Florida Department of Transportation

FDOT TRANSPORTATION RESEARCH PEER EXCHANGE

FINAL REPORT

[Prepared and submitted in accordance with 23 CFR 420.207(6)(b)]

FDOT Research Center
605 Suwannee Street, MS 30
Tallahassee, Florida 32399

February 28, 2013

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I. INTRODUCTION — Welcome, Overview, and Objections

23 CFR Part 420, Subpart B contains four provisions that each State must meet to be eligible for FHWA planning and research funds for its research, development, and technology transfer (RD&T) activities, one of which is to conduct of peer exchanges that consider for improvement the State's RD&T management process, or some aspect of the research program, and to be willing to participate in peer exchanges held by other state transportation research programs. This report documents the Florida Department of Transportation's peer exchange held January 30–February 1, 2013, in partial fulfillment of these requirements. Members of this Peer Exchange team included

- Jason Bittner, USF/CUTR
- Jerry DiMaggio, SHRP2/TRB
- Darryll Dockstader, FDOT
- Robert Eger III, Naval Postgraduate School
- Vicky Fout, ODOT
- Mark Greeley, FDOT
- Barbara Harder, B. T. Harder, Inc.
- Cameron Kergaye, UDOT
- Carl Mikyska, FHWA
- Skip Paul, LTRC/LA DOTD
- Pete Zaniewski, Caltrans

Other participants observing the exchange:

- Jeri Shell, LTAP

Left to right: Cameron Kergaye (UDOT), Barbara Harder (B. T. Harder, Inc.), Vicky Fout (ODOT), Mark Greeley (FDOT), Darryll Dockstader (FDOT), Jason Bittner (USF/CUTR), Carl Mikyska (FHWA), Jerry DiMaggio (SHRP2), Pete Zaniewski (Caltrans), Skip Paul (LTRC/LA DOTD), Robert Eger III (Naval Postgraduate School), Jeri Shell (LTAP)

Each of FDOT's peer exchanges has been substantially different in composition and theme. The first focused on overall research program management; the second on opportunities for enhancing the Research Center's relationships with FDOT project managers and universities; and the third on identifying research opportunities through visioning.

The theme of this fourth peer exchange was to identify opportunities to enhance transportation research implementation and performance analysis activities and processes. The format of the report follows the format of the working sessions for the first two days of the exchange. Two sessions were held on day one, focusing respectively on implementation of research and performance analysis of research outcomes. The goal of day two was to workshop and synthesize the ideas generated on day one to develop recommendations for program improvement.

II. IMPLEMENTATION

Participant Recommendations for Implementing Transportation Research Results

Barbara T. Harder led a brief session in which participants discussed recommendations for an implementation and performance analysis process. The following is a list of brainstorm ideas in no particular order of preference.

Implementation elements to be considered for an implementation and performance analysis process

- Problem exists, emerging problem
- Solve problem
- Key trigger points — monitor
  - kickoff meeting, mid-project, closeout meetings
  - where trigger point is
- Expectation of end products
- Defined success – short- and long-term
- Defined evaluation process
- How do you believe you will measure?
  - Do early
  - May change over course of project
- Data collection
- Adapt to incorporate performance assessment
  - Before and after
  - Life-cycle perspective
- Outputs — Outcomes
- Products — Impacts
- Train people — Change of process
- Barriers to success of implementation
  - Change of staff
  - External knowledge
- Define roles and responsibilities for Implementation and Performance Analysis

- Everything has to equal a number, quantification of
  - Time
  - Dollars
- Implemented or not (overall program measure)
- Plan for implementation
  - Potential impact
  - Target audience
  - Strategies and tactics to use
  - Decision-makers involved
  - How evaluate?
- Alignment/relevancy
- Stewardship of money, other resources
- IT research results, unique case of implementation
- Cost of implementation
  - Who will pay
  - Partner with operational organization
  - Skill competency
- Can I afford the implementation?
- Organizational readiness to accept the innovation
- Time to do implementation and technology transfer needs to be part of the contract or otherwise addressed in some formal way
- What did you do differently based on implementing the research?
- What did you learn?
- What will you do with your results?
  - Vision for result/outcome

III. PERFORMANCE ANALYSIS

Research Performance Analysis

Robert Eger III led an in-depth discussion on performance analysis, in which participants discussed measurement indicators and desired outcomes. Key points of this discussion included

Why to measure performance

- Provide support
- Guide knowledge transfer
- Enhance opportunities
- Determine value of opportunity costs

How to measure performance

- Common (the what-to-measure) metrics
  - Input/output based
    - Labor
    - Materials
  - Outcome based

Potential outcomes of R&D

- Positive results (directionally hypothesized)
  - Measurement focus on R&D sunk costs and forecasted costs (historical)
  - R&D can drive metrics used
  - Focus on ROI and/or CBA leads to dependency to use linear focus
- Negative results (opposite direction of the hypotheses)
  - Leads to non-implementation
  - Measurement focus on sunk costs
  - Ignores opportunity costs
  - Usually ignores costs associated with DOT management and oversight
  - Timeliness effects
- No results (from both a practical and statistical point)
  - Leads to potentially more R&D
  - Measurement of similar to negative results
  - Leads to question, "Was the first R&D correctly thought through?"

Group consensus determined that benefit can be shown in other ways than monetary:

- Cost savings
- Time savings
- Knowledge increase
- Leverage

IV. CONCLUSIONS

This peer exchange benefited from a vibrant team with a great deal of mature consideration of issues which continue to create challenges within the transportation research community. The various perspectives of the state, federal, academic, consultant, and SHRP2 participants made for valuable discussion.

1. Participant Takeaways

Jason Bittner
Center for Urban Transportation Research (CUTR)
University of South Florida

- Implementation activities need to be clearly defined at the start of project cycle
- We solve problems
- Staff size essential for performance tracking (or outsource)
- Program managers/project directors need to be committed to the project and champion its implementation
- Numbers are needed — monetization probably more important than ever before
- PI must be engaged in the implementation plan; can no longer just throw it over the wall
- Implementation needs dedicated funding (e.g., VCTR $10m)

Jerry DiMaggio
SHRP2

- Processes for lessons learned would be valuable to RAC leadership
- Growing need to have implementation process in cooperative program

Robert Eger
Naval Postgraduate School

- Add ways to approach implementation early in RFP response
- Seek out if projects were implemented
- Evaluate in meta-analysis the time effects in measuring (monetized) performance
- Consider LTRC system as potential example of specific short-paper hits

Vicky Fout
Ohio DOT Research Section

- Measures need to be unified, user-oriented, scalable, systematic, effective, and calculable; however, just because you can measure it doesn't mean it's meaningful. Continue working towards defining and establishing measures of quality.
- Identify tools that will be used to measure implementation, the data needed for evaluation, and who will be responsible for data collection at the beginning of the project.
- Consider limiting highlighting projects for demonstrating a return on investment to 3−5 years after implementation has occurred in order to be realistic and credible.
- Consider utilizing 60-second YouTube videos developed by researchers (as part of projects) for marketing tools.

Barbara T. Harder
Barbara T. Harder, Inc.

- Work on defining practices/guidance for capturing implementation success.
- Review current assignments to better link implementation and performance measures.
- Do some background work to identify credible quality measures for transportation research outcomes.
- As suggested by Cameron Kergaye (Utah DOT), investigate adding language for clients' problem statement criteria: "how do we measure implementation and what data is required to do so?"
- Investigate the functional capabilities of LTRC's Program and Project Management System as a potential model for an existing assignment.
- Consider developing a Research Implementation Assessment Report system for current client based on LTRC's Report.
- Investigate promoting more content in implementation plans related to performance — data required before implementation, after implementation, how best to get it.

Cameron Kergaye
UDOT

- Redefine a position (with funding) for research implementation.
- Request problem statement submitters suggest "implementation performance measures."
- Incorporate peer reviewed papers to supplement or replace UDOT research reports.
- Utilize SPR funding to support travel for needed out of state TAC members.

- Prepare for EDC2 funding opportunities (similar to SHRP2 efforts).
- Drop "relevance" as a research workshop/problem statement criteria and use "importance" and "likelihood" of implementation in Utah.
- Ranking of problem statements should require an explanation for the order of top problem statements (to assist in funding determinations between functional groups).

Carl Mikyska
FHWA

- Economic climate sets politics
- Political trend is to demonstrate value of service
- Aligns with MAP-21 and expected future highway funding legislation
- Everything can be measured — needs to be unified
  - Monetary
  - Quality
  - Results — yes or no
- Research existing data can define measures
- Success is started in careful definition of problem statement and defining the project
- Elevator speech
- Looks at funding for implementation of research. What are other states doing? How are they funding it?

Skip Paul
LTRC

- Funding set-aside for implementation projects
- Use of research posters at TTEC and LADOTD HQ atrium to communicate research solutions
- Develop scan tours similar to one of three domestic scan tour models

Pete Zaniewski
Caltrans

- Problem statement
  - Anticipated benefit
  - Expected outcome
  - Performance measure to use and data need
- Implementability of product part of criteria for project selection
- Implementation status report
- Implementation plan
  - Research assessment and implementation report drafted by implementation engineer at first project meeting
- Customer survey
  - Was the product delivered what you expected?

2. Research Center Action Plan

Key recommendations provided by the peer exchange team include the following:

1. Develop an automated program/project management system.
2. Utilize a research implementation assessment report as a planning and process document.
3. Reexamine the Research Center's project selection process with respect to closer attention to implementation and performance measures.
4. Embrace performance analysis to include credible qualitative measures.
5. Develop additional ways to communicate research solutions.
6. Increase PI participation in implementation activities.

Each of these recommendations provides an opportunity to develop or advance activities and processes to enhance program effectiveness and efficiency.

While more complete review of these recommendations and action plans for addressing them will occur over the next few weeks, the following outlines initial considerations:

- In order to leverage existing resources in an effective and efficient manner, develop a comprehensive, automated Research Program and Project Management System to include elements such as
  - Project reports
  - Project deliverables tracking
  - Research problem solicitation process
  - Financials
  - Research assessment and implementation report
  - Roll-up capabilities
  - Automated reports/emails/alerts
- Develop a planning document in the form of a research assessment and implementation report to include possible elements such as
  - Project title
  - Objectives
  - Implementation recommendations
  - Potential impact
  - Target audience
  - Strategies and tactics
  - Timelines
  - Implementation responsibilities
  - Decision makers
  - Evaluation effort/performance indicators
  - Principal investigators
  - Functional group
  - Research manager
  - Implementation manager
- Experiment with and pilot the research assessment and implementation report to develop it into a standard operating procedure for each research effort; proof-of-concept w/revisions are expected. Similarly, trigger points for report updates will need to be proofed.
- Reexamine project selection process with respect to implementation and performance measures

- Consider additional or increasing methods to communicate research solutions such as:
    - Tweets
    - One pagers
    - Four-page technical reports
    - Final reports
    - Webinars
    - 60-second videos
- Enhance participation of principal investigator in implementation activities; help to develop ownership, further engage the PI. Provide guidance for planning or participation in specifications, training modules, creation of videos.
- Embrace performance analysis using quality measures in addition or in lieu of quantitative measures. Specific examples include policy studies, environmental studies, planning studies.
- Assign responsibilities and accountabilities to take advantage of the enhanced effectiveness and efficiencies that will be created.
- Revise procedures and research manual to reflect changes made and formalize the processes.

V. THE FDOT RESEARCH CENTER 2013 PEER EXCHANGE TEAM

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The FDOT Research Program receives over $12 million in funding annually. Most of the research projects are performed by in-state universities under contract. FDOT functional areas, the Research Center, and upper management review and prioritize annual research needs identified by FDOT employees. The Research Center's website, http://www.dot.state.fl.us/research-center, includes final reports, summaries of final reports, *Research Showcase* magazine, and other information. The T2 program for the state is administered by the University of Florida.

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Background, left to right: Pete Zaniewski (Caltrans), Carl Mikyska (FHWA), Skip Paul (LDOTD), Jerry DiMaggio (SHRP2), Cameron Kergaye (UDOT), Barbara Harder (Barbara T. Harder, Inc.), Robert Eger III (Naval PostGraduate School); Foreground, left to right: Vicky Fout (ODOT), Jason Bittner (USF)

Appendix A — Florida Peer Exchange 2013 Program

Florida Peer Exchange
"Research Implementation and Performance Analysis"
January 30 – February 1, 2013

WEDNESDAY — January 30, 2013

8:00 am	**Commute to Burns Building**	
8:15 – 9:00 am	**Welcome, Overview, and Objectives** Brief Introductions	D. Dockstader All
9:00 – 10:15 am	**Participant Expectations for Research Implementation** Describe your role in implementation monitoring and Improvement. Does your program have a developed process? Plans for evolving the process? Examples?	All
10:15 – 10:30 am	**Break**	
10:30 – 11:30 am	**Morning discussion continued** Close with cataloging of questions / issues	All
11:30 am – 12:45 pm	**Lunch**	
12:45 – 1:30 pm	**Implementing Transportation Research Results**	B. Harder
1:30 – 2:45 pm	**Participant Expectations for Performance Analysis** Describe your role in performance analysis of research Projects. Does your program have a developed process? Plans for evolving the process? Examples?	All
2:45 – 3:00 pm	**Break**	
3:00 – 4:00 pm	**Afternoon discussion continued** Close with cataloging of questions / issues	All
4:00 – 4:45 pm	**Research Performance Analysis**	R. Eger
4:45 – 5:15 pm	**Review questions / issues list, goals for day two** **Return to hotel**	Facilitator
6:00 pm	**Group Dinner — Backwoods Bistro**	

Florida Peer Exchange
"Research Implementation and Performance Analysis"
January 30 – February 1, 2013

THURSDAY — January 31, 2013

8:00 am	**Commute to Burns Building**	
8:30 – 9:00 am	**Recap of Wednesday** Comments	Facilitator
9:00 – 10:45 am	**Implementation & Performance Analysis Model Process** Develop an integrated implementation and performance analysis model process	All
10:45 – 11:00 am	**Break**	
11:00 am – 12:00 pm	**Implementation & Performance Analysis Model Process**	All
12:00 – 1:15 pm	**Lunch**	
1:15 – 3:00 pm	**Implementation & Performance Analysis Model Process**	All
3:00 – 3:15 pm	**Break**	
3:15 – 4:15 pm	**Implementation & Performance Analysis Model Process**	All
4:15 – 5:30 pm	**Develop information for Friday wrap-up** Opportunities and key takeaways	All

FRIDAY – February 1, 2013

8:00 am	**Commute to Burns Building**	
8:15 – 9:00 am	**Report Review / Finalization**	Facilitator
9:00 – 9:30 am	**Travel / Break**	Travel / Break
9:30 – 10:30 am	**Wrap-up Presentations to FDOT Management**	All
9:30 – 10:30 am	**Return to hotel**	All

Appendix B — "Implementing Transportation Research Results", by Barbara T. Harder

The following is the text of a PowerPoint presentation made at the Florida Peer Exchange 2013.

Slide 1

Implementing Research Results

Florida Department of Transportation
Research Center Peer Exchange
January 30 – February 1, 2013

Barbara T. Harder
B. T. Harder, Inc.
Discussion Leader

Slide 2

Schedule for Implementation Discussion

- 45 minutes to
  - Share expertise on implementation
- One hour + for questions and issues discussion
  - Get on the same page
- 45 minutes to
  - Identify and list key observations and issues that we would like included in the implantation and performance analysis model process which we will build tomorrow

Slide 3

Agency Implementation Activity Summaries

- Short description of implementation program/activities
  - Key processes — implementation planning, identification/selection of candidate projects, marketing/promotion, monitoring/tracking, evaluation, assessment
  - Level of effort — resources committed; personnel
  - Primary needs/gaps — skill/competency; processes/methods; resources

Slide 4

Getting on the Same Page: A Quick Check

- What are we implementing?
  - Research results; innovations
  - Internally or externally produced, by my program or others
- Common understanding of implementation for this exchange
- How are we using terms?
  - Adoption
  - Deployment

- Application to practice
- Innovation delivery
- Technology transfer

Slide 5

Purpose of Implementation

- Realize the value/benefits of research results and/or innovations for agency use
- Generate a return for the research investment
- Contribute to achieving agency's strategic goals and objectives
- Build credibility for research program activities to continue to accomplish first 3 points
- …
- …

Reference points 1-3: Building PennDOT's Research and Innovation System ,
91st TRB Annual Meeting, Bonini, Fields, Vance, Renz, Harder, Treisbach, Bankert

Slide 6

Implementation Discussion
Yellow — A Priority (A), Teal — B Priority (B), White — No Priority Assigned (NPA)

- Problem exists, emerging problem (A)
- Solve Problem (A)
- Key trigger points — monitor (A)
  - Kickoff meeting, mid project, closeout meetings
  - Where trigger point is
- Expectation of end products (B)
- Defined success — short and long term (B)
- Defined evaluation process (B)
- How do you believe you will measure (B)
  - Do early
  - May change over course of project
- Data collection (B)
- Adapt to incorporate performance assessment (A)
  - Before and after
  - Life cycle perspective
- Outputs Outcomes (A)
- Products Impacts (A)
- Train people change of process (A)
- Barriers to success[ful] impl[ementation] (A)
  - Change of staff
  - External knowledge
- Define roles and responsibilities for Implementation and Performance Analysis Model (A)
- Everything has to = a number — quantifications (NPA)
  - Time
  - Dollars

Slide 7

Implementation Discussion

Yellow — A Priority (A), Teal — B Priority (B), White — No Priority Assigned (NPA)

- Implemented or not (overall program measure) (B)
- Plan for implementation (A)
  - Potential impact
  - Target audience
  - Strategies and tactics to use
  - Decision-makers involved
  - How evaluate?
- Alignment/relevancy (A)
- Stewardship of money, other resources (B)
- IT research results, unique case of implementation (NPA)
- Cost of implementation (A)
  - Who will pay
  - Partner with operational organization
  - Skill competency
- Can I afford the implementation? (NPA)
- Organizational readiness to accept the innovation (A)
- Time to do implementation and technology transfer piece, needs to be part of the contract or provided for in some formal way (NPA)
- What did you do differently based on implementing the research (NPA)
- What did you learn? (NPA)
- What will you do with your results? (NPA)

Appendix C — "Can We Measure Performance?" by Robert J. Eger

The following is the text of a PowerPoint presentation made at the Florida Peer Exchange 2013.

Slide 1

Can We Measure Performance

Robert J. Eger III, Ph.D.
Naval Postgraduate School
Graduate School of Business and Public Policy

Slide 2

Basic Questions

- Why measure performance
  - Provide support
  - Guide knowledge transfer
  - Enhance opportunities
  - Valuation of opportunity costs
- How to measure performance
  - Common (the what to measure) metrics
    - Input/output based
      - Labor
      - Materials
    - Outcome based

Slide 3

Characteristics of Measure

- Unified
- User-oriented
- Scalable
- Systematic
- Effective
- Calculable

Slide 4

What Does Measurement Indicate

Measurement quantifies results →Results are associated with performance

In R&D the question is: Are results associated with performance?

Let's think about this

- R&D can lead to 3 potential outcomes
  - Positive results (directionally hypothesized)

- Negative results (opposite direction of the hypotheses)
- No results (from both a practical and statistical point)

So this leads to all 3 potential results for performance measurement and metrics which require general and specific information (data)

Slide 5

Measuring "Positive Results"

Results may lead to implementation

- Measurement focused on R&D sunk costs & forecasted costs (historical)
- R&D can drive what metrics used
- Focus on ROI and/or CBA — tendency is to use linear focus

What's missed?

- Quality costs / gains
- Timeliness costs / gains
- Non-linear costs / gains
- Opportunity costs
- Oversight costs / gains
- Managerial costs / gains

Slide 6

Measuring "Negative Results"

Negative — Leads to non-implementation

- Measurement focus on sunk costs associated with R&D

What's missed?

- Ignores opportunity costs
- Usually ignores costs associated with DOT management and oversight
- Timeliness effects

Slide 7

Measuring "No Results"

None — Leads to potentially more R&D

- Measurement similar to negative results
- "was the first R&D correctly thought through"

Slide 8

Application #1

Issue RFP for structural steel that changes bridge performance.

- How many potential results?
- What are the potential metrics?

- Does timing and process associated with the metrics have an influence on the measurement?

Slide 9

Application #2

RFP for comparative highway maintenance analysis to determine the total cost for in-house versus outsourcing of 3.5 miles of urban highway.

- How many potential results?
- What are the potential metrics?
- Does timing and process associated with the metrics have an influence on the measurement?

Slide 10

Application #3

RFP for analyzing asphaltic cement forecasted costs. Analyze moving from a market based, contractor responsibility to a DOT supplied index based on a known market indicator at the time the AC is purchased for use.

- How many potential results?
- What are potential metrics?
- Does timing and process associated with the metrics have an influence on the measurement?

Slide 11

Measurement Alternatives

Cost Effectiveness Analysis – denominator is a non-monetized measure of quality

Non-Linear forecasting – allows for non-linear estimation of costs without bounding them to a specified distribution.

Using multiple measurements – combining techniques such as CBA, CEA, while adding in factors associate with true costing (or sometimes referred to as full-costing) such as multiple overhead rates and bases, managerial costs, and oversight costs.