

Asset Management: Laying the Groundwork for Safety Analysis Tools

Overview of Safety Analysis Tools

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FHWA

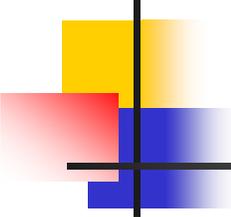
Office of Safety Integration

October 18, 2009



U.S. Department of Transportation
Federal Highway Administration





Objectives:

- Overview of New Safety Analysis Tools
- Summary of Data needed to support the tools
- Identify data gaps



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Introduction to Highway Safety

- Highway Safety Improvement Program (HSIP)
- Strategic Highway Safety Plan (SHSP)
- Safety analysis tools



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Safety Data Analysis Tools

- Highway Safety Manual (HSM)
- SafetyAnalyst
 - HSM Part B
- Interactive Highway Safety Design Model
 - HSM Part C



WHAT IS THE HSM?

Provide

Best factual
information

Tools

To facilitate explicit safety considerations for:

Planning

Design

Operations

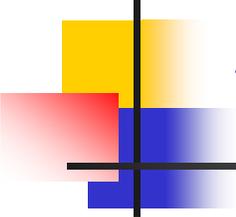
Maintenance

through

Synthesis
of
validated
highway
research

Adapted &
integrated
to practice

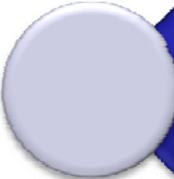
Analytical
tools for
predicting
impact on
road
safety



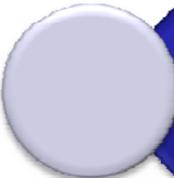
The VISION of the HSM – A DOCUMENT AKIN to the HCM



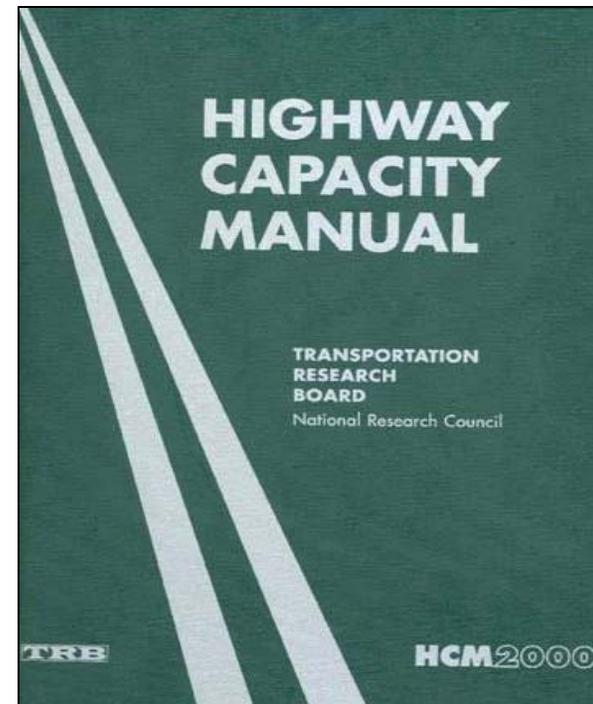
Definitive; represents quantitative 'state-of-the-art' information



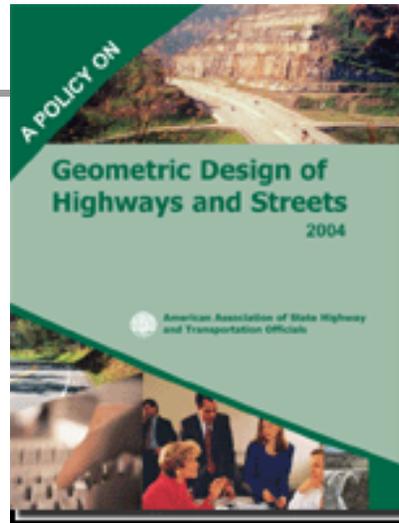
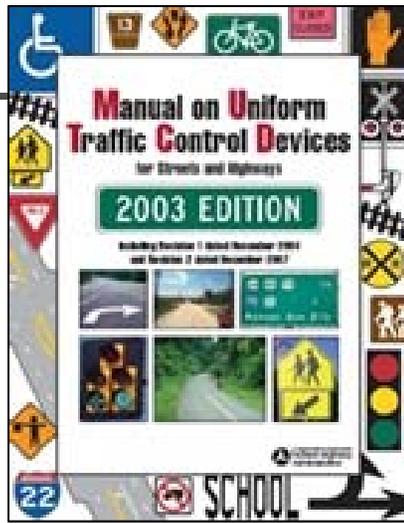
Widely accepted within professional practice of transportation engineering



Science-based; updated regularly to reflect research



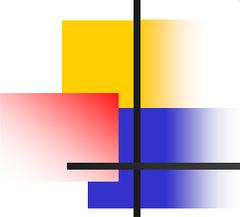
WHAT the HSM is NOT



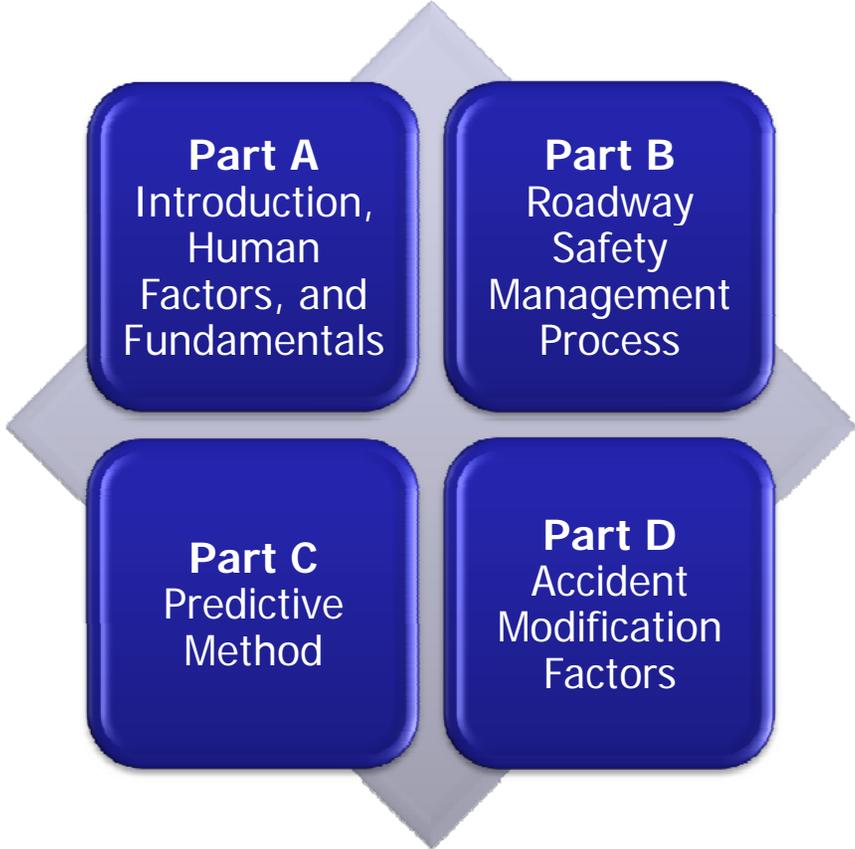
VS



- The HSM does **not** set requirements or mandates
- The HSM is **not** a best practice document for design or operations.
- The HSM contains **no** warrants or standards and does **not** supersede other publications that do.



OUTLINE of the HSM

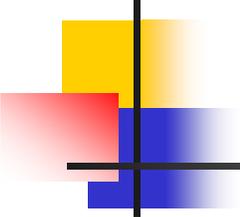


Part A
Introduction,
Human
Factors, and
Fundamentals

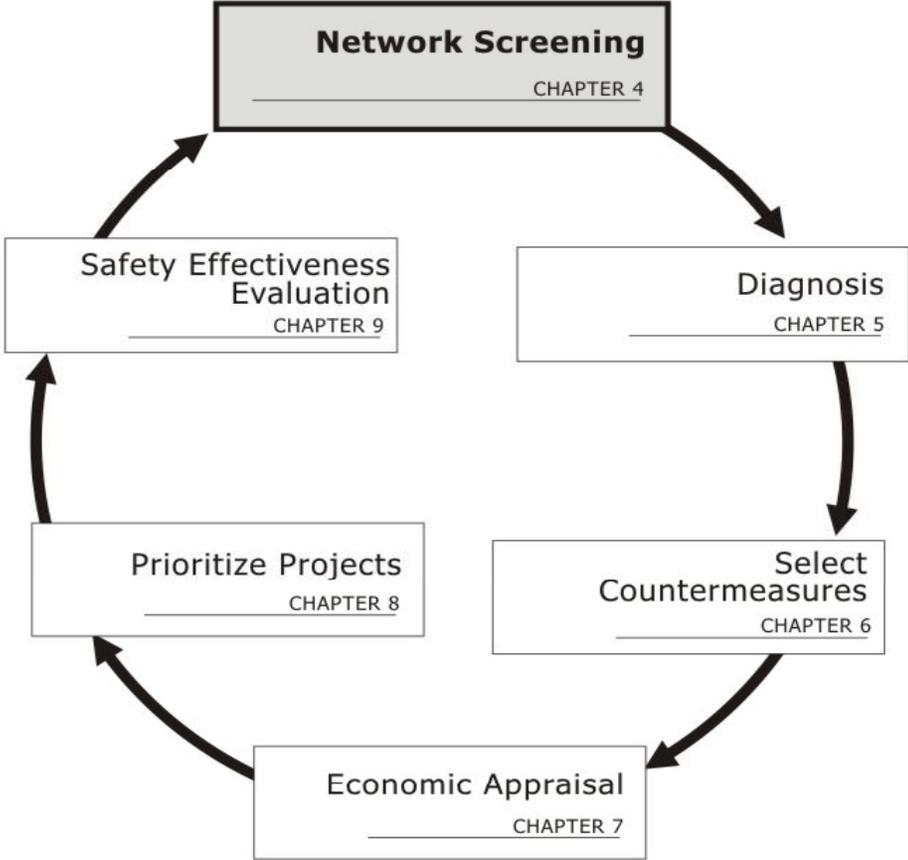
Part B
Roadway
Safety
Management
Process

Part C
Predictive
Method

Part D
Accident
Modification
Factors



Part B: Roadway Safety Management Process



Part C: Predictive Methods



**Two-Lane
Rural Roads**



**Urban/ Suburban Arterial
Highways**



Rural Multilane Highways

**Special Part C
Common Procedures**

- Calibration
- Combining predicted with observed crashes

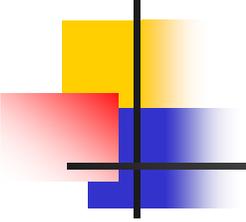
Highway Safety Manual Supporting Tools

- *SafetyAnalyst* supports HSM part B
- IHSDM supports HSM part C



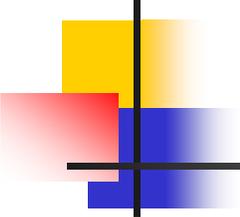
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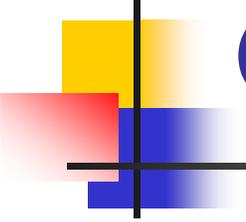
SafetyAnalyst Modules

1. Network Screening
2. Diagnosis and Countermeasure Selection
3. Economic Appraisal and Priority Ranking
4. Countermeasure Evaluation



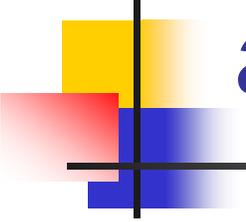
Module 1 – Network Screening

- Reviews highway network (or any portion of the network) to identify sites with potential for safety improvement
- Identifies sites that are candidates for further investigation



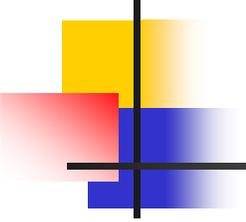
Module 2 – Diagnosis and Countermeasure Selection

- Guides user in the diagnosis of safety problems at specific sites
- Suggests array of countermeasures that address identified accident patterns
- User selects recommended countermeasures for further economic evaluation in Module 3



Module 3 – Economic Appraisal and Priority Ranking

- Perform economic analysis of alternative countermeasures for a specific site
- Perform economic analysis of countermeasures across selected sites
- Develop priority ranking of alternative improvements
- Select an optimal mix of sites and countermeasures

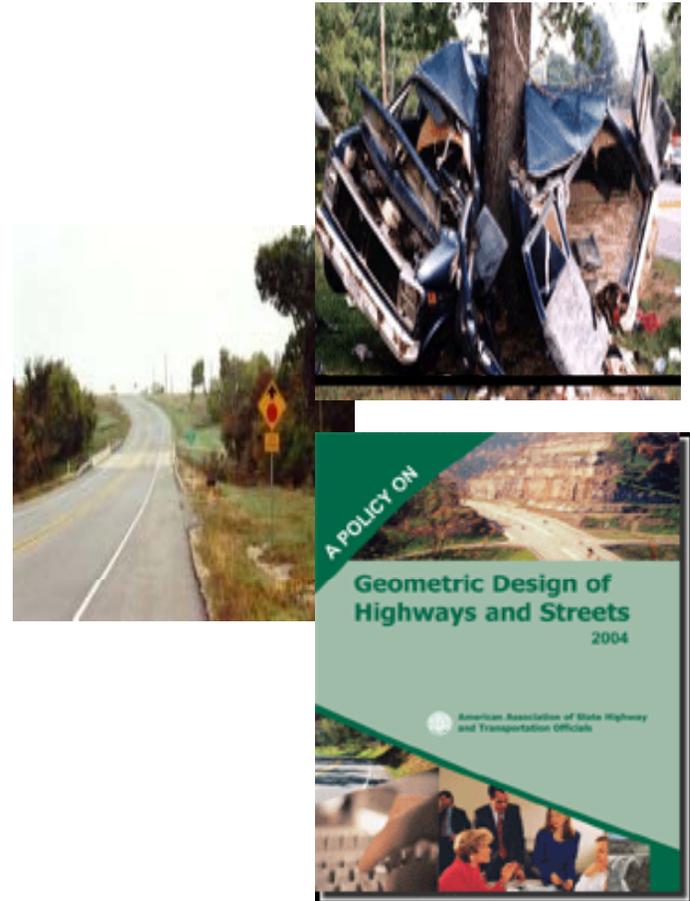


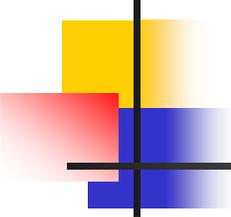
Module 4 – Countermeasure Evaluation

- Determine safety effectiveness for specific implemented countermeasures
- Conduct before-after evaluation of crash frequencies using the Empirical Bayes (EB) approach
- Conduct before-after evaluation of shifts in crash type proportions

Interactive Highway Safety Design Model Modules

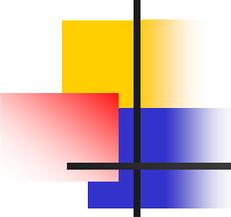
- Crash Prediction
- Design Consistency
- Driver/Vehicle
- Intersection Review
- Policy Review
- Traffic Analysis





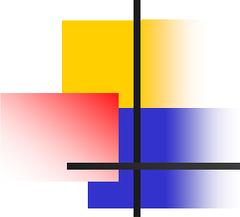
Crash Prediction Module

- Estimates the frequency of crashes expected on a roadway based on its geometric design and traffic characteristics
- Crash prediction algorithms consider the effect of a number of roadway segment and intersection variables



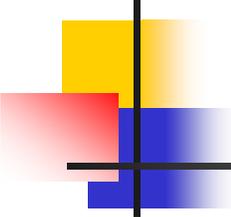
Design Consistency Module

- Helps diagnose safety concerns at horizontal curves
- Uses a speed-profile model that estimates 85th percentile, free-flow, passenger vehicle speeds at each point along a roadway



Intersection Review Module

- Performs a diagnostic review to systematically evaluate an intersection design for typical safety concerns
- Provides useful input to project scoping, preliminary engineering, and design review



Policy Review Module

- Checks roadway-segment design elements for compliance with relevant highway geometric design policies
- Provides electronic files replicating quantitative policy values specified by AASHTO's Green Book

Data Requirements for Safety Analysis Tools

- Site characteristics (i.e., inventory data)
 - roadway elements
 - Functional classification
 - Area type (urban or rural)
- Crash data
- Traffic data
- Implemented countermeasures



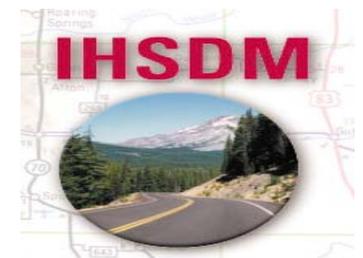
Data Requirements: Roadway Inventory

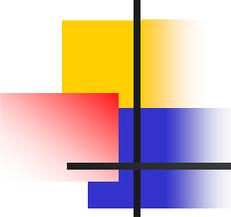
■ Roadway Segments

- Number of lanes
 - Through
 - Passing
 - Two-way left turn lanes
- Lane & shoulder width
- Median type and width
- Number of driveways
- Horizontal alignment
- Vertical alignment
- Roadside

■ Intersections

- Number of legs
- Type of control
 - Signalized
 - Stop-controlled
- Presence of auxiliary lanes
 - Left-turn
 - Right-turn
- Skew angle
- Sight distance

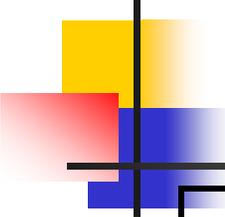




Data Gaps

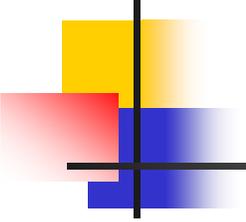
- Horizontal Curves
- Roadside Hardware
- Intersections and ramps
- Local system
- Lighting





Additional Information

HSM	Related Tools	Availability
Part A: Introduction		
Part B: Roadway Safety Management Process	SafetyAnalyst	July 2009
Part C: Predictive Methods	IHSDM	First Version 2003 Update due 2010
Part D: Crash Modification Factors (CMFs)	CMF Clearinghouse	October 2009



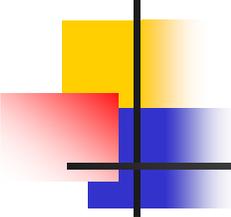
Resources

- FHWA - http://safety.fhwa.dot.gov/tools/data_tools
- HSM – <http://www.highwaysafetymanual.org>
- SafetyAnalyst – <http://www.safetyanalyst.org>
- IHSDM – <http://www.ihsdm.org>



Questions





Contact Info

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