Data-Driven Safety Analysis (DDSA)

Using evidence-based tools to evaluate the current and future safety performance of roadways allows agencies to target investments with more confidence and reduce severe crashes on their system.

Traditional crash and roadway analysis methods mostly rely on subjective or limited quantitative measures of safety performance. This makes it difficult to calculate safety impacts alongside other criteria when planning projects. Data-driven safety analysis (DDSA) employs newer, evidence-based models that provide state and local agencies with the means to quantify safety impacts similar to the way they do other impacts such as environmental effects, traffic operations and pavement life.

The analyses provide scientifically sound, data-driven approaches to identifying locations and features with the highest potential for safety improvement. Agencies then execute the most beneficial projects with available resources to achieve fewer fatal and serious injury crashes.

Through round four of Every Day Counts (EDC-4), this effort focuses on both predictive and systemic analyses—two types of data-driven approaches that state and local agencies can implement individually or in combination.

**Predictive analysis** helps identify roadway sites with the greatest potential for improvement and quantify the expected safety performance of different project alternatives.

Predictive approaches combine crash, roadway inventory and traffic volume data to provide more reliable estimates of an existing or proposed roadway’s expected safety performance. The results inform roadway safety management and project development decision-making. The data not only help agencies make better decisions, but also inform the public as to what safety benefits they can expect from their investment.

**Systemic analysis** uses crash and roadway data in combination to identify roadway factors that correlate with particular crash types.

Agencies have traditionally relied on crash history data to identify “hot spots,” or sites with high crash frequency. However, severe crashes are widely dispersed over road networks, and their location and frequency fluctuate over time. Systemic analysis identifies locations that have the greatest potential
for severe crashes, even if there is not a high crash frequency. Practitioners can then proactively apply low-cost countermeasures to those locations. The benefit is wider, but more targeted, safety investment.

**STATE OF THE PRACTICE**

To date, 75 percent of states are applying DDSA in one or more of their project development processes.

This effort is a result of collaborative work by AASHTO, FHWA, the Transportation Research Board and industry over the past two decades. DDSA was originally promoted under the third round of EDC (EDC-3), and it continues under the fourth round (EDC-4) with an additional focus on broadening use among local agencies.

**BENEFITS**

- **Informed Decision-Making.** Predictive and systemic analyses improve on traditional decision-making approaches that rely on subjective and limited quantitative measures of safety performance.

- **Targeted Investment.** Agencies use the analyses to optimize funding by selecting the most appropriate roadway features and project sites.

- **Improved Safety.** DDSA offers a scientifically sound, data-driven approach to allocating resources that results in fewer fatal and serious injury crashes on the Nation’s roadways.

**DDSA TOOLBOX**

Supporting information, informational videos and more can be found at the DDSA webpage: https://www.fhwa.dot.gov/innovation/everydaycounts/edc_4/ddsa.cfm

EDC-4 Summit Breakout Session: Fall 2016
https://www.youtube.com/watch?v=KH3QpnyJCN0

**Predictive Analysis**

AASHTO Highway Safety Manual
http://www.highwaysafetymanual.org

AASHTOWare Safety Analyst software
http://www.safetyanalyst.org

Agile Assets Safety Analyst software
https://www.agileassets.com/products/safety-analyst/

Crash Modification Factors Clearinghouse
http://www.cmfclearinghouse.org

FHWA Interactive Highway Safety Design Model

SPF Tool http://spftool.com/

Spreadsheet tools, including the Enhanced Interchange Safety Analysis Tool (ISATe)
http://www.highwaysafetymanual.org/Pages/Tools.aspx

**Systemic Analysis**

FHWA Systemic Safety Project Selection Tool
http://safety.fhwa.dot.gov/systemic/fhwasa13019

Roadway Safety Foundation United States Road Assessment Program (usRAP) software
http://www.usrap.org/

*FHWA cites specific tools as examples, not as an endorsement of these tools over others.

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