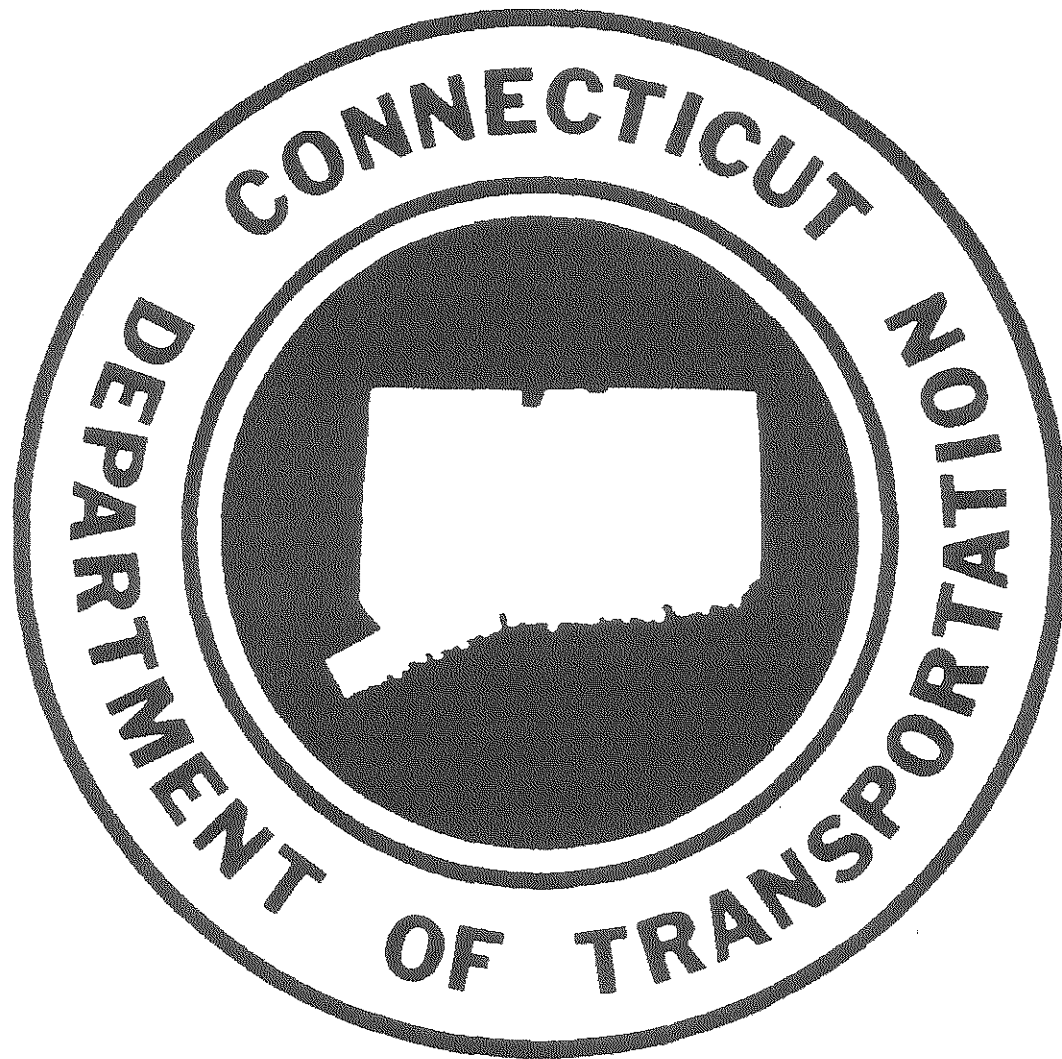
**James M. Sime, P.E.**  
**Manager of Research**  
**Office of Research & Materials**

**Phone: (860) 258-0309**

**Facsimile: (860) 258-0399**

**Email: [James.Sime@po.state.ct.us](mailto:James.Sime@po.state.ct.us)**





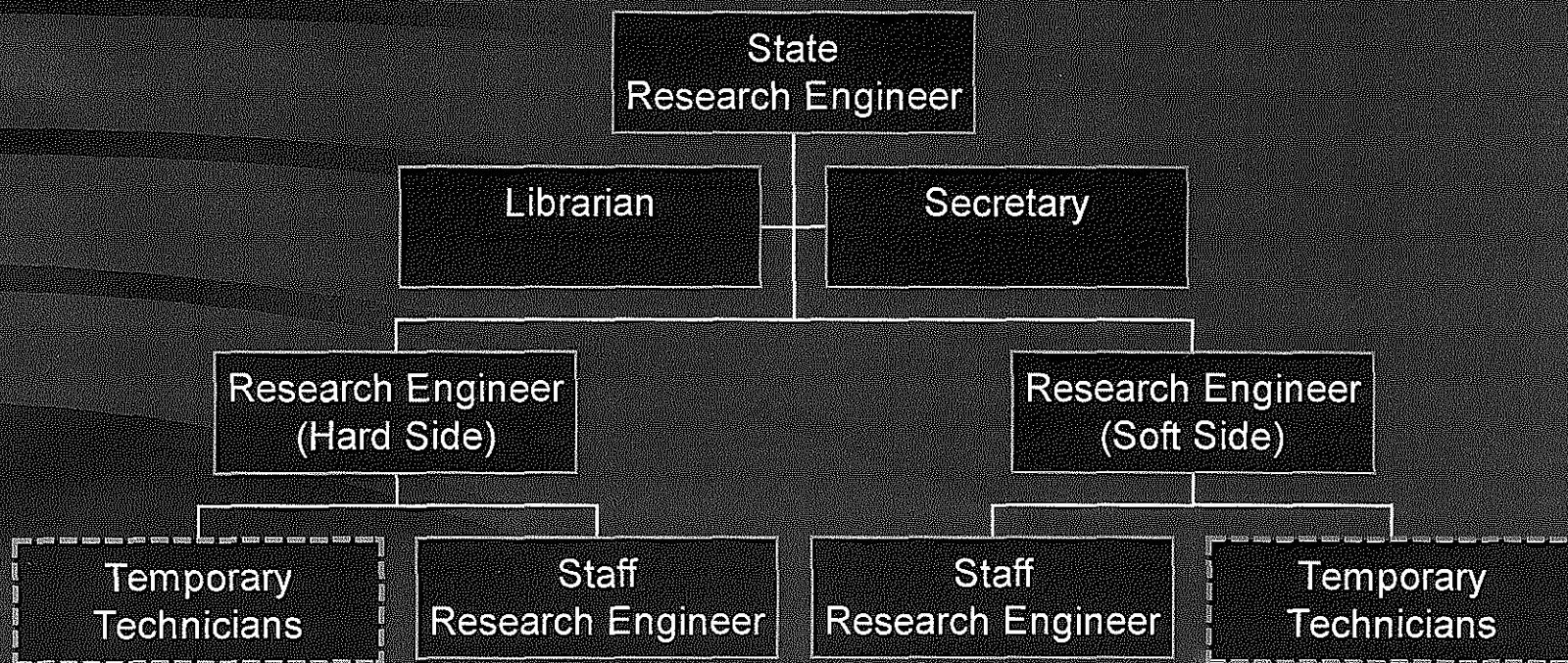
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OF  
TRANSPORTATION

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# Research & Analysis Linking with Customers



# R & D Sales Force



# R&A Motto

- Create Value

for

**CUSTOMERS**

Through

Research

# R & A Mission

- Promote, Manage, and Implement  
Research and Analysis

# R & A Mind-set

- Be Driven by Customer Demand  
(Front-end Implementation)

# Who are R & A's customers

- State Department of Transportation
  - Headquarters
  - Field Management
  - Headquarters Functional Units
  - Field Functional Units



# Who are R & A's Stakeholders

- Paying users
  - Trucking Industry
  - Motorists
- Others

# Management Customer List

- Office of the Secretary
- Deputy Secretaries
- Modal Division Administrators
  - Rail
  - Ferry
  - Aviation
  - Bicycle and Pedestrian
  - Public Transportation
  - Highway

# Management Customer List (Contd.)

- State Highway Administrator
  - Deputy Administrator: Planning
  - Deputy Administrators: Pre-Construction
    - (Private Consulting Companies)
  - Deputy Administrator: Operations:
    - (Private Contractors)
    - Highway Division Engineers
      - Division Maintenance Engineer
      - Division Construction Engineer
      - Division Operations Engineer
      - Division Bridge Maintenance Engineer

# Headquarters Functional Units

- Planning
- Pre-construction (design)
- Construction
- Maintenance

# Planning Customers

- Systems Planning
- Metropolitan and Regional Planning
- Thoroughfare Planning
- Scheduling and Funding
- Project Planning
  - Detail Planning
  - Permits (Environmental, Cultural Resources, etc.)

# Pre-construction Customers

- Traffic & Safety
- Right of Way
- Computers
- Photogrammetry
- Surveying
- Contracts, etc.
- Roadway Design
- Pavement Design
- Structures Design
- Geo-exploration
- Foundations
- Hydraulics

# Headquarters “Operations” Customers

- Construction

- Materials Testing
- Roadway
- Bridge
- Pavement
- Roadside
- ITS

- Maintenance

- Road
- Pavement Management
- Bridge Inspection
- Bridge Maintenance
- Equipment
- Vehicle Permit

# Field “Operations” Customers

- Construction:
  - Resident Engineers
- Maintenance (Road & Pavement)
  - District Engineers
    - County Maintenance Engineers
- Winter Maintenance
- Bridge Maintenance
  - Bridge Maintenance Supervisors
- Traffic and Safety



# Revenue Paying Stakeholders

- Trucking Industry
- Motorists

# More Stakeholders

- Commerce and Industry:
  - Manufacturing, Technology, Pharmaceutical,
  - Agriculture, Forestry, Fisheries, Developers, ...
- National Transportation Agencies
  - AASHTO
    - SCOR
    - RAC (National and Regional)
    - Lead States
    - Subcommittees

## More National Stakeholders (cont'd)

- AASHTO
  - NCHRP
  - TRB
- FHWA
  - Head Quarters
  - Turner-Fairbank
  - Regional Service center
  - Regional LTPP Centers / Contractors
  - State Division Offices

## More National Stakeholders(cont'd)

- Corps of Engineers
- U S Fish and Wildlife
- National Marine Fisheries
- EPA
- Others

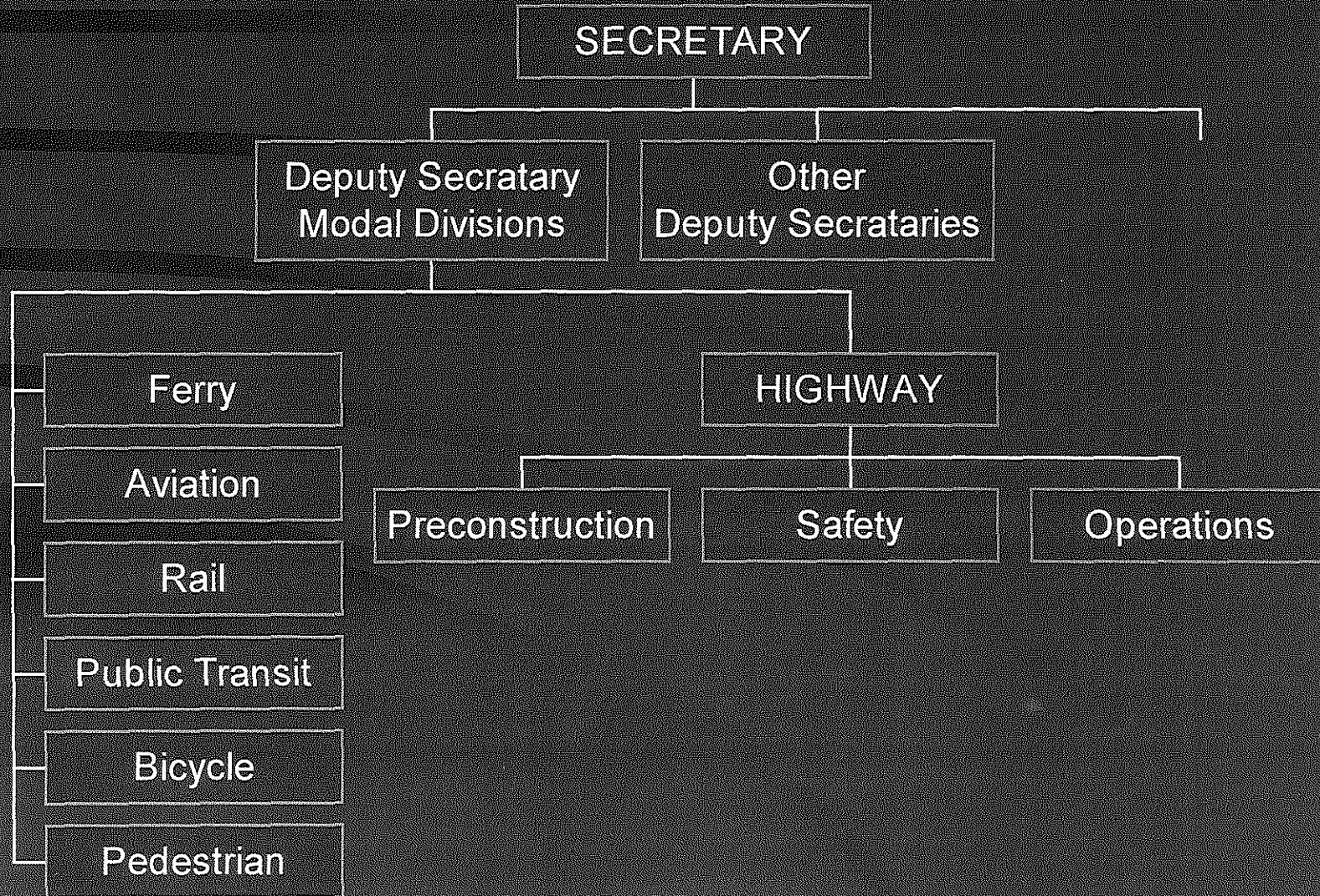
# More Stakeholders

- Statewide Agencies
  - Environmental & Cultural
  - Wildlife
  - Corrections
  - Emergency Response
  - Metropolitan and Regional Planning
  - Local Government
  - University Academic and Research Units
  - University Transportation Centers

# More Stakeholders

- Media
- Bicyclists
- Pedestrians
- Tourists
- Individual Researchers:
  - Faculty and Graduate Students
- Knowledge-base Users

# Where our DOT Customers Live



# Highway People

Division of Highways

Preconstruction

Safety & Loss Control

Operations

Traffic & Safety Engineering

Project Planning and Permits

Design

Construction

Maintenance

14 Field Divisions  
Secondary Roads

Right of Way

Computers

- Project Planning
- Mitigation & Permit
- Natural Systems
- Air & Noise
- Archaeology
- Historic

- Roadway Pavements
- Structures
- Geo-exploration
- Foundations
- Hydraulics
- Surveying
- Photogrammetry
- Contacts, Etc.

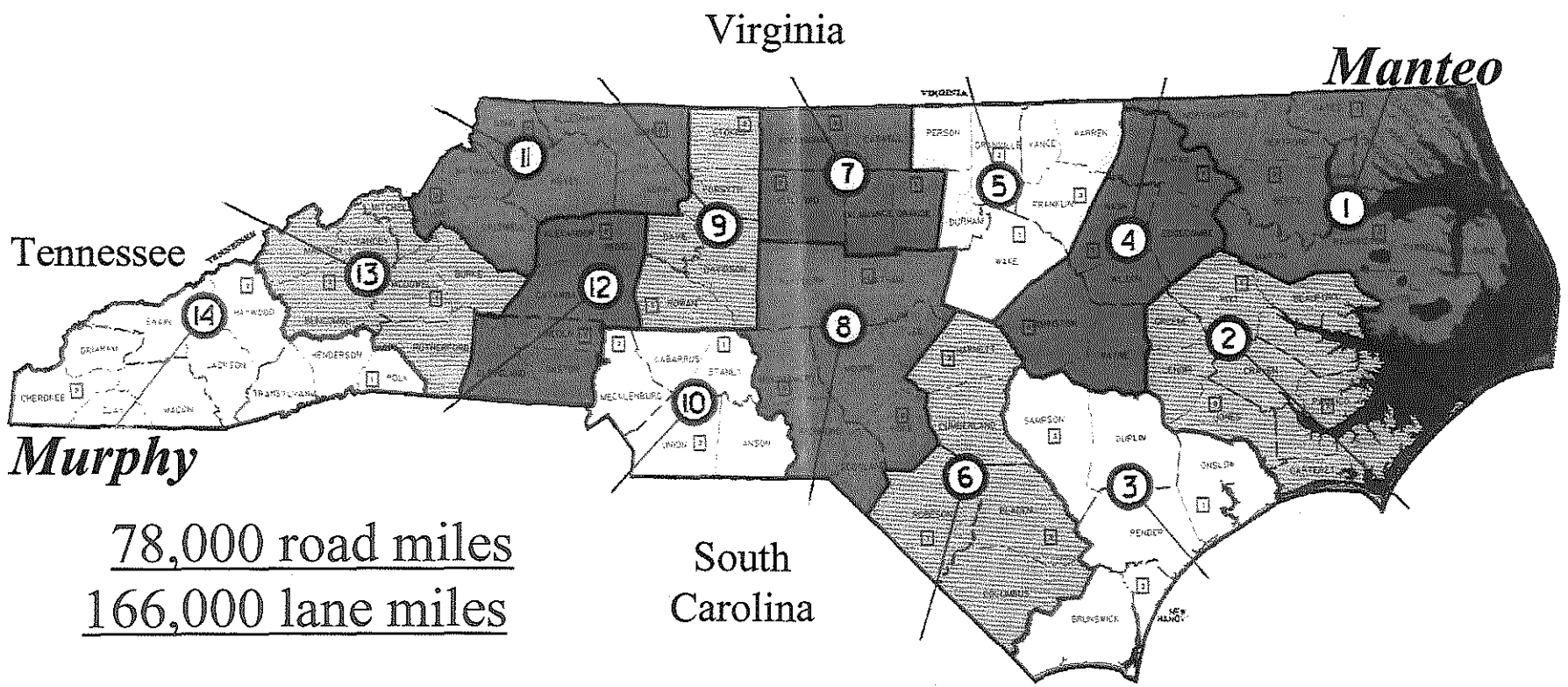
- Roadway Pavement
- Bridge
- Material
- Roadside
- ITS

- Road
- Bridge
- Equipment
- Vehicle Permit
- Pavement Management



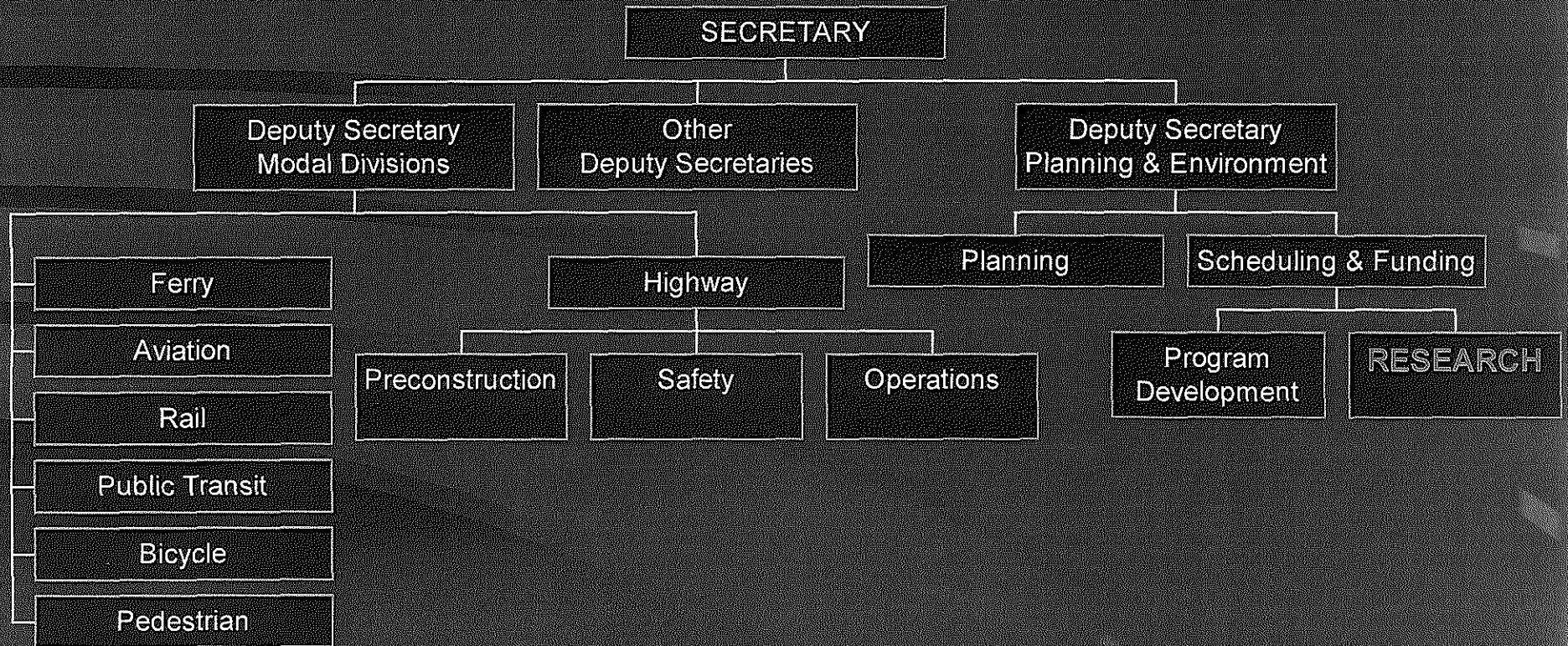
# Home of NCDOT

*“Murphy to Manteo”*



78,000 road miles  
166,000 lane miles

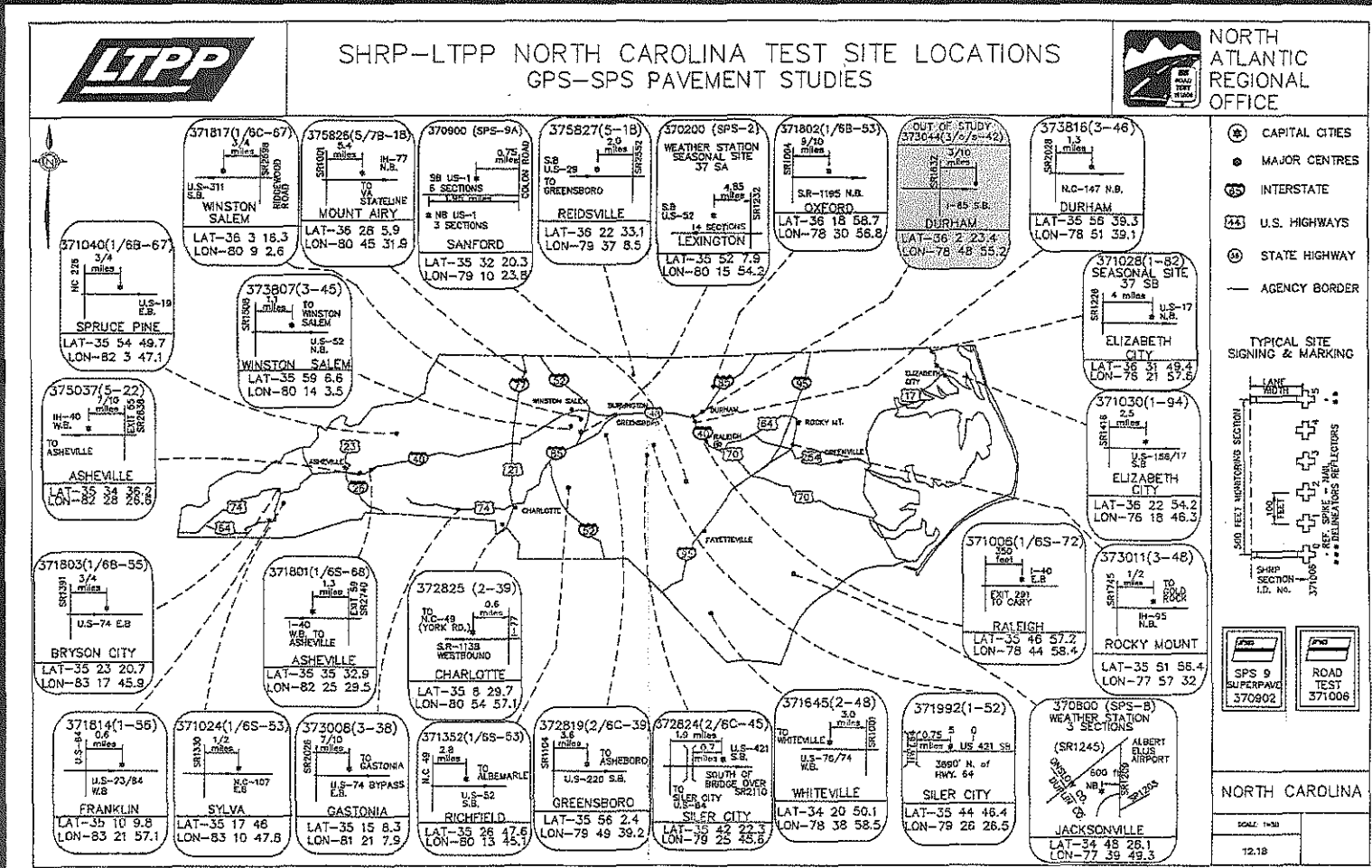
# Where's Research?



# Challenges

- How to get things done when you are not in charge
- 11 (5) people linking to X.E<sup>n</sup> customers

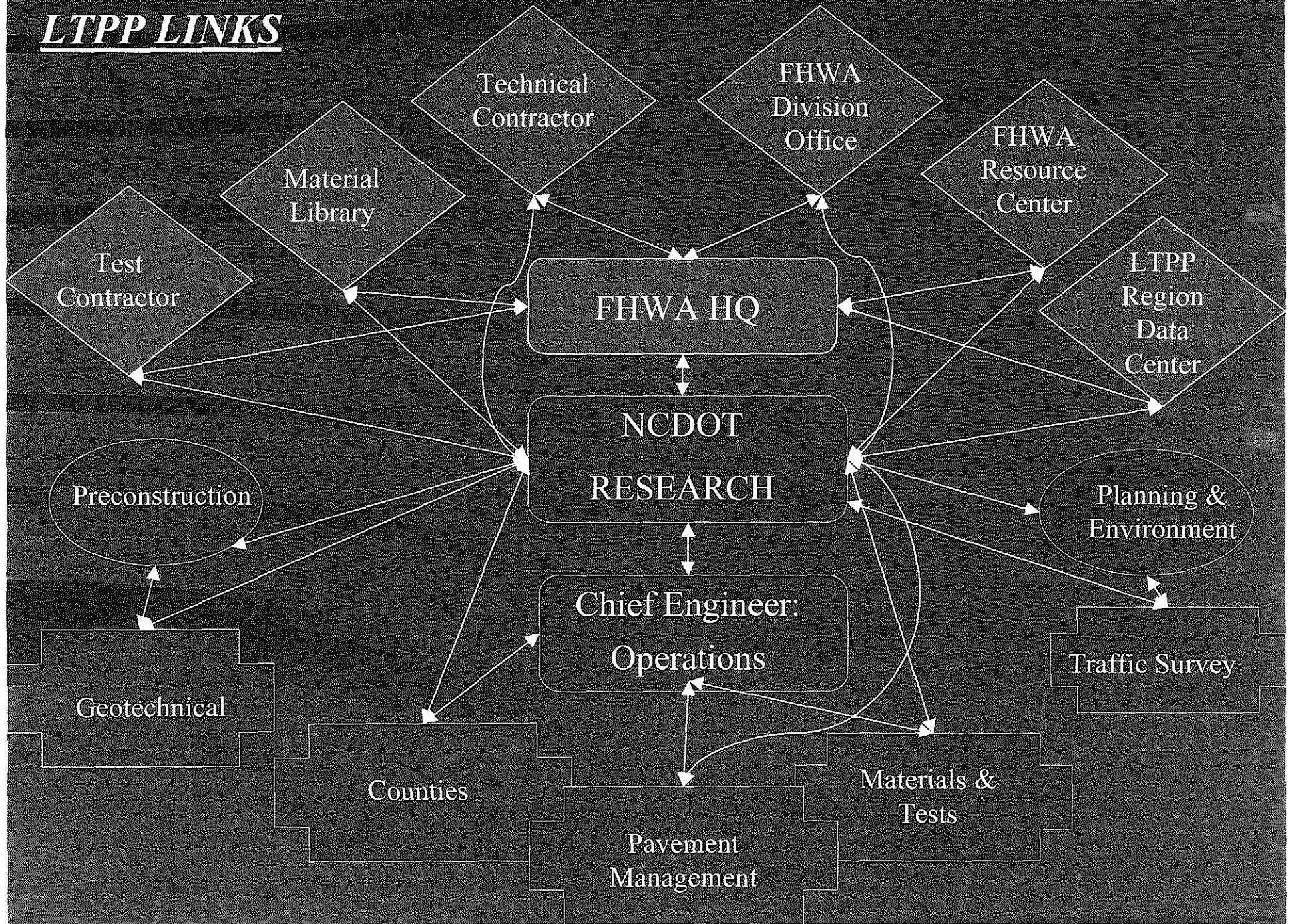
# Case 1: LTTP Experiments



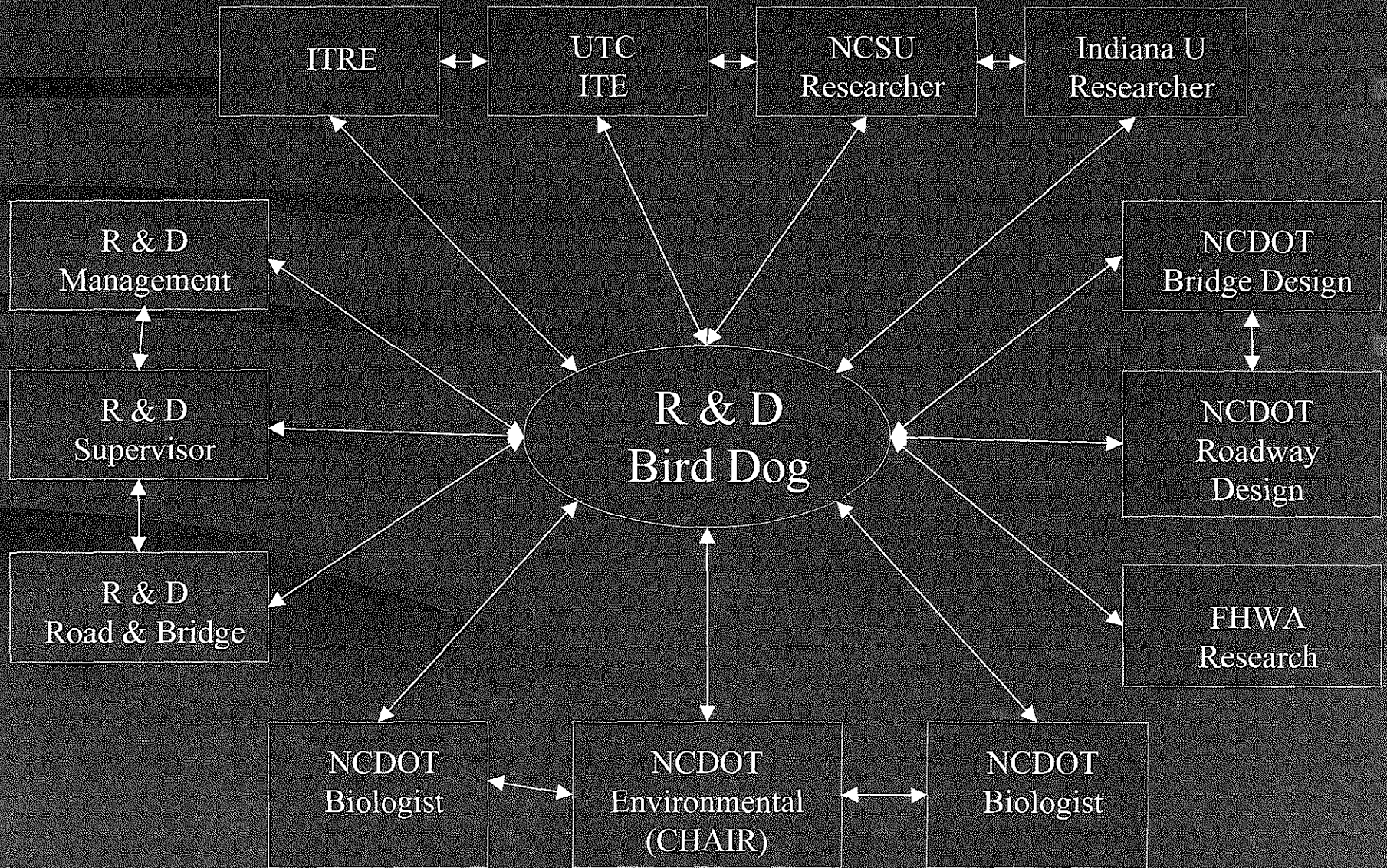
# NCDOT LTPP

- 50 Test Sections
- 26 Test Sites
- 21 Counties
- 13 Divisions

# LTPP LINKS



# Case 2: Bridge Shading on Saltwater Marsh

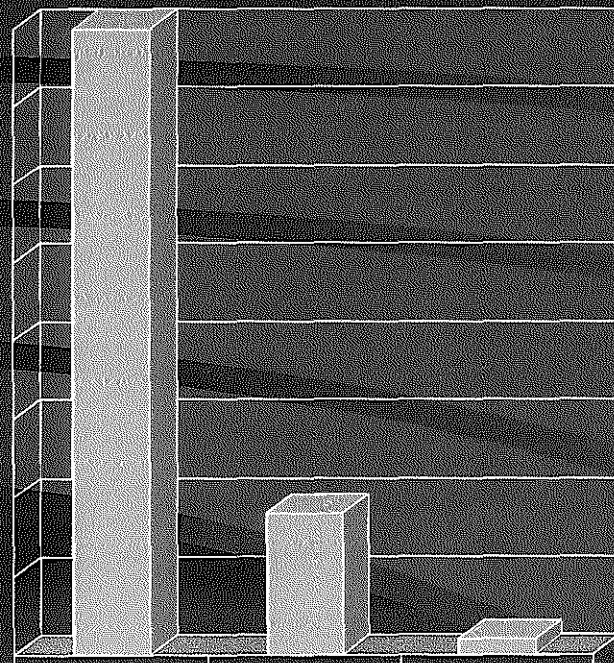


# Methods of Linking

- Email
- FAX
- Letter/Memo (Snail mail)
- Telephone / Car / Cellular / Pager
- One on one personal visit
  - with appointment or drop-in
- Group visits (Dog and Pony Shows)

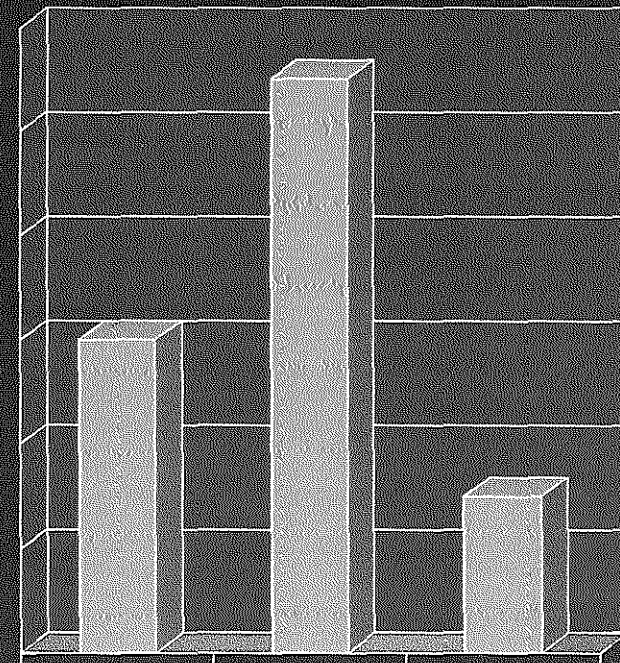


# Sources for Research Ideas



UNIV    DOT-  
         HQ    DOT-  
                 FIELD

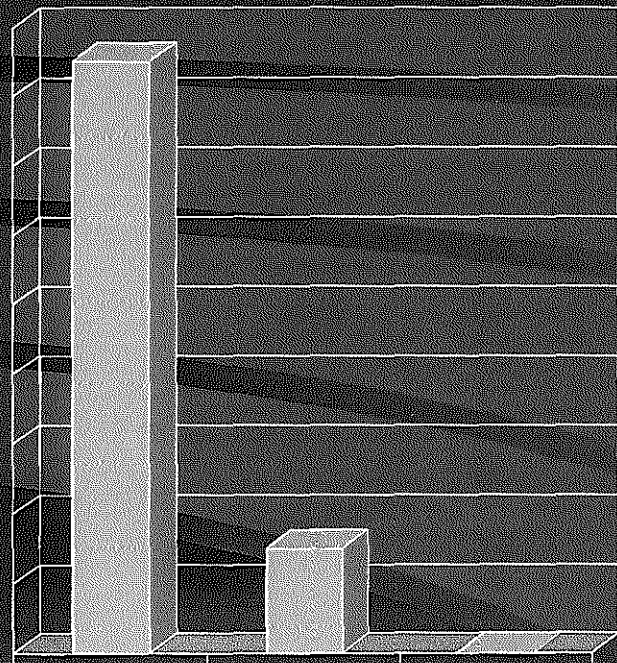
**BEFORE**



UNIV    DOT-  
         HQ    DOT-  
                 FIELD

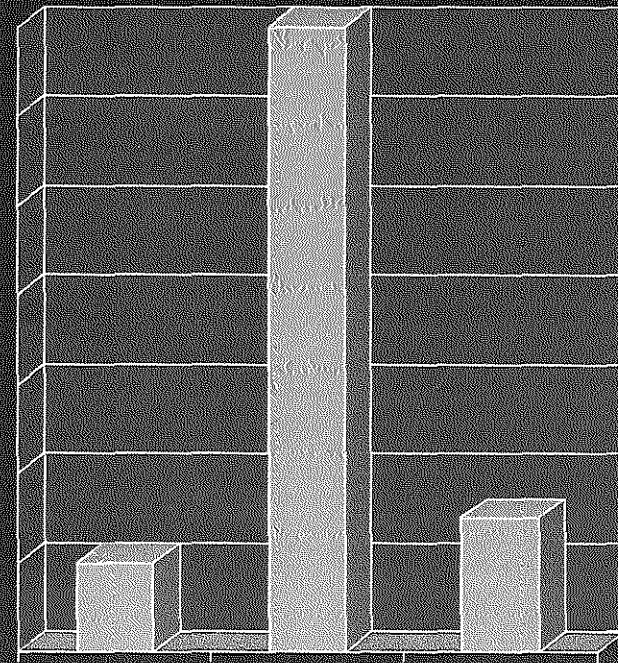
**AFTER**

# Projects Funded



UNIV      DOT-  
                    HQ      DOT-  
                                    FIELD

**BEFORE**



UNIV      DOT-  
                    HQ      DOT-  
                                    FIELD

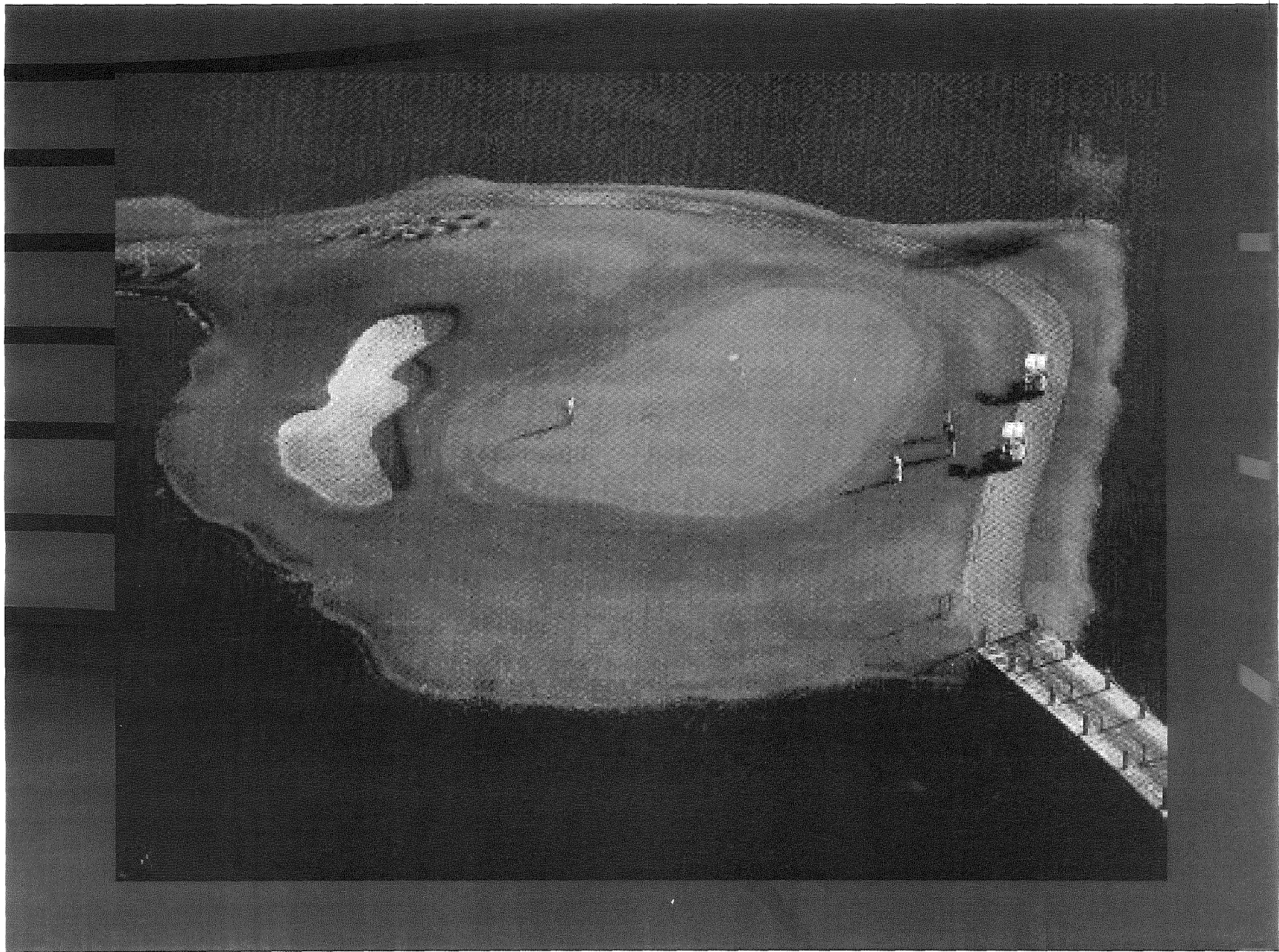
**AFTER**

# Random Thoughts on Linking

- Build TRUST through competence, genuine interest, and mutual care
- Visualize success
- Do not plan experiments designed to fail
- Hold meeting at customers turf
- Let customers do the talking
- Communicate, Communicate, Communicate

# More Serious Thoughts on Linking (Networking)

- Make Friends and Keep Friends
  - Sporting misadventures
    - Hunting
    - Fishing
    - Baseball
  - Culinary misadventures
    - North Carolina Barbecue
    - Catfish / Ham hocks / back bones
    - Collards
    - Peanut butter pies



# Cape Hatteras Lighthouse

