

Documenting Preventive Maintenance Cost Effectiveness

Rocky Mountain West Pavement Preservation Partnership

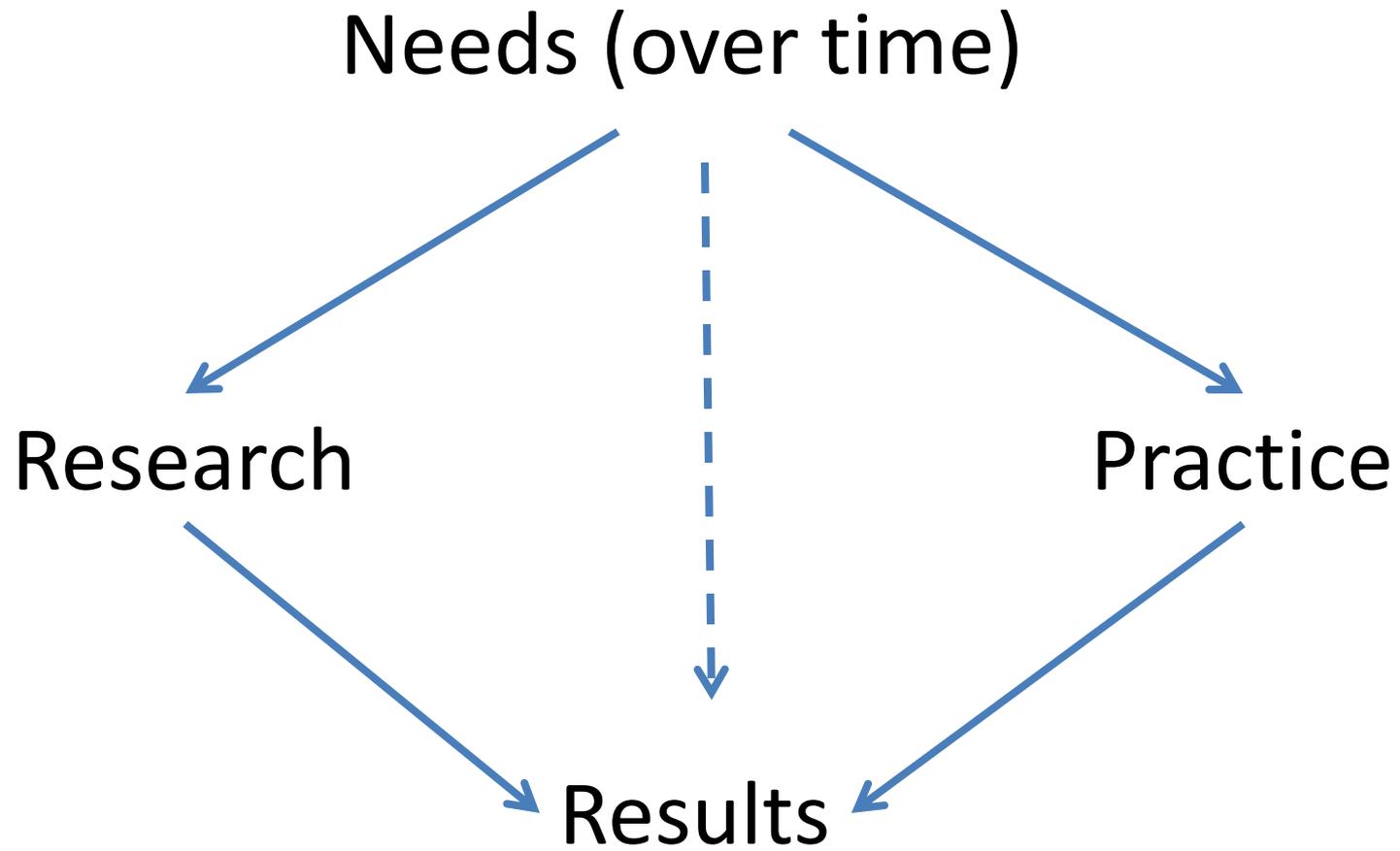
Reno, Nevada
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providing engineering solutions to improve pavement performance

Presentation Outline



Cost Effectiveness?

- Change in performance over time compared to the costs of obtaining that change
 - Benefits defined as “area under the curve”
 - Can be graphed to compare alternatives
- When benefits exceed costs
 - e.g., $B/C > 1$
 - Does it matter what the units of “benefits” are?



Calculation of Benefit

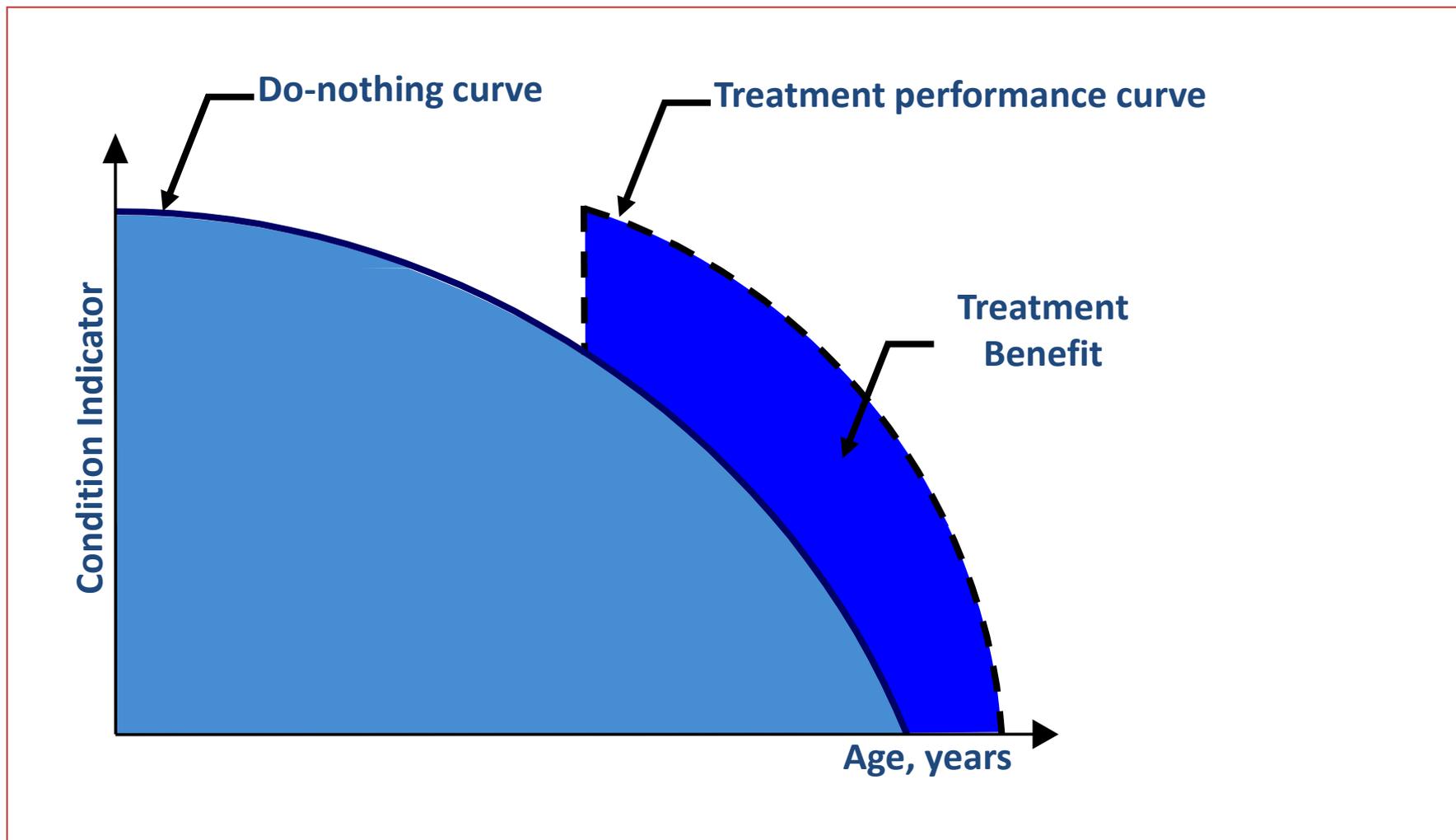
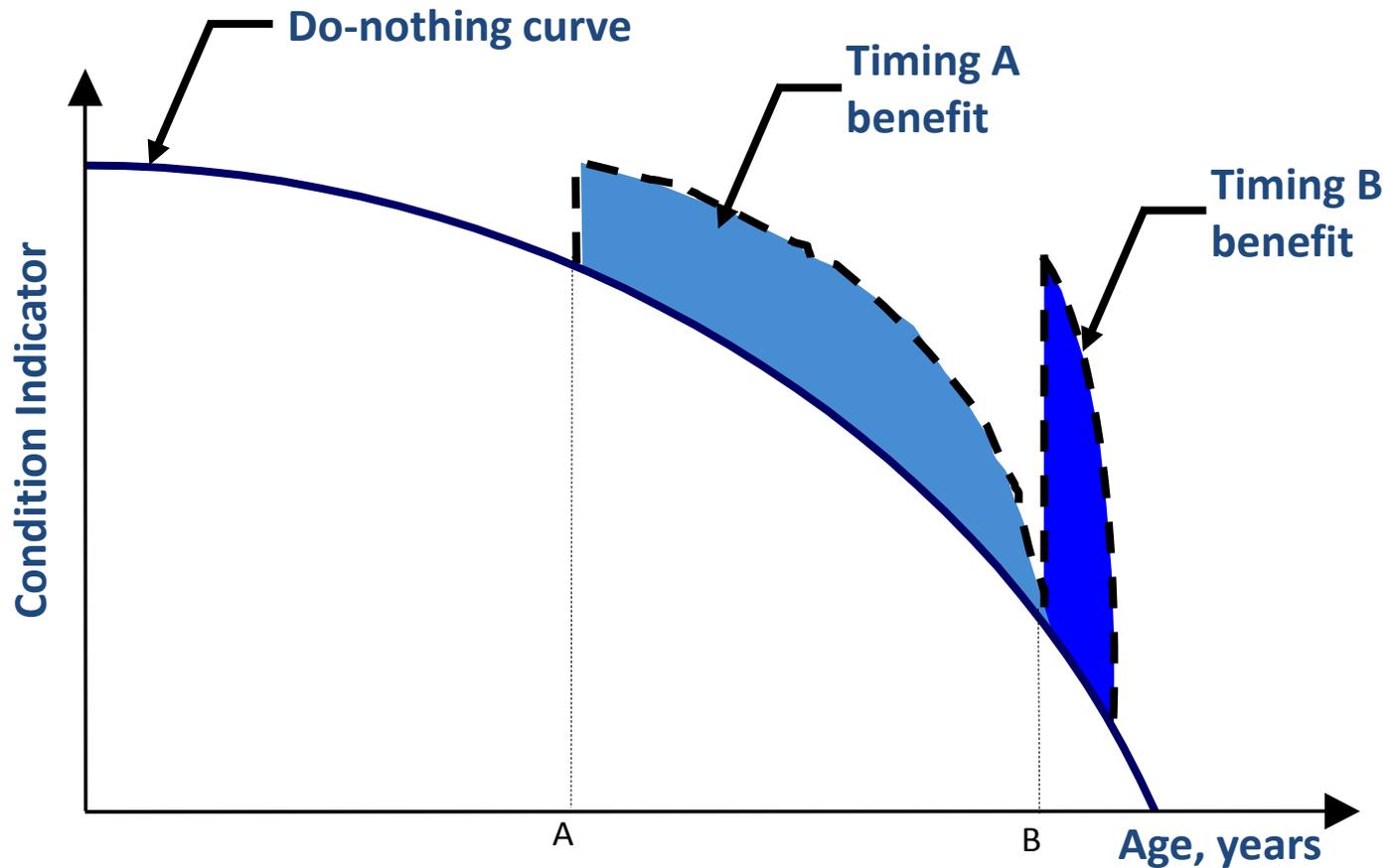


Illustration of Different Benefits



Benefit/Cost Comparison



<u>Strategy</u>	<u>Benefit</u>	<u>Cost, \$M</u>	<u>B/C</u>
Treatment A	100	\$0.3	333
Treatment B	1000	\$3.5	286
Treatment C	500	\$1.5	333
Treatment D	250	\$0.5	500
Treatment E	650	\$2.7	241

Research and Identified Needs

- NCHRP 77, Evaluation of Pavement Maintenance Strategies (1981)
- NCHRP 153, Evolution and Benefits of Preventive Maintenance Strategies (1989)
- NCHRP 223, Cost-Effective Preventive Pavement Maintenance (1996)
- NCHRP 20-07 (184) Pavement Preservation: Practices, Research Plans, and Initiatives (2005)
- Transportation System Preservation Research, Development, and Implementation Roadmap (2008)



What Cost Effectiveness Isn't

- Typical preventive maintenance costs less than other rehabilitation or reconstruction
- “We saved **X** % with our preventive maintenance program.”
- Treatment **Y** lasts longer than Treatment **Z***



NCHRP 77 (1981)

- **Needs:** development of systems “that will produce the most cost-effective maintenance or rehabilitation program, one that includes not only the order of improvements but also the optimum time.”
- **Recommendations:** “a pavement management system is desirable to develop pavement maintenance strategies. Work is going on in the development of pavement management systems, and it is recommended that each agency consider the implementation of such as system...”



NCHRP 153 (1989)

- **Problem 1:** “because the benefits are poorly defined, preventive maintenance programs are, in many cases, not able to compete with other programs.”
- **Problem 2:** “the fact that preventive maintenance programs require timely execution to be cost-effective is still called into question by some budget analysts and executives.”



NCHRP 223 (1996)

“There is a need to conduct and publish the results of formal research on the cost-effectiveness of pavement preventive maintenance techniques. The majority of existing information regarding cost-effectiveness of such techniques now resides within agencies and is related from observational experience.”



NCHRP 20-07 (184) (2005)

High priority research topics

- Economic evaluation of treatment effectiveness
- Treatment selection guidelines
- Integration of preventive maintenance and pavement management
- Improved treatment timing guidelines
- Tools to measure preventive maintenance treatment/pavement performance
- Construction and monitoring of test sections
- Treatment impact on pavement performance



Preservation Road Map (2008)



Ranking Pavement Preservation Needs Statements

- Second: Determining pavement preservation treatment lives and related pavement life extension
- Third: Determine the economic benefits of pavement preservation strategies
- Fifth: Quantify performance and benefits of various pavement preservation treatments
- Eighth: Quantifying the benefits of pavement preservation treatments



NCHRP Report 523 (2004)



Optimal Timing of Pavement Preventive Maintenance Treatment Applications

- First looked at techniques used to determine optimal time
- There was almost no guidance available on the topic
- No agencies were attempting to optimize timing



Other Important Research



- SHRP SPS 3 and 4 Studies
- Texas SMERP
- Arizona Maintenance Effectiveness



A Somewhat Rhetorical Question



Are we any better off today than we were in 1981 or whenever we began asking questions about the effectiveness or cost effectiveness of maintenance/preventive maintenance/pavement preservation?



If We Can Agree About the Answer



For those who know that there's room for improvement...



Do the Right Thing

- Start with a program of pavement preservation
- If your pavements have failed or need major rehabilitation, it's not preventive maintenance
- If you are not doing preventive maintenance, you will not be able to measure its effectiveness



Know Where You Did It



- Agency crews or contract
- Specific locations or over a long section
- One or both directions
- Location referencing systems



Measure the Right Thing(s)



- What are we trying to document?
- What methods will do this?



What Are We Documenting?

Some possibilities...

- Performance over time
- Life extension
- Reduction in specific distresses
- Improvements in safety
- Cost effectiveness in relation to treatment timing
- Comparative cost effectiveness of different treatments



How are These Measured?



Manual or automated data collection

- Manual
 - High resolution
 - Slow production
 - Safety concerns
- Automated
 - High production
 - Resolution of cracking
 - Distinguish surface types



What's Being Measured—Automated



- International Roughness Index (IRI)
- Rutting
- Some cracking
- Surface texture?



What's Being Measured—Manual



- Raveling and weathering
- Low severity and hairline cracking
- Subjective assessment of texture
- Objective measure of texture
- Distresses that aren't even distresses yet



Observations

- If you can't show what you're doing is cost effective, why should you be funded to do it?
- We can do better
- Look ahead: what do you want to be able to show?
- Set up your program to provide the required information



Suggestions

- Engineer your preservation program
- Track where you are truly doing pavement preservation
- Measure what you need to know to evaluate benefits
- If you don't have the right information, learn what you need and go collect it
- If the needed information is housed in different locations, assemble it in one place
- Addressing some of these is the function of pavement management



Questions/Discussion



Thanks!

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