AASHTO’s Highway Safety Manual: Quantification of Highway Safety

Priscilla Tobias, PE
Illinois Department of Transportation
State Safety Engineer
Do you ever find yourself trading safety off against something else?
How to meet the challenge?

• Bring safety at same level as other parameters
• Integrate safety into transportation decision-making processes
  – Quantify effect of decisions on future crash frequency and severity
  – Increase our accountability, measure performance, and meet legislatively mandated priorities
• Fill the gap between state of art and state of practice
The HSM is a tool to change how we consider safety.

**Nominal Safety**

Examined in reference to compliance with standards, warrants, guidelines and sanctioned design procedures.

**Substantive Safety**

The expected or actual crash frequency and severity for a highway or roadway.

*Ezra Hauer, ITE Traffic Safety Toolbox Introduction, 1999*
The Vision:
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
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Evaluating Individual Projects
Before-after studies

Countermeasure Selection, B/C
Site diagnosis, countermeasure selection, economic analysis

Network Screening
Based on policy focus (e.g. SHSP, systematic approaches, risk-based (proactive) approaches, and reactive approaches; some as a result of STIP, TIP, route development process and corridor planning)

Evaluating System Performance
Performance Measures for Safety

Evaluate Alternatives - Evaluate alternatives in operations, maintenance, and construction

Planning & Programming
Pre-design & Scoping
Design & Construction
Operations, Maintenance & Construction

HSM Part B, C, and D

Compare Safety Impact vs Other Impacts (e.g. environmental)

Countermeasure Selection & B/C - Site diagnosis, countermeasure selection, economic analysis

3R vs 4R - (i.e. less restrictive design requirements vs Green Book new construction criteria)

Design exceptions/deviations Evaluate design alternatives
Compare safety impact vs other impacts (e.g. environmental)
Evaluate design-build proposals - Using value-based evaluation that includes safety

The Project Development Process at a state DOT, activities, and the relationship with the HSM
Goal of HSM Implementation

• Move forward
  – Integration of safety in the day to day activities
  – Support State’s Performance Goals
• Institutionalize safety culture
  – HSM becomes a tool *routinely* used by transportation/road professionals
  – Safety is another quantified parameter always
HSM Implementation Key Components

- Implementation plan / road map / timelines
- Leadership and internal marketing
- Policy (e.g., incorporate HSM into processes)
- Personnel Resources and Funding
- Data
- Training
- Supporting Tools
AASHTO Subcommittee on Safety Management: Technical Safety Publication Oversight & Coordination (HSM)

- Priscilla Tobias (SM)-Chair
- Anne Holder (SM)-Vice Chair
- Robert Hull (SM)
- Michael Curtit (SM)
- Dan Magri (SM)
- Bruce Ibarguen (Traffic Engineering)
- Mark Bott (Traffic Engineering)
- Bart Thrasher (Design)
- Jim Mills (Design)
- Tim Colling (Michigan LTAP)
- John Milton (TRB)
- Brelanl Gowan (TRB)
- Tim Neuman (TRB)
HSM Implementation – Some of the Current Initiatives

• Lead State Peer to Peer Workshop (Nov 2010)
  – 13 States Nationwide
  – State, Local, and Federal Participation
  – Focus on Key Implementation Components
  – Best Practices and Challenges
  – Lessons Learned
  – Next Steps
Coordinated National Initiatives

- **FHWA**
  - National Roadmap for Implementation / Training (NHI) / IHSDM
  - Crash Modification Factor (CMF) Clearinghouse

- **AASHTO**
  - HSM / Safety Analyst / Website [www.highwaysafetymanual.org](http://www.highwaysafetymanual.org)
  - User Discussion Forum

- **TRB**
  - Committee for Highway Safety Performance
    - User Liaison and Technology Facilitation Subcommittee

- **NCHRP**
  - Lead State Initiative
  - CMF Protocols
  - Research projects

- **Individual States**
  - Collaboration and Peer Exchanges
Procedure for Updates to HSM

- Four year cycle for complete update
- Items can be added earlier
- Need to identify areas for research statements
- Major priority items identified
Future Editions of the HSM

• Develop a Strategic Plan
• Identify and Prioritize Research Needs
• Identify Potential Resources
Crash Severity Distributions

Better handling crash severities (SPFs & CMFs)

• Understanding crash severity distribution

• Impact of road changes to crash severities
System-wide Analysis Approaches

• Analytical approaches to system-wide problem identification and countermeasure selection
• Methods for identifying overrepresentation of crash types, severities, contributing factors
• 4 E approaches to address driver behavior
Performance Measurement

• Crash Modification Factors (CMF)
  – Indicators of the potential safety effect of a treatment, such as:
    • Shoulder rumble strips
    • Illumination
    • Pedestrian crossing
    • Paved shoulder

• CMF is given as a multiplier and its standard error, such as 0.8 ± 0.1
Information Sources

• CMFs form a key element of the methodologies for safety quantification
• Highway Safety Manual – Part D
  – Includes the “few” CMFs of high quality
• CMF Clearinghouse (www.cmfclearinghouse.org)
  – Includes all available CMFs
  – Star Quality Rating
Current Status and CMF Expansion Activities

• Current Status
  – Few treatments have high quality CMFs
  – Many treatments / strategies have no CMFs
  – Missed opportunity: studies are being conducting without capturing CMFs

• Need for sound evaluation studies

• Recent activities
  – A Guide to Developing Quality CMFs
  – Recommended Protocol for Developing CMFs (NCHRP 20-07 project)
Questions?

• Follow-up Information
  – Webinar (date TBD)

• Thank you very much!