Research Performance Measures And Program Evaluation

Iowa Department of Transportation
Research Peer Exchange
October 8-9, 2003

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Introduction

The Iowa Department of Transportation hosted a Peer Exchange on October 8-9, 2003. The purpose of this exchange was to give research managers from several state departments of transportation the opportunity to discuss research performance measures and program evaluation. Breakout sessions allowed the team to discuss the value of research, implementation and technology transfer with Iowa DOT staff who sponsor research projects, and with university researchers who contract work with Iowa DOT. In addition, the team was given a tour of Iowa DOT's Materials Laboratory and a demonstration of Iowa's Maintenance Concept Vehicle, a snowplow truck equipped with high tech tools to make snowfighting operations more efficient.

The Report

This report is organized with the following topics.

- Observations and recommendations for Iowa DOT from team members
- Learning points and thoughts identified by team members for application in their home agencies.
- Suggestions for improving the peer exchange process.

The Peer Exchange Team

Each team member had a hand in making this exchange a success by every measure.

From left: Matt Mueller, Illinois DOT; Carol Culver, Iowa DOT; Mark Dunn, Iowa DOT; Max Grogg, FHWA Iowa Division; Dave Huft, South Dakota DOT; Sandra Larson, Iowa DOT; Richard Long, Florida DOT; Jowell Parks, FHWA Turner Fairbank Research Center; Pat Casey, Wisconsin DOT; David Johnson, Minnesota DOT; Dick McReynolds, Kansas DOT.

Observations and recommendations for Iowa DOT

1. What makes research valuable and effective?

- Research gives us the ability to accomplish what we are not able to do with existing staff. They have knowledge but not time. They may be aware of solutions to problems or situations but don't have credibility to make management listen.
- Puts a magnifying glass on a specific aspect or need and seeks a solution.
- Helps us apply and implement new technology.
- Helps us upgrade technical practices and standards.
- A means to stay current with best practices and opportunity to apply best practices.
- How well an identified problem is addressed, communicated and implemented.
- Better use of the resources we have.
- It's the job of research to make things work in a different way from how they work every day, apart from normal process improvement.
- Encourages multi-disciplinary approaches to problem solving.

2. What measurements can be used for research project and program performance?

- Iowa DOT wants to add to existing performance measures.
- Minnesota's three questions: 1) Are we doing the right things?
  2) Are we doing things right?
  3) Are they having the desired impact?

  Is it possible to develop a measurement system based on these questions?
- Research customer survey – electronic and brief
- Research peer review – PennDOT
- Program funding amount and sources – total value of pooled funds are a reflection of the value of the research program
- Pre-contract, selection phase considerations
  - Risk assessment, screening
  - Estimates of savings, benefits
  - Evaluate risk vs reward/payoff. Weight of this element? Need to realize that benefit may not be obvious or immediate. Sometimes it is outside the box, but potentially high payoff in long term. Display as quadrants.
  - Research supports department goals & performance measures, alignment with strategic plan
- Should there be goals, measures of the philosophy (such as balance and inclusiveness)? This can be part of "are we doing the right things?"
  - Are we meeting all the research needs?
  - Project development cycle time
  - Focus groups help us identify needs and set priorities. (Focus groups are cross-sectional groups of stakeholders in various work areas such as ACC, PCC, structure, roadside, geotechnical, safety, planning, etc. Groups include DOT staff, university staff, local government, industry and FHWA.)
  - Tracking the results of focus groups may provide a basis of measurement.
  - Track which focus groups meet, how often and who participated.
  - May discover more about the range of needs by making a very general solicitation first, then working with requesters to flesh out their requests.

- Measure research effectiveness/outcomes <u>for selected projects</u>.
  - Benefit/cost
  - Time savings – cycle time, crew time
  - Return on investment
  - Testimonials, anecdotal evidence
  - Life cycle analysis
  - User cost
  - Safety improvement, crash reduction
  - Real Options/Matrix Approach – Florida & New Mexico
  - Timeliness - schedule of individual tasks, good cop/bad cop, quarterly reports on standard form
  - Wisconsin project charting
  - Net Present Value takes into account time value of money
  - Retrospective analysis
  - Dashboards – Minnesota (Four outcomes are listed in Question #3.)
- Measure implemented research that meets user needs.

<u>3. How can implementation be ensured/facilitated?</u>

- Have the right people involved from the beginning – buy-in
- Close-out check-off after implementation – standard form by Minnesota
  - Original objective
  - What research was done
  - What implementation activities occurred
  - Descriptive info about impact or measurements
  - Outcome – 1) measurable change in practices
    2) non-measurable change
    3) knowledge gained
    4) results not usable
  - Outcomes are used as dashboards for reporting
- Louisiana has a system for tracking implementation over time
- Implementation and technology transfer activities
  - Videos
  - Reports
  - Results in change to specification or standard procedure
  - Field demonstrations
  - Workshops or training
  - Newsletter
  - Web site
  - News releases
  - Conference presentations – regional, national
  - Equipment
  - Tool development – software or hardware
  - Use by other agencies
  - Intrinsic benefits list - Kansas
- Timeliness
- Best practices after implementation – was the research used?

4. How can technology transfer be evaluated?

- Measure customer satisfaction and effectiveness of activities above.
- What are we using and disseminating from other resources - states, FHWA, industry, etc.?
- Library measures – web hits, requests for assistance, outreach efforts, acquisition and distribution

Learning points and thoughts identified by team members

Richard Long, Florida DOT

- Wisconsin's customer survey will be useful
- Usefulness of technical panels
- Usefulness of focus groups
- FHWA effort on Program Assessment Rating Tool (PART)
- Application of Baldrige criteria – customer satisfaction, organizational health, business improvement
- Minnesota criteria (three questions from Question #2 above)

Dick McReynolds, Kansas DOT

- Use of technical career track vs management career track
- Illinois – quarterly progress reports and invoicing to tie them together
- Use of Research Coordinators
- Investigate dashboard-style presentation of information
- Four definitions of success from Minnesota (dashboards from Question #3 above)
- Wisconsin Annual report format – visual reporting of timeliness
- TRIS/RIP search on Research Idea form - Florida
- PART
- Customer satisfaction survey
- Risk vs reward evaluation – identify quadrants

David Johnson, Minnesota DOT

- TRIS/RIP search
- Customer satisfaction added to three questions
- Benefit/cost of research – Kansas
- Focus on target projects (home runs) for further b/c analysis
- Illinois idea of considering implementation planning at beginning of project
- Quarterly reporting

Patrick Casey, Wisconsin DOT

- Focus group structure, organization and involvement of locals & industry
- Minnesota concept of setting aside % of funds for implementation up front
- Florida's recommendation to use high success projects for implementation focus. Select a few for implementation efforts.
- Materials lab tour yielded ideas to be taken back.

David Huft, South Dakota DOT

- Modify SDDOT's Quarterly Research Status Report to include a graphical representation of schedule and progress like Wisconsin's.
- Strengthen the definition of planned implementation by using an Implementation Plan format—with specifically identified tasks and responsibilities—similar to that used by Kansas and Wisconsin.
- Adopt a standard progress report format, based on the Illinois quarterly report.
- Incorporate aspects of Wisconsin's and Florida's research customer surveys into SDDOT's survey of active and recent research contractors.
- Add an estimate of potential benefit and risk to SDDOT's research suggestion form.
- Acquire information on technical career paths from FHWA and Iowa, for use in South Dakota's current research classification review.
- Consider assigning ongoing responsibility for specific subject areas to individual research project managers, including accountability for scanning literature for applicable research done by others and communicating information to practitioners in the subject areas.
- Exchange information with FHWA on use of the Performance Assessment Rating Tool at FHWA and SDDOT.
- Include Minnesota's 4-outcome dashboard assessment (measurable changes, unmeasured changes, knowledge gained, and no useful results) in SDDOT's project evaluation by the technical panel.
- Produce quantified benefit/cost estimates for at least 1/3 of projects completed next year.

Matt Mueller, Illinois DOT

- All of the above plus
- Frequent and simplified newsletter – single sheet
- Solicit research through newsletter (Kansas does by e-mail)
- Research mission statement
- Emphasis on successes with annual report using graphics, visuals

Joe Parks, FHWA Turner-Fairbank Highway Research Center

- Usefulness and ease of Kansas benefit/cost approach
- Minnesota three questions (about doing things right)
- Illinois process to identify benefits up front
- Wisconsin Annual Report graphics

Max Grogg, FHWA Iowa Division

- Wisconsin one-page Annual Report
- Need for a champion in getting implementation
- Home run emphasis
- TRIS/RIP search
- Minnesota three questions and four-measure dashboards

Sandra Larson, Iowa DOT

- All of the above plus
- Immediate plan for the "low-hanging fruit" from this project as Iowa will publish an annual report in December.
- Long-term plan for deeper implementation
- Home runs for emphasis on measurement
- Timeliness encouragements, good cop/bad cop
- OK to start w/ small steps
- Usefulness of customer surveys
- Implementation funds set aside up front
- Annual report ideas, especially Wisconsin's one-page presentation

Mark Dunn, Iowa DOT

- Wisconsin one-page report format w/ graphic on timeliness
- Four-point outcome rating will be useful
- Functional area breakdown of funding
- More face to face prompting for research ideas
- Tracking funds leveraged from others as measure of partnerships and selling point
- Improving on quarterly reports, making them more useful and requiring from all projects
- Want to measure project development cycle time – when a concept is presented, when it gets underway, when it is completed.

Carol Culver, Iowa DOT.

- Graphics for Annual Report to provide visual impact.
- Breakdown of funding by work area using the funds and by activity (for example, work areas would be ACC, PCC, or structures, while activity would be research project, pilot project, training, equipment)
- Minnesota dashboards
- Quarterly report in electronic format w/ prompts for information

Suggestions for improving the peer exchange process

- Post all Peer Exchange reports on RAC/SCOR website
- Each state should use and structure the Peer Exchange to meet its need.
- This exchange had an unusual format with breakout groups rather than traditional interviews. It was helpful since customers were able to interact with team members and university representative and shared ideas. The schedule allowed change of places, focus, and pace with appropriate downtime.

Attachments

1. Peer Exchange Agenda
2. Notes from the breakouts
3. Team member contact list

Attachment 1

Iowa DOT Research Peer Exchange
Agenda

Tuesday evening, October 7

Peer Exchange Team only

6:00 Dinner & Introductions, Audubon's (Gateway Center)

Wednesday, October 8 – Gateway, Meadow Room

Note: 8:00 – 2:45 activities will involve Peer Exchange Team and Iowa participants.

8:00 – 8:30 Welcome – Sandra Larson

8:30 – 10:30 Short roundtable – what each state is doing in research

- Describe your program - projects, value, researchers, pooled funds
- Project value, quality or performance measurement methods
- Timing - are measures in process, at project close or post-implementation?
- How did you choose your measures?
- What training was needed?
- How do you evaluate the success of your overall program?
- Do you measure customer satisfaction?

10:30-10:45 Break

10:45 – Noon Breakout groups in conference rooms (listed on next page)
Each group will need a recorder and reporter

Questions to consider

- What makes research valuable to your work area and to DOT?
- What makes research effective for your work area and to DOT?
- How do you decide what research to fund and at what level?
- Do you review/audit the cost of research projects? Who, how and when?
- Do you evaluate timeliness of project completion? Who, how and when?
- Do you assess the benefit of a project? Who, how and when?
- Do you consider measures of value or performance at project's outset?
- As you evaluate the success of your research, how do you take into account implementation and technology transfer?

12:00 – 1:00 Lunch

1:00 – 2:30 Reports back on breakout discussions

2:30 – 2:45 Break

Peer Exchange Team only

2:45 – 4:30 Discuss Research Program Philosophy

6:00 Dinner

Thursday, October 9 – Gateway, S Meadow Room
Peer Exchange Team only

8:00 – 9:30 Tour DOT research facilities
- Materials Laboratory
  - Nottingham Asphalt Tester
  - Foamed Asphalt
  - Air Voids Analyzer
- Maintenance Concept Vehicle
- Research & Technology Bureau – view web site

9:45 – 10:15 Visit CTRE facilities

10:30 – 11:15 Begin to develop recommendations

Performance Measures
- prior to starting the research
- in progress
- at completion
- follow-up – after 1 year?

Technology Transfer
- how does it occur?

Technology Implementation
- plan for during all research phases
- carry out research plan

11:15 – 1:00 Lunch

1:00 – 4:00 Complete report (need to clear the room by 4)

6:00 Dinner

Breakout Groups

Engineering	Operations	Planning
Sandra Larson	Mike Jackson	Carol Culver
Joe Parks	Mark Dunn	Pat Casey
Matt Mueller	Dick McReynolds	Richard Long
Dave Johnson	Dave Huft	Max Grogg
Norm McDonald	Jim Berger	Stan Peterson
Ahmad Abu Hawash	Lee Wilkinson	Steve Andrle
Will Stein	John Smythe	Phil Meraz
Kent Nicholson	Roger Gould	John Somervill
Chris Brakke	Jim Rost	
Lowell Greimann	Will Zitterich	
Tim Simodynes	David Forkenbrock	
	Lee Smithson	

Attachment 2

Iowa DOT Research Peer Exchange
Notes from 10-08-03 breakouts

1) What makes research valuable to your work area and to DOT?

- Gain knowledge
- Save money
- Efficiency
- Future savings
- Improved safety
- Research is valuable when it is implemented
- Allows innovation
- Allows for looking at the big picture
- Intangible value is not measurable – satisfaction researcher gets from pursuing solutions and thinking outside the box
- South Dakota – always in strategic plan, assist with agency concern
- Helps us apply or implement new technology
- An opportunity for forensic investigation of current operations
- Stay current with best practices in operations and improve current operations – faster, higher quality, more efficient, etc.
- Solve user-driven needs
- Better use of the resources we have
- How well an identified problem is addressed, communicated and implemented
- Needs could be unique to specific geographical areas
- LTPP – help use our local resources to improve
- Return on investment

2) What makes research effective for your work area and to DOT?

- Make the product better
- Change outcomes
- Does it achieve what you are after
- Intangible - discussion with peers
- Effective research has a team leader/champion throughout the entire process
- Minnesota sets aside a % of funds to jumpstart implementation
- Without with champion or jumpstart money, you rely solely on someone's initiative to utilize the research
- Strong cooperation of industry and department
- Reasonable ease of integration into our process, if desirable
- Did it meet goals and optimize results
- Put recommendations in terms that users can understand and use
- Meet a defined need and be affordable
- Research has to be valid and sound
- Needs to tell us what to do and what NOT to do
- Technology transfer

3) How do you decide what research to fund and at what level?

- Combine a top-down and bottom –up approach, problems identified both by managers and in the trenches
- Focus groups in Iowa – 100 stakeholders develop their agenda in specific area
- Ideas (pure research) vs practical research projects – need to distinguish between these two
- Strategic plan w/ performance measures in other areas
- General focus can change (9/11 as example, new focus of security)
- Be careful not to jump into wrong areas to an unwarranted level
- Don't forget five-year or long-term goals
- Client-driven approach creates a new set of problems
- DOT's need to think more when putting out an RFP – need dialog for successful projects
- Develop relationship up front – research managers in dept with outside researchers
- Broker networks of communication
- Researchers - best for new technology
- Depends on individual project whether DOT monitors or has hands-on involvement
- Researchers ask DOT for data and suggest projects
- Florida will not accept requests from other than DOT staff
- Not always clear what dollar amount of project should be – experience helps
- Cost estimate can be developed jointly between DOT and university
- Iowa Highway Research Board – costs based on pattern of projects
- Budget constraints vs need for project
- Wisconsin does "Review Study" – apply unbiased expert recommendations based on research previously conducted by others. Looking for insight into the work.
- Depends on the funding source – SPR or state
- Matching funds help
- Upper management approval
- Iowa Highway Research Board – focus groups meet periodically, product a report of research recommendations, set priorities, also do ad hoc immediate opportunity projects, assign estimated value to research.
- South Dakota - Suggestions lists – project panel decides if needed and funding level. Final approval by a review board
- Kansas has three-tier committee structure solicits from everyone, then screens. Also has an ad hoc process for immediate needs

4) Do you review/audit the cost of research projects? Who, how and when?

- Florida – 90% are lump-sum contracts, generally don't pay travel expenses for things like TRB
- Researcher does the best job possible with the money they are given
- External audit could become an issue in the future
- Helpful to have macro accounting of what DOT's are getting from SPR projects
- Research fund manager reviews all proposals and revisions
- Set costs are almost never exceeded w/ lump sum
- Illinois uses standard progress report format
- Should there be a budget up front for a project?

5) Do you evaluate timeliness of project completion? Who, how and when?

- Is time an issue? More focus on research results.
- Establish reasonable schedule up front, then make researchers justify extensions
- Set up accountability with researchers, show when they are behind
- Some states only make payment on project deliverables
- Shorter term projects are often more timely with completion
- Currently a lot of extensions for projects are being submitted
- Schedules are required to be set at the onset of the project and then enforced by someone other than the project manager (Illinois) good cop/bad cop
- A high rate of no-cost time extensions requests in Minnesota

6) Do you assess the benefit of a project? Who, how and when?

- Benefit to whom? DOT, researcher, user may have different values
- Florida reach functional area prioritizes their projects, pick from the top
- Research is somewhat trendy
- There may be "sequential" research – one project builds foundation for another
- Retrospective evaluations helpful – five years?
- Iowa and Illinois do this right up front
- Minnesota uses a retrospective approach, assessing benefits afterward
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7) Do you consider measures of value or performance at project's outset?

- Florida – matrix model will force them to measure benefits up front
- Measure benefits through life of research – how long would that be?
- Do only sampling for future benefits and pick the home run hits
- Iowa and Minnesota– no
- Illinois determines value or benefit up front before beginning a project
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8) As you evaluate the success of your research, how do you take into account implementation and technology transfer?

- Must be done – can't measure benefits if it has not actually been implemented
- Research in states vs implementation in other states – more attention needs to be paid on back end of research projects
- Research turns into a service – external partnerships
- Illinois has an implementation engineer
- Some funding is set aside for implementation
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Attachment 3

Peer Exchange Team Members

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