Efficiency through technology and collaboration

Data-Driven Safety Analysis

Integrating Safety Performance into All Highway Investment Decisions

Every Day Counts

U.S. Department of Transportation
Federal Highway Administration
What is the Data-Driven Safety Analysis Initiative?

- The application of two science-based analysis approaches into two common transportation processes

<table>
<thead>
<tr>
<th>Approaches</th>
<th>Transportation Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictive</td>
<td>Safety Management</td>
</tr>
<tr>
<td>Systemic</td>
<td>Project Development</td>
</tr>
</tbody>
</table>
What is the Data-Driven Safety Analysis Initiative?

• **Key Message:**

  - **More Informed Decision Making**
  - **Better Targeted Investment**
  - **Fewer Fatalities & Serious Injuries**
Quantitative Analysis in Other Professions

• True story about Oakland A's general manager Billy Beane's who successfully used computer-generated analysis to determine who to draft or acquire
• Made the playoffs with a $41M budget and competed against teams with $120M budgets
• Almost every professional baseball team now has at least one quantitative analyst on staff, as do most basketball, football, and soccer

Source: http://www.imdb.com/title/tt1210166/
Predictive Analysis

• Combines crash, roadway, and traffic volume data to provide reliable estimates of an existing or proposed roadway’s expected safety performance.

• Helps agencies quantify the safety impacts of transportation decisions, similar to the way agencies quantify:
  – traffic growth
  – environmental impacts
  – traffic operations
  – pavement life
  – construction costs
Predictive Analysis Tools

- Hand Calculations
- Spreadsheets
- Crash Modification Factors Clearinghouse
- Software Products
Systemic Analysis

• Examine the system as a whole
• Identify roadway elements with high crash experience that would be corrected on a system-wide basis
• Supplements traditional site analysis to form a comprehensive method for safety planning and implementation

Source: FHWA Systemic Safety Project Selection Tool
Systemic Analysis

• Particularly applicable when a significant number of severe crashes happen over a wide area:
  – Rural Roadways
  – Local Roadways
  – Specific Crash Types
    • (e.g. cross-median, pedestrian)

• May include treating locations that haven’t experienced many crashes
Our ultimate performance measure
Transportation Processes

Safety Management
- Problem Identification
- Countermeasure Selection
- Project Prioritization
- Project List
- Implementation
- Evaluation

Project Development
- Project Planning
- Alternatives Identification
- Alternatives Evaluation
- Preliminary Design
- Final Design

Systemic
- Predictive
- Predictive
- Predictive
- Predictive
- Predictive
- Predictive

Every Day Counts
A Predictive Illustration...

All three of these meet design standards...

but predictive approaches tell us that they would perform very differently from a safety perspective.

Source: CH2MILL
A systemic illustration...

• You could select cable median barrier locations on fatal crash data alone... but considering other roadway characteristics would likely lead to a better risk-based solution.

Photo Source: Iowa DOT
Integrating Performance into Investment Decisions

• Uses a thorough approach to determine the companies that have the greatest probability of maximizing the return of each dollar invested

• Strives to understand the companies and the people who manage them, using facts and less judgment
  – Berkshire Hathaway has grown from $100 to over $200,000 per share
  – up 177% since March 2009
  – Stock outpacing the S&P500 by 8 percentage points
  – 22.8% Gain annually compounded

Source: USA Today, A first: share of Buffet’s Berkshire tops $200,000
August 14, 2014
What effect can Quantitative Analysis have on Safety?

• Colorado - “Deployment of advanced methods on all projects and acquisition of high quality data may explain why Colorado outperformed the rest of the country in reduction of fatal crashes.” ¹

• Illinois - use of these methods “requires additional roadway data, but has improved the sophistication of safety analyses in Illinois resulting in better decisions to allocate limited safety resources.” ²

What effect can Quantitative Analysis have on Safety?

- Ohio – “Now, several screening methods can be used in the network screening process resulting in greater identification of rural corridors and projects. This identification enables Ohio’s safety program to address more factors contributing to fatal and injury crashes across the state.”

- Ohio – “the number of fatalities per identified mile is 67 percent higher, the number of serious injuries per mile is 151 percent higher, and the number of total crashes is 105 percent higher with these new methods than with their former methods.”

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Our EDC Purpose Vision and Mission

VISION:

• Quantitative safety analysis is used to support all highway investment decisions.

MISSION:

• To broaden implementation of quantitative safety analysis so that it becomes an integral component of safety management and project development decision making, resulting in fewer fatal and serious injury crashes on our Nation’s roadways.
EDC Goals - Safety Management

• Predictive Safety Analysis

  – By December 2015, 25 states will have applied predictive safety analysis approaches for network screening as a part of their safety management process.

  – By December 2016, 10 states will have fully implemented predictive safety analysis approaches for network screening as an integral part of their safety management process.
EDC Goals - Safety Management

• **Systemic Safety Analysis**
  
  – By December 2015, **all** states will have applied systemic safety analysis approaches as a part of their safety management process.
  
  – By December 2016, **25** states will have fully implemented systemic safety analysis approaches as an integral part of their safety management process statewide.
EDC Goals - Project Development

- Predictive Safety Analysis
  - By December 2015, 35 states will have piloted predictive safety analysis for evaluating alternatives or design exceptions as a part of their project development process.
  - By December 2016, 10 states will have fully implemented predictive safety analysis for evaluating alternatives and design exceptions as a standard practice in the project development process.
What we can offer

• Technology Transfer
  – Presentations
  – Training
  – Peer Exchange

• FREE Technical Assistance for each state that opts-in
  – Safety Management & Project Development
  – Predictive & Systemic Analyses
# Our Team

<table>
<thead>
<tr>
<th>Position</th>
<th>Team Member(s)</th>
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<tbody>
<tr>
<td><strong>Team Lead</strong></td>
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<td>Jerry Roche, Office of Safety</td>
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<td>John McFadden, RC Safety &amp; Design</td>
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<td><strong>Co-Team Lead</strong></td>
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<td><strong>FHWA Subject Matter Experts</strong></td>
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<td>Ray Krammes, Office of Safety</td>
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<td>Karen Scurry, Office of Safety</td>
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<td>Clayton Chen, Safety Research &amp; Development</td>
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<td>Mick Matzke, Office of Infrastructure</td>
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<td>Gene Amparano, RC Safety &amp; Design</td>
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<td>Dave Engstrom, RC Safety &amp; Design</td>
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<td>Hillary Isebrands, RC Safety &amp; Design</td>
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<td><strong>State DOT Representatives</strong></td>
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<td>Tim Harmon, New Hampshire DOT</td>
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<td>John Miller, Missouri DOT</td>
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<td>Stephen Read, Virginia DOT</td>
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<td>Derek Troyer, Ohio DOT</td>
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<td>Jeremey Vortherms, Iowa DOT</td>
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<td><strong>FHWA Division Representatives</strong></td>
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<td></td>
<td>Linda Guin, Alabama Division</td>
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<td>Don Petersen, Washington Division</td>
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<td>Will Stein, Minnesota Division</td>
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<td>Betsey Tramonte, Louisiana Division</td>
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<td><strong>Marketing</strong></td>
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<td>Judith Johnson, FHWA Office of Technical Services</td>
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<td><strong>Coordination with AASHTO/TRB</strong></td>
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<td>Kelly Hardy, AASHTO</td>
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<td>John Milton, Washington State DOT</td>
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<td>Priscilla Tobias, Illinois DOT</td>
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<td><strong>Local Agency Representatives</strong></td>
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<td>Matt Enders, Washington State LTAP</td>
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<td>Earl “Rusty” Lee, Delaware LTAP, University of Delaware</td>
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<td>Kevin Murphy, Delaware Valley Regional Planning Commission</td>
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<td>Mark Vizecky, Minnesota DOT</td>
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<td><strong>FLH, Parks and Tribal Outreach</strong></td>
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<td>Victoria Brinkly, Western Federal Lands</td>
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Questions?

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