Data-Driven Safety Analysis

Integrating Safety Performance into All Transportation Investment Decisions

every day counts
An Innovation Partnership with States

U.S. Department of Transportation
Federal Highway Administration
Safety – a top priority for all of us

U.S. Highway Fatalities Increased Most in 50 Years in 2015

Data-Driven Safety Analysis

General Information
Project description:
Analyst: Date: Area type: 
First year of analysis: 2013
Last year of analysis: 2015

Crash Data Description
Freeway segments Segment crash data available? Yes First year of crash data: 2005
Project-level crash data available? No Last year of crash data: 2007

Ramp segments Segment crash data available? Yes First year of crash data: 2005
Project-level crash data available? No Last year of crash data: 2007

Ramp terminals Segment crash data available? Yes First year of crash data: 2005
Project-level crash data available? No Last year of crash data: 2007

Estimated Crash Statistics

<table>
<thead>
<tr>
<th>Category</th>
<th>Nbr. Sites</th>
<th>Total K</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>PDO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway segments</td>
<td>4</td>
<td>33.4</td>
<td>0.2</td>
<td>0.6</td>
<td>3.6</td>
<td>7.0</td>
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<tr>
<td>Ramp segments</td>
<td>6</td>
<td>4.8</td>
<td>0.0</td>
<td>0.1</td>
<td>0.7</td>
<td>1.1</td>
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<tr>
<td>Crossroad terminals</td>
<td>6</td>
<td>9.1</td>
<td>0.1</td>
<td>1.2</td>
<td>8.0</td>
<td>34.9</td>
</tr>
</tbody>
</table>

Crashes for Entire Facility by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Total K</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>PDO</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>43.1</td>
<td>0.1</td>
<td>0.6</td>
<td>4.1</td>
<td>14.3</td>
</tr>
<tr>
<td>2006</td>
<td>43.1</td>
<td>0.1</td>
<td>0.6</td>
<td>4.1</td>
<td>14.3</td>
</tr>
<tr>
<td>2007</td>
<td>43.1</td>
<td>0.1</td>
<td>0.6</td>
<td>4.1</td>
<td>14.3</td>
</tr>
</tbody>
</table>

Distribution of Crashes for Entire Facility

<table>
<thead>
<tr>
<th>Crash Type</th>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>Multiple vehicle</td>
<td>106.8</td>
</tr>
<tr>
<td>Head-on</td>
<td>1.0</td>
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<tr>
<td>Right-angle</td>
<td>24.6</td>
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<tr>
<td>Rear-end</td>
<td>65.7</td>
</tr>
<tr>
<td>Sideswipe</td>
<td>13.6</td>
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<tr>
<td>Other multiple-vehicle</td>
<td>2.0</td>
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Single vehicle

<table>
<thead>
<tr>
<th>Crash Type</th>
<th>Number</th>
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<tbody>
<tr>
<td>Crashes with animal</td>
<td>0.2</td>
</tr>
<tr>
<td>Crashes with fixed object</td>
<td>16.6</td>
</tr>
<tr>
<td>Crashes with other object</td>
<td>1.5</td>
</tr>
<tr>
<td>Crashes with parked vehicle</td>
<td>0.4</td>
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<tr>
<td>Other single-vehicle crashes</td>
<td>3.9</td>
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</tbody>
</table>

Total crashes: 129.3

Source: FHWA
Overview and Innovation

Description

Jerry Roche
Office of Safety
Data & Analysis Tools
What’s happening?

• Shrinking budgets
• Growing lists of needs
• Increasing fatalities
• Establishing Safety performance measures
Incorporating Safety in ALL Projects...

23 CFR 625.2 Policy

(c) An important goal of the FHWA is to provide the highest practical and feasible level of safety for people and property associated with the Nation's highway transportation systems and to reduce highway hazards and the resulting number and severity of accidents on all the Nation's highways.
We need to know how a roadway will perform in terms of safety.
The EDC Data-Driven Safety Analysis Initiative...

Goal: Integrate **safety performance** into **ALL** transportation investment decisions.

- **More Informed Decision Making**
- **Better Targeted Investments**
- **Fewer Fatalities & Serious Injuries**
Our EDC Vision and Mission

VISION:
• Safety Performance is integrated into all transportation investment decisions.

MISSION:
• To broaden implementation of quantitative safety analysis, so that it becomes an integral component of project development decision making, allowing better targeting of safety investments, and resulting in fewer fatalities and serious injuries on our Nation’s roadways.
What is DDSA?

• The application of the latest evidence-based tools and approaches to safety analysis

• Provides 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

Source: AASHTO, AASHTOWare, Roadway Safety Foundation

2010 Release:
• Rural Two-Lane Roads
• Multilane Rural Highways
• Urban/Suburban Arterials

2014 Supplement:
• Freeway Segments
• Ramps
• Ramp Terminals

Source: AASHTO
The Vision for the HSM

A Document Akin To the HCM...

1. Definitive; represents quantitative ‘state-of-the-art’ information

2. Widely accepted within professional practice of transportation engineering

3. Science-based; updated regularly to reflect research

Source: Transportation Research Board
The HSM has resulted in the development of:

- Spreadsheets
- Software Products
- Guidance Documents
- Crash Modification Factors Clearinghouse
Quantifying the impacts of potential projects...
Where can DDSA be applied in the Project Development Process?

DDSA can be applied in nearly all phases of project delivery to make more-informed investment decisions and optimize safety investments.

Planning

Alternatives Analysis

Design

Construction, Operations & Maintenance

Source: FHWA
Division Office Role and Available Resources

Jerry Roche
Office of Safety
Data & Analysis Tools
FHWA’s Strategic Implementation Plan

System Performance-1: Reduce fatalities and serious injuries on all public roadways.

• SP 1.1 Provide leadership and expertise to States, FLMAs, tribal, and local highway agencies in planning for, collecting, and managing the Model Inventory of Roadway Elements Fundamental Data Elements on all public roads, and broadening the implementation of predictive and systemic safety analysis approaches in both safety management and project development processes (HQ, DO, and OTS).

• SP 1.2 Enhance every States’ abilities to implement a performance-driven HSIP (HQ, DOs, and OTS).
DDSA Resources for Division Offices

• Fact Sheets and Case Studies
• Presentations
• Videos
• Webinars
• Guidance Documents
• Exhibit Booth
• Training Workshops
• Technical Assistance
DDSA Videos

• Overview

https://www.youtube.com/watch?v=Lx7sJktkFVA

• Case Studies:
  • New Jersey
    https://www.youtube.com/watch?v=cHv086TQ2L1
  • Minnesota

Source: FHWA
DDSA How-To Webinars

- Safety analysis of freeways and interchanges (Jan 27)
- Integrating safety into all projects (Feb 24)
- Systemic Safety analysis approaches with limited roadway data (Mar 29)
- Office Hours – applications of the HSM when its not a 1:1 fit (Apr 19)
- Using Advanced Safety Analysis Techniques for Network Screening (May 19)
- Safety Performance Function Calibration and Development (July 21)

All recorded and available for download
Future DDSA webinar topics

• Safety Analysis in Operations
• Safety Analysis in Design
• Discussion of State-developed SPF
• Safety Analysis in Alternatives Analysis
• Systemic Safety Approaches
• Safety Analysis in Planning and Scoping
• Selecting appropriate safety analysis methods/tools
• Development of Local Road Safety Plans
• Guidance on developing State policies and procedures on use of the HSM
DDSA-supported (FREE) Training Available

Virtual and in-person opportunities

- Systemic Approach to Safety
- Highway Safety Manual for Practitioners
- Safety Analysis of Freeways and Interchanges
- Interactive Highway Safety Design Model (IHSDM)

FHWA DDSA Training (since Aug 2015)
New Resource (soon!):

• Informational Guide funded by TPF-5(255) HSM Pooled Fund
• Identifies existing HSM language in State policy/procedural manuals
• In areas with limited or no HSM language, provides model language that a State could start with
• Language on each PD Phase
• Anticipated completion date: September 2016
New Resource (soon!)

Scale and Scope of Safety Assessment Methods in the PDP

- Informational Guide funded by the TPF-5(255) HSM Pooled Fund
- Helps identify appropriate HSM safety assessment methods by for various project applications
- Chapter on each PD Phase, with examples
- Includes a continuous case study example (planning through design)
- Anticipated completion date: October 2016
DDSA Exhibit Booth

Available via FHWA Report Center for reservation and shipping: Report.Center@dot.gov
What we can offer

• Technology Transfer
  – Presentations
  – Training
  – Workshops

• FREE Technical Assistance for each state that opts-in (project and/or program level)
  – Implementation Planning
  – Conducting/Reviewing Safety Analysis
  – SPF Calibration/Development
Funding Opportunities

STIC Incentive Program

- $100,000 per state, each year
- Reminders
  - Funds are used to standardize an innovation, not for research or piloting an innovation
  - Activity must be eligible under 23 CFR for federal funds
  - A 20% match is required
  - Progress reports are due every 6-months
Accelerated Innovation Deployment (AID) Demonstration Program

AID Demonstration

• Continuing in FY16 Reminders
  o Funds are used to pilot an innovation for a project
  o Activity must be eligible under 23 CFR for federal aid
  o 20% match is required

• Please check status of awards in your state: final reports are due within 6 months of project completion…
DDSA assistance under EDC-3: 42 States, 125 Requests and counting...
Encourage your state’s participation in our Data-Driven Safety Analysis Session (Breakout #1)

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Number</th>
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<tbody>
<tr>
<td>Tuesday &amp; Wednesday,</td>
<td>Baltimore, MD</td>
<td>(#1)</td>
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<tr>
<td>October 18-19</td>
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<tr>
<td>Tuesday &amp; Wednesday,</td>
<td>Minneapolis, MN</td>
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<td>October 25-26</td>
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<tr>
<td>Tuesday &amp; Wednesday,</td>
<td>Albany, NY</td>
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<tr>
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<tr>
<td>Tuesday &amp; Wednesday,</td>
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<td>November 29-30</td>
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<tr>
<td>Tuesday &amp; Wednesday,</td>
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<td>Wednesday &amp; Thursday,</td>
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</table>
## Our Team

<table>
<thead>
<tr>
<th>Team Lead</th>
<th>Co-Team Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jerry Roche, FHWA Office of Safety</td>
<td>John McFadden, FHWA RC Safety &amp; Design</td>
</tr>
</tbody>
</table>

### FHWA Subject Matter Experts (SMEs)
- Gene Amparano, FHWA RC Safety & Design
- Rosemarie Anderson, FHWA Office of Safety
- Clayton Chen, FHWA Safety R&D
- Hillary Isebrands, FHWA RC Safety & Design
- Ray Krammes, FHWA Office of Safety
- George Merritt, FHWA RC Safety & Design
- Robert Mooney, FHWA Office of Infrastructure
- Karen Scurry, FHWA Office of Safety
- Neel Vanikar, FHWA Office of Planning, Environment, & Realty
- Jeff Zaharewicz, FHWA Office of Innovative Program Delivery

### State DOT Representatives
- John Miller, Missouri DOT
- Stephen Read, Virginia DOT
- Derek Troyer, Ohio DOT
- Mark Vizecky, Minnesota DOT

### FHWA Division Coordination
- John Broemmelsiek - Louisiana Division
- Emeka Ezekwemba – Colorado Division
- Linda Guin, FHWA - Alabama Division
- Don Petersen, FHWA - Washington Division
- Will Stein, FHWA - Minnesota Division
- Betsey Tramonte, FHWA - Louisiana Division
- Caroline Trueman, FHWA - New Jersey Division

### Marketing Coordination with AASHTO/TRB
- Tara McLoughlin, FHWA Office of Safety
- Kelly Hardy, AASHTO

### Local Agency Representatives
- Tim Colling, Michigan LTAP
- Matt Enders, Washington State LTAP
- Victor Lund, St. Louis County (MN)
- Kevin Murphy, Delaware Valley Regional Planning Commission (NJ and PA)

### FLH, Parks and Tribal Outreach
- Victoria Brinkly, Western Federal Lands
*FHWA cites specific tools as examples of ways to implement safety analysis approaches, not as an endorsement of these tools over others.