A Unified Approach to Crash Reporting

Efforts to Obtain Better Crash Data

David A. Noyce, PhD, PE, F.ASCE

Department of Civil and Environmental Engineering

Director, Traffic Operations and Safety Laboratory

University of Wisconsin-Madison

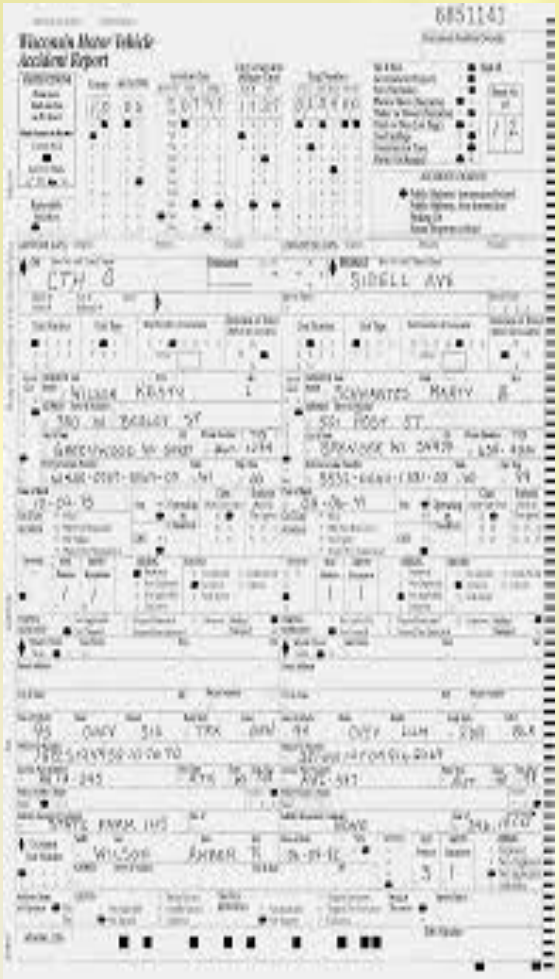
Commercial Vehicle Safety Research Summit: Best Practices for Advancing Safety through Partnerships with Universities

Northampton, MA

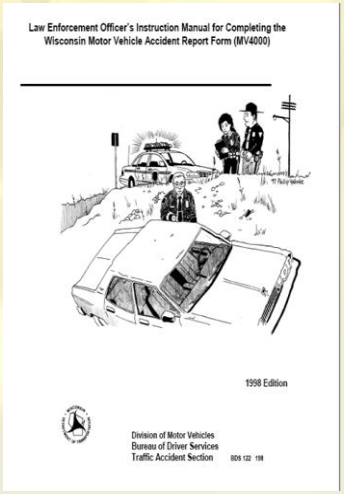
Project Objectives and Motivation

- A new approach to managing and collecting crash data
  - Why important?
  - Relies on a new underlying architecture and new reporting interface for officers
- Stakeholders involvement in data collection process
  - Feedback from generators and end users considered in development
- Better data for safety improvements
  - Proactive and comprehensive data-driven approach
- Faster feedback loop
  - Proactive and data-driven approach through technology
- Advancing Safety through Partnerships with Universities

Previous Practice



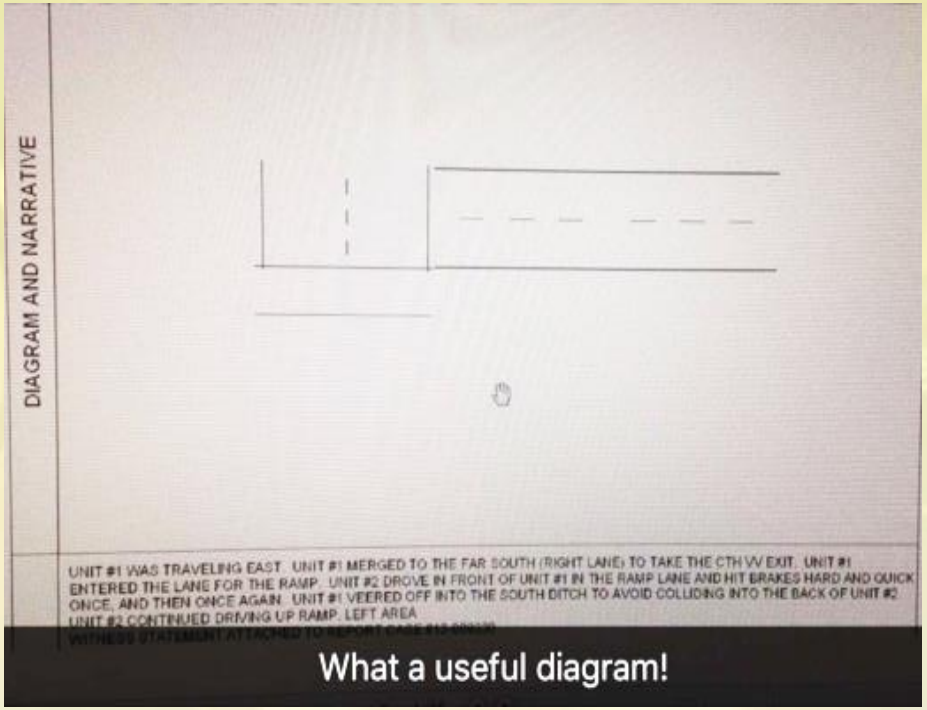
Paper crash report backlogs in Texas. (GAO-10-454)



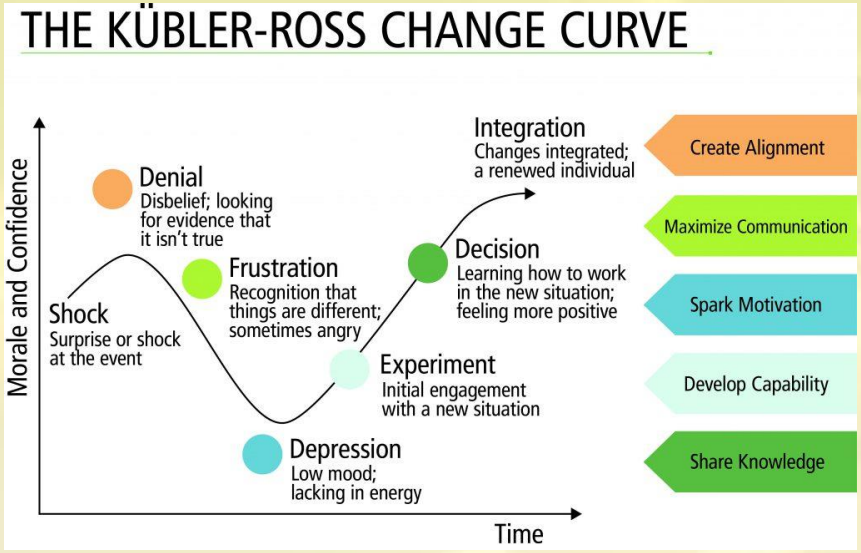
- Commonly heard from reporting officers: "crash forms are just for insurance companies"
  - CDIPG
- MV4000 Instruction Manual
  - Primary officer training resource in WI
    - Last update: 1998
  - Brief/vague engineering fields content:
    - No baseline definition of when to flag hills or curves
    - Poor definition of traffic barrier
    - No discussion of roundabouts
    - CM information vague

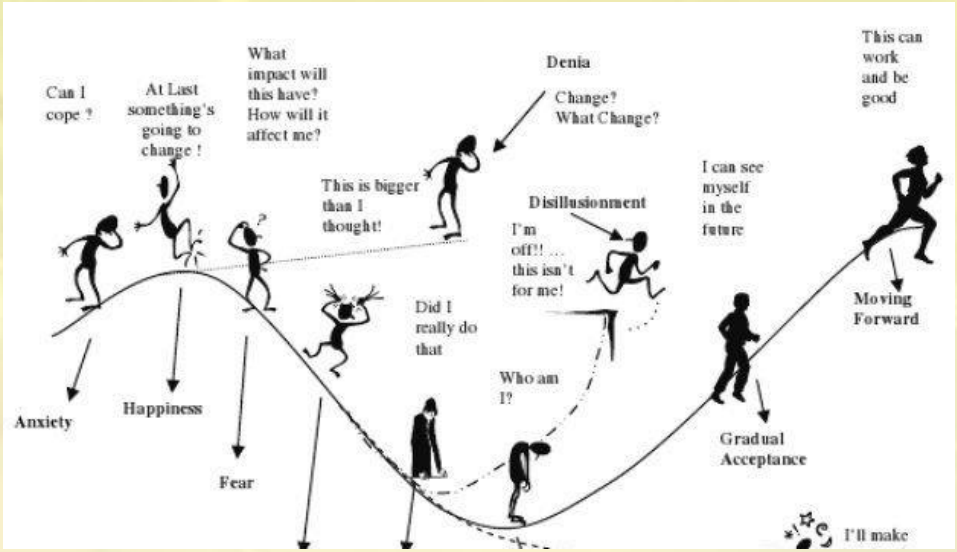
Engineering Elements Data Quality Audit

- Low accuracy for access control at partially controlled facilities
  - Highlights limited understanding of what qualifies as partial control
- Challenges for mixed conditions
  - When hills or curves are present on at least one approach, when should they be marked?
- Classification of traffic-way information
  - Misunderstanding what constitute divided roadways and barriers
- Roundabout-specific inaccuracies
  - Especially noteworthy in the horizontal curve and traffic-way fields



Change is Not Easy…



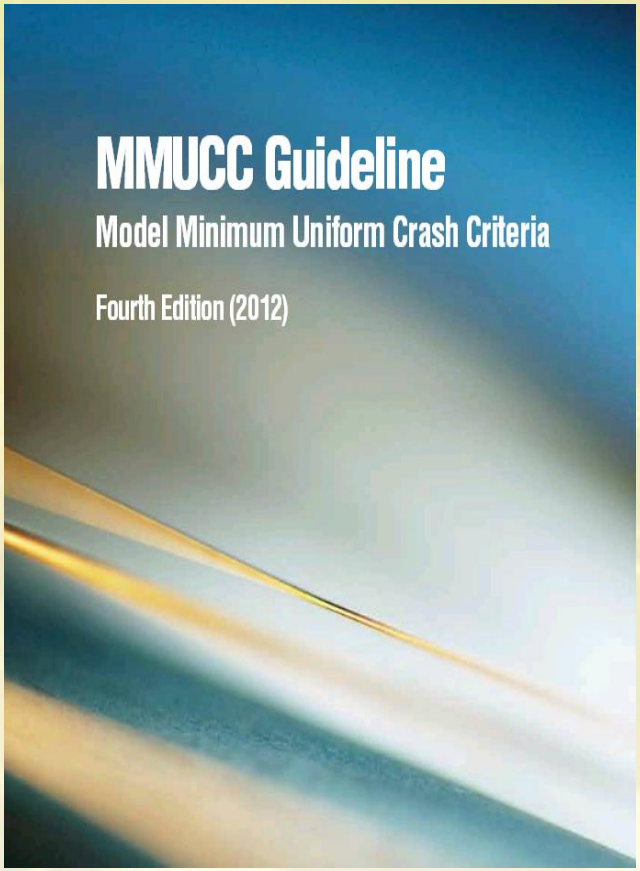


Significant advantage of Partnerships with Universities…

National Perspective: Model Minimum Uniform Crash Criteria (MMUCC) and FAST Act

MMUCC 4

- 110 Crash Data Elements
  - 77 Collected From Scene
  - 10 Derived
  - 23 Linked
- 4 Categories
  - Crash Data Elements
  - Vehicle Data Elements
  - Person Data Elements
  - Roadway Elements



FAST Act

- Safety Performance Measures
  - HSIP – Motor and non-Motor Fatal, Injury

Wisconsin Crash Reporting Improvement Efforts

- Beyond MMUCC
  - Secondary Crashes
  - Incident Management
  - Motorcycle
  - Non Motorists
  - Citations for All Persons
  - CV/Truck/Bus/Hazmat
  - Captain Grondal - Drug/Alcohol
- Crash Data Improvement Program (CDIP)
  - Key to Improvement Efforts

Traffic Safety Information System

Replacement MV4000 Form

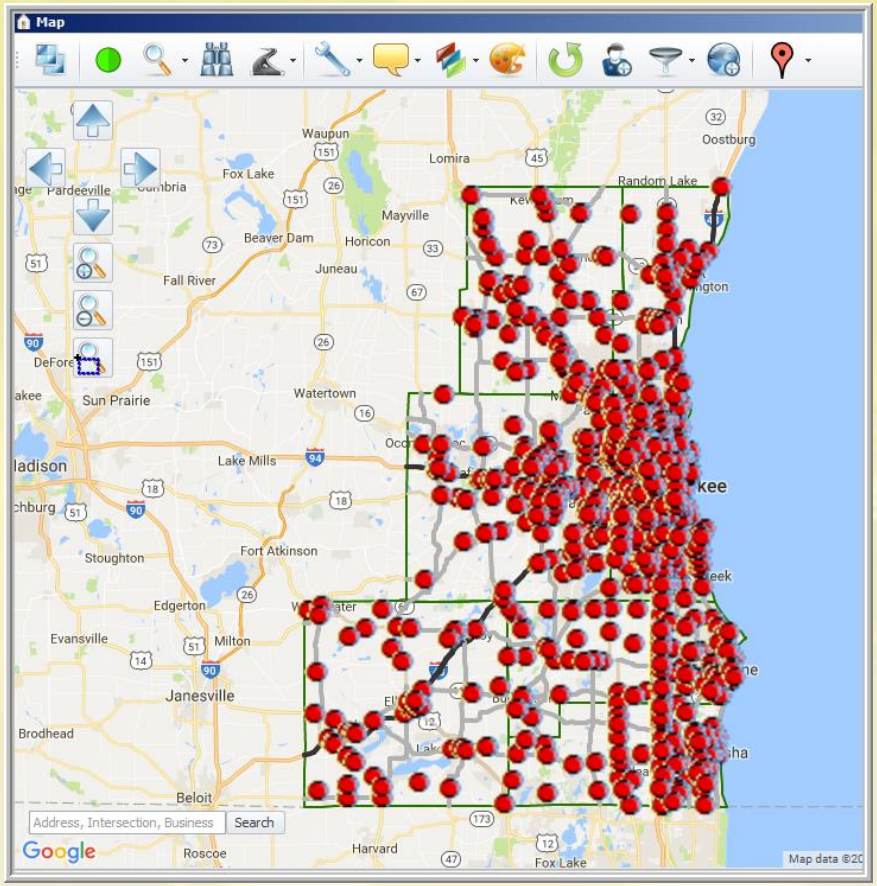
Summary

Crash Date 02/04/2016	Crash Time 09:44 AM	Date Notified 02/04/2016	Time Notified 09:44 AM	
Date Arrived 02/04/2016	Time Arrived 09:44 AM	Total Units 01	Total Injured 01	Total Killed 00
☐ On Emergency	☐ Hit and Run	☑ Lane Closure Due to Crash	☑ Work Zone	☑ Trailer or Towed
☑ Government Property		☐ Active School Zone	School Bus Related NO	

Crash Scene

First Harmful Event	First Harmful Event Location	
Manner of Collision 05--SIDEWIPE/SAME DIRECTION	Light Condition	
Road Surface Condition	Environment Factor(s)	
Roadway Factor(s)	Weather Condition(s)	
Animal Type	Relation To Trafficway	
Crash Classification - Location TRIBAL LAND	Crash Classification - Jurisdiction	
Tribal Land BAD RIVER BAND	Access Control	Special Study

Dynamic Crash Form



Accompanying Officer Interface

0DL008M7X4
CHRIS SCENARIO 1

Wisconsin Motor Vehicle Crash Report

TEST POLICE DEPARTMENT
PO BOX 7918
MADISON, WI 53707
(608) 267-1847

0DL008M7X4

Document Number Override	Primary Crash Document #	Agency Crash Number	Investigating Officer/Deputy
			CHIEF DEPUTY CHRIS BROWN

Crash Date	Crash Time	Date Arrived	Time Arrived
11/08/2016	04:54 AM	11/08/2016	05:20 AM

Date Notified	Time Notified	Total Units	Total Injured	Total Killed
11/08/2016	05:15 AM	02	02	00

☐ On Emergency	☐ Hit and Run	☐ Lane Closure	☐ Work Zone	☑ Trailer or Towed

☐ Government Property	☐ Active School Zone	School Bus Related	Tags
		No	

☑ Reportable	Crash Type	☐ Amended	☐ Secondary Crash
	DT4000 (Standard Crash)		

Description

Diagram

Reconstruction By

Photos By

Additional Information
None

Narrative: I, a sworn law enforcement officer, agree that I have not added any CJIS data in this report.

HYDROCHLORIC ACID IS A COLORLESS, HIGHLY PUNGENT SOLUTION OF HYDROGEN CHLORIDE (HCL) IN WATER. IT IS A CORROSIVE, STRONG MINERAL ACID WITH MANY INDUSTRIAL USES. HYDROCHLORIC ACID IS FOUND NATURALLY IN GASTRIC ACID. WHEN IT REACTS WITH AN ORGANIC BASE IT FORMS A HYDROCHLORIDE SALT.

IT WAS HISTORICALLY CALLED ACIDUM SALIS, MURIATIC ACID, AND SPIRITS OF SALT BECAUSE IT WAS PRODUCED FROM ROCK SALT AND GREEN VITRIOL (BY BASILIUS VALENTINUS IN THE 15TH CENTURY) AND LATER FROM THE CHEMICALLY SIMILAR COMMON SALT AND SULFURIC ACID (BY JOHANN RUDOLPH GLAUBER IN THE 17TH CENTURY). FREE HYDROCHLORIC ACID WAS FIRST FORMALLY DESCRIBED IN THE 16TH CENTURY BY LIBAVIUS. LATER, IT WAS USED BY CHEMISTS SUCH AS GLAUBER, PRIESTLEY, AND DAVY IN THEIR SCIENTIFIC RESEARCH.

WITH MAJOR PRODUCTION STARTING IN THE INDUSTRIAL REVOLUTION, HYDROCHLORIC ACID IS USED IN THE CHEMICAL INDUSTRY AS A CHEMICAL REAGENT IN THE LARGE-SCALE PRODUCTION OF VINYL CHLORIDE FOR PVC PLASTIC, AND MDI/TDI FOR POLYURETHANE. IT HAS NUMEROUS SMALLER-SCALE APPLICATIONS, INCLUDING HOUSEHOLD CLEANING, PRODUCTION OF GELATIN AND OTHER FOOD ADDITIVES,

Wisconsin Motor Vehicle Crash Report

TEST POLICE DEPARTMENT
PO BOX 7919
MADISON, WI 53707
(608) 267-1847

DESCALING, AND LEATHER PROCESSING. ABOUT 20 MILLION TONNES OF HYDROCHLORIC ACID ARE PRODUCED WORLDWIDE ANNUALLY.

Location

ON DAV DR 657 FT W OF W BONE LAKE DR IN THE TOWN OF MILLTOWN IN POLK COUNTY	Latitude 45.519638	Longitude -92.409262
	X Coordinate 77549.078126	Y Coordinate 6064818.5
	Structure Type No Structure	

Crash Scene

First Harmful Event Motor Veh In Transport	First Harmful Event Location On Roadway
Manner of Collision 03--Front To Front	Light Condition Dawn
Road Surface Condition(s) Wet	Roadway Factor(s)
Environment Factor(s) Visual Obstruction (c), Glare	Visability Obscured
Weather Condition(s) Rain	
Animal Type	Relation To Trafficway Trafficway - On Road
Crash Classification - Location Public Property	Crash Classification - Jurisdiction No Special Jurisdiction
Tribal Land	Access Control No Control — Special Study

Within Interchange Area	Junction Location	Intersection Type
NO	Non-Junction	Not an Intersection

Unit Summary

01 — UNIT

Unit Status In Transit		Vehicle Operating As Classification D CLASS		Unit Type Automobile
Vehicle Type Passenger Car				Operating As Endorsements
Total Occs 2	Train/Bus # Injured	Total # Citations Issued 0	Total Trailers 0	Total HazMat Types 0
Insurance? YES	Direction Of Travel Eastbound	☐ Pre Crash Tire Mark	Speed Limit 45	Total Lanes 2
Most Harmful Event: Collision With Motor Veh In Transport		Special Function No Special Function		Emergency Motor Vehicle Use Not Applicable
Traffic Way Two-Way, Not Divided		Traffic Control No Control		Traffic Control Inoperative/Missing NO
Surface Type Blacktop (Bituminous)		Road Curvature Curve Left		Road Grade Downhill
Truck Bus or HazMat No		Reporting Threshold No		

Vehicle

01 — VEHICLE

License Plate Number DEF468	Plate Type AUT - Automobile	St WI	Country of Issuance UNITED STATES
Vehicle Identification Number 2FAFP71W26X177889	Make FORD	Year 2006	Model FOCUS
Color BLU - Blue	Body Style 2D - 2DR		Bus Use Not A Bus
Initial Contact Point 12--Front	Vehicle Damage		

Extent Of Damage

Wisconsin Motor Vehicle Crash Report

TEST POLICE DEPARTMENT
PO BOX 7919
MADISON, WI 53707
(608) 267-1847

UNIT 01 — VEHICLE

	1--Right Front Corner, 11--Left Front Corner, 12--Front
Disabling Damage	
Towed Due To Damage **Towed Due To Disabling Damage**	Vehicle Removed By **MIKES BIG TOW**
What Driver Was Doing **Negotiating Curve**	Vehicle Factors **Not Applicable**
Driver Prior Action Other	
Driver Actions **No Contributing Action**	
Driver Distractions **Not Distracted**	

Vehicle Owner

UNIT 01 — VEHICLE OWNER

Individual **TERRA R ZZZTESTERTON**	Address **4802 SHEBOYGAN AVE** **MADISON, WI 53705 , US**

Sequence Of Events

01	Event **Motor Veh In Transport**
02	Event
03	Event
04	Event

Policy Holder

UNIT

Insurance Company **LUMBERMENS-UNDERWRITING-ALLIANCE-US**	Individual **TINA ZZZCHO**

0DL008M7X4
CHRIS SCENARIO 1

Wisconsin Motor Vehicle Crash Report

TEST POLICE DEPARTMENT
PO BOX 7919
MADISON, WI 53707
(608) 267-1847

Individual

UNIT 01 INDIVIDUAL 001

Driver: TINA A ZZZCHO		Citations Issued: 0	Phone Number:
		Date of Birth: 02/08/1960	Sex: Female / Race: ASIAN
Address: 100 MAIN ST, PO BOX 123, MADISON, WI 53706 1234, US		Driver License Number: Z3358036064802, State: Wisconsin Country: UNITED STATES	

Equipment

On Duty Crash		Safety Equipment: Shoulder & Lap Belt
Seat Position: 1--Front Seat-Left Side (Driver/Motoroyole/Bioyol		
Helmet Use		Helmet Compliance
Eye Protection		Tint Compliance

Injury

Injury Severity: Suspected Serious Injury		Airbag: Non Deployed
Ejected: Not Ejected	Ejection Path: Not Ejected/Not Applicable	Trapped/Extricated: Not Trapped
Medical Transport: EMS Ground	EMS Agency Identifier: 8001122	EMS Run #: 888
Hospital: U OF MINN MED CTR - FAIRVIEW	Date of Death	Time of Death

Non Motorist

Striking Unit #	Prior Action	Location	To/From School

Action

Action Other

Drug & Alcohol

☐ Suspected Alcohol Use ☐ Suspected Drug Use

Alcohol Test Given: Test Not Given	Alcohol Test Type	Alcohol Test Results
Drug Test Given: Test Not Given	Drug Test Type	Drug Test Results

Drug Type

Individual Condition: Appeared Normal

Wisconsin Motor Vehicle Crash Report

TEST POLICE DEPARTMENT
PO BOX 7919
MADISON, WI 53707
(608) 267-1847

Individual

UNIT 01 INDIVIDUAL 002

Passenger: TINA B ZZZCHO		Citations Issued: 0	Phone Number:
		Date of Birth: 02/08/1860	Sex: Female / Race: ASIAN
Address: 100 MAIN ST PO BOX 123 MADISON, WI 53706 1234, US		Driver License Number:	
Equipment	On Duty Crash:	Safety Equipment: Shoulder & Lap Belt	
Seat Position: 3--Front Seat-Right Side (Train Engineers/Right			
Helmet Use:		Helmet Compliance:	
Eye Protection:		Tint Compliance:	
Injury	Injury Severity: Suspected Serious Injury	Airbag: Deployed-Front	
Ejected: Not Ejected		Ejection Path: Not Ejected/Not Applicable	Trapped/Extricated: Not Trapped
Medical Transport: EMS Ground		EMS Agency Identifier: 6804817	EMS Run #: 333
Hospital: AMERY REGIONAL MEDICAL CENTER		Date of Death:	Time of Death:
Non Motorist	Striking Unit #:	Prior Action:	Location: / To/From School:
Action:			
Action Other:			
Drug & Alcohol	☐ Suspected Alcohol Use	☐ Suspected Drug Use	
Alcohol Test Given: Test Not Given		Alcohol Test Type:	Alcohol Test Results:
Drug Test Given: Test Not Given		Drug Test Type:	Drug Test Results:
Drug Type:			
Individual Condition: Appeared Normal			

Wisconsin Motor Vehicle Crash Report

TEST POLICE DEPARTMENT
PO BOX 7919
MADISON, WI 53707
(608) 267-1847

Unit Summary

UNIT 02

Unit Status: In Transit		Vehicle Operating As Classification: A CLASS		Unit Type: Truck
Vehicle Type: Truck Tractor (Semi Attached)				Operating As Endorsements: X - TANK/HAZARDOUS MATERIAL
Total Occs: 1	Train/Bus # Injured	Total # Citations Issued: 3	Total Trailers: 1	Total HazMat Types: 1
Insurance?: YES	Direction Of Travel: Westbound	☐ Pre CrashTire Mark	Speed Limit: 45	Total Lanes: 2
Most Harmful Event: Collision With: Motor Veh In Transport		Special Function: No Special Function		Emergency Motor Vehicle Use: Not Applicable
Traffic Way: Two-Way, Not Divided		Traffic Control: No Control		Traffic Control Inoperative/Missing: NO
Surface Type: Blacktop (Bituminous)		Road Curvature: Curve Right		Road Grade: Uphill
Truck Bus or HazMat: Any truck or truck combination > 10,000lbs GVWR/GCWR		Reporting Threshold: Medical Transport		

Vehicle

UNIT 02 — VEHICLE

License Plate Number: TS38747	Plate Type: TOR - Tractor	St: WI	Country of Issuance: UNITED STATES
Vehicle Identification Number: 4V5NC9EH4FN931602	Make: VOLVO	Year: 2015	Model: VNX 630
Color: CAM - Camouflage	Body Style: CB - CAB CHASSIS		Bus Use: Not A Bus
Initial Contact Point: 12--Front	Vehicle Damage: 12--Front		
Extent Of Damage: Minor Damage			
Towed Due To Damage: Not Towed	Vehicle Removed By: OPERATOR		
What Driver Was Doing: Negotiating Curve	Vehicle Factors: Brakes		
Driver Prior Action Other			

UNIT 02 — VEHICLE

Driver Actions: Speed Too Fast/Cond, Improper Turn, Failed To Keep In Designated Lane, Operated Motor Vehicle In Inattentive, Careless or Erratic Manner

Driver Distractions: Distraction/Inattention

Vehicle Owner

UNIT 02 — VEHICLE OWNER

Individual: JOHNNY Z ZZZANDER	Address: 600 WILLIAMS ST MADISON, WI 53706 , US

Sequence Of Events

UNIT 01

Event: Cross Centerline

0DL008M7X4
CHRIS SCENARIO 1

Wisconsin Motor Vehicle Crash Report

TEST POLICE DEPARTMENT
PO BOX 7919
MADISON, WI 53707
(608) 267-1847

UNIT 02 — INDIVIDUAL 003

Individual

Driver	Citations Issued	Phone Number	
JOHNNY Z ZZZANDER$	3		
	Date of Birth: 02/12/1962	Sex: Male	Race: BLACK
Address: 600 WILLIAM$ ST, MADISON, WI 53706 , U$	Driver License Number: Z3324396206208, State: Wisconsin Country: UNITED $TATE$		

Equipment

On Duty Crash	Safety Equipment
	Shoulder & Lap Belt
Seat Position: 1--Front Seat-Left Side (Driver/Motoroyole/Bioyol	
Helmet Use	Helmet Compliance
Eye Protection	Tint Compliance

Injury

Injury Severity	Airbag
No Apparent Injury	Non Deployed

Ejected	Ejection Path	Trapped/Extricated
Not Ejected	Not Ejected/Not Applicable	Not Trapped
Medical Transport: Not Transported	EMS Agency Identifier	EMS Run #
Hospital	Date of Death	Time of Death

Non Motorist

Striking Unit #	Prior Action	Location	To/From School

Action

Action Other

Drug & Alcohol

☑ Suspected Alcohol Use	☑ Suspected Drug Use	
Alcohol Test Given: Test Given	Alcohol Test Type: Evidentiary Breath Test (EBT)	Alcohol Test Results: Pending
Drug Test Given: Test Given	Drug Test Type: Blood	Drug Test Results: Pending
Drug Type		

Individual Condition: Asleep or Fatigued, Under The Influence Of Medications/Drugs/ Alcohol, Confused or Disoriented (Non Lucid)

Violations

	UTC Number	Issue To?	Statute Number	Seq Num	Description
01	A100024	003	346.63(1)(a)	002	OPERATING WHILE UNDER THE INFLUENCE
02	A100025	003	346.57(4)(k)	004	$PEEDING ON RU$TIC ROAD/45 MPH (20-24 MPH)
03	A100026	003	347.36(3)(a)	001	OPERATE $EMITRAILER W/O CAPABLE BRAKE$

0DL008M7X4
CHRIS SCENARIO 1

Wisconsin Motor Vehicle Crash Report

TEST POLICE DEPARTMENT
PO BOX 7919
MADISON, WI 53707
(608) 267-1847

UNIT 02 — TRUCK BUS

Carrier

Use Vehicle Owner Same as Carrier	Carrier Name	Source
☑	JOHNNY Z ZZZANDERS	Trip-Manifest

Name	Address

GVWR	Vehicle Configuration	Cargo Body Type
103	Truck Tractor/Semi-Trailer	Cargo Tank

US DOT #	Carrier Type	Permitted Load
12345	Interstate Carrier	Not Applicable

OS/OW Load	WI Permit Number	Permitted Vehicle On Permitted Route	Escort Vehicle Required By Permit	Escort Vehicle Present
☐		☑	☐	—

Measured Height	Measured Length	Measured Width	Measured Weight
12 FT 11 IN	38 FT 2 IN	8 FT 0 IN	40000 LBS

Hazardous Material

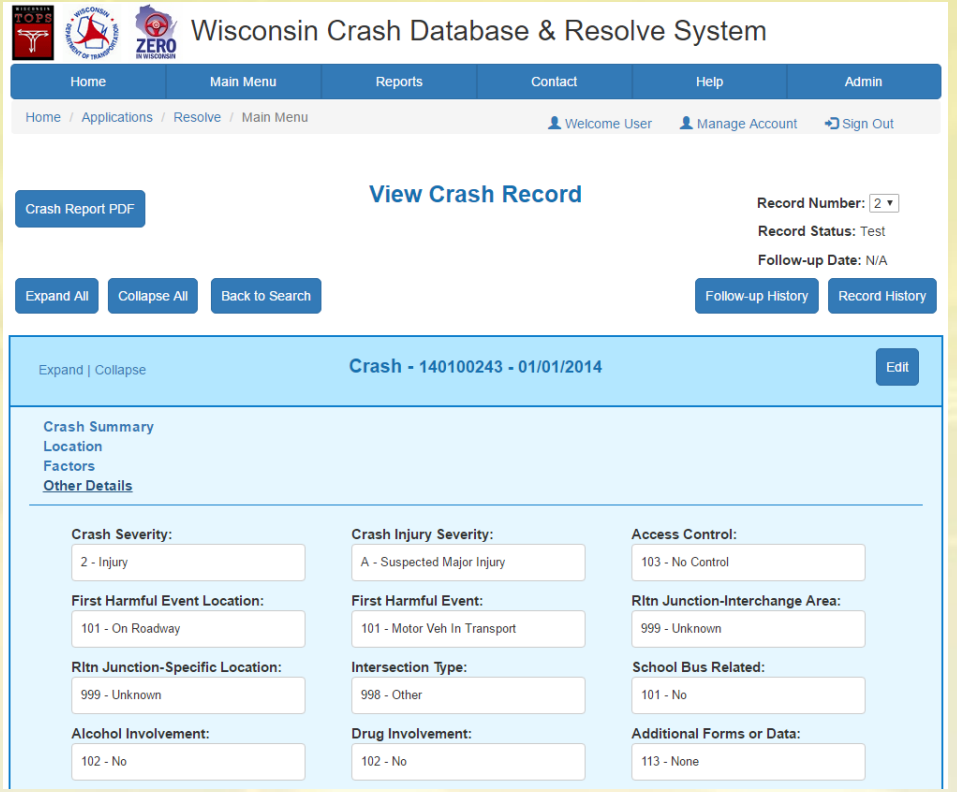
HAZ MAT 01

HazMat Class	HazMat UN #	HazMat Released
Corrosives-8.0	1789	NO

HazMat Name	HazMat Placard Displayed
HYDROCHLORIC ACID	YES

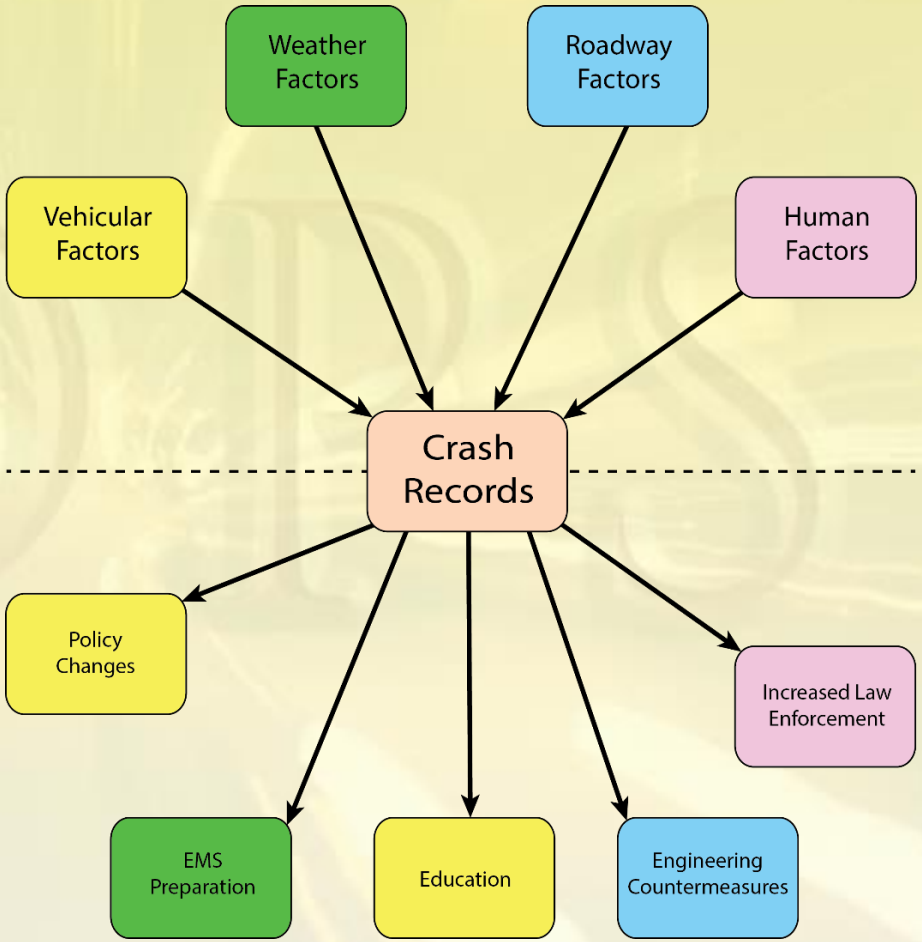
Resolve System:
Post Crash Data Management

- Web Based
  - Enhanced Editing & Validation
- Multiple Roles
  - CRU, FARS, DMV, FMCSA
  - Risk Management
- Version History
  - Key to management policies and quality controls



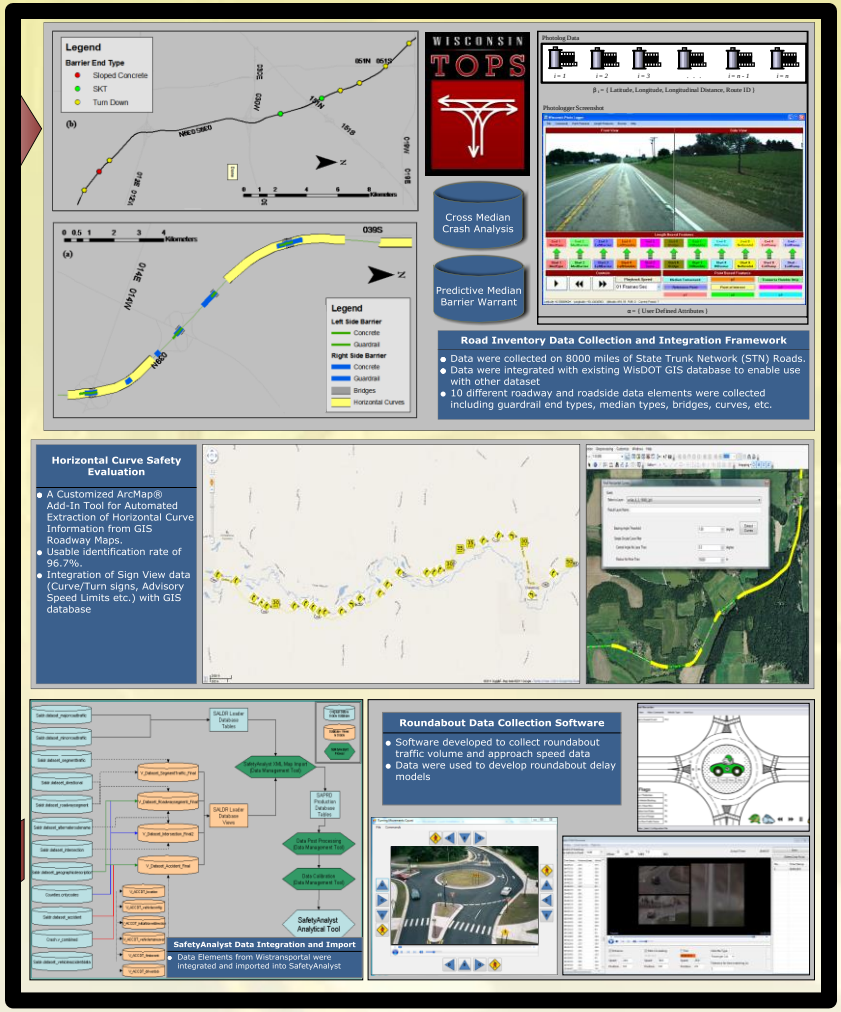
Resolve System: Post Crash Data Management

- Enhanced Reporting
  - System enables the inclusion supplemental datasets.
- Support Difference Transportation Areas
  - Policy Changes
  - EMS Preparation
  - Education
  - Engineering Countermeasures
  - Increased Law Enforcement



Supporting Data for Resolve System

- Fusion of WisDOT functional areas datasets
- Years of university partnership research on traffic safety
- Databases developed by research team



Impacts to Law Enforcement

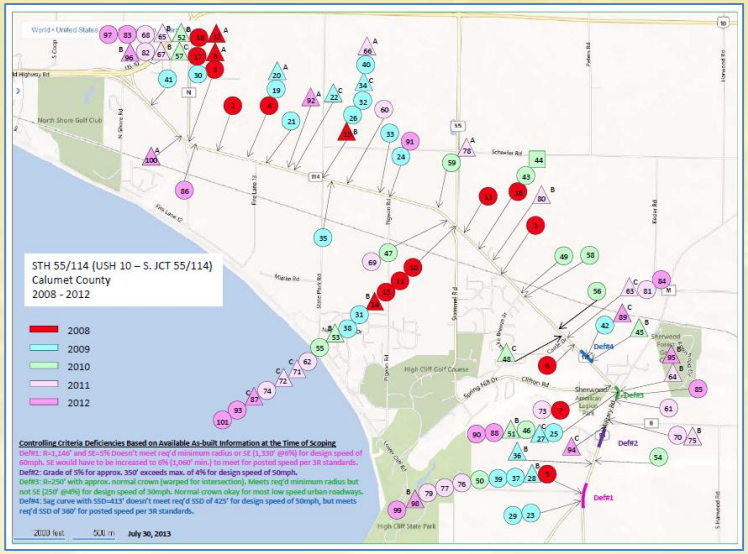
- **Key – focus on public safety!**
- TraCS Form Transmission Process
- Automate Up Front Validation Steps
- Requirement for Electronic Reporting
- Maintain Communication & Feedback During Resolve Processing
- TIME, Wisconsin.Gov Access Unchanged
- Changes to Data Extracts, WisTransPortal

Impacts to Law Enforcement

- Weed out fields that had become obsolete
  - Identify others that were not being collected (i.e., phasing, roundabouts or cell phone use)
- Form is more intuitive
  - Great savings at both the state and local level by gathering correct and accurate data
- Easily describe what happened
  - Cell phone usage, roundabouts, cross median crashes

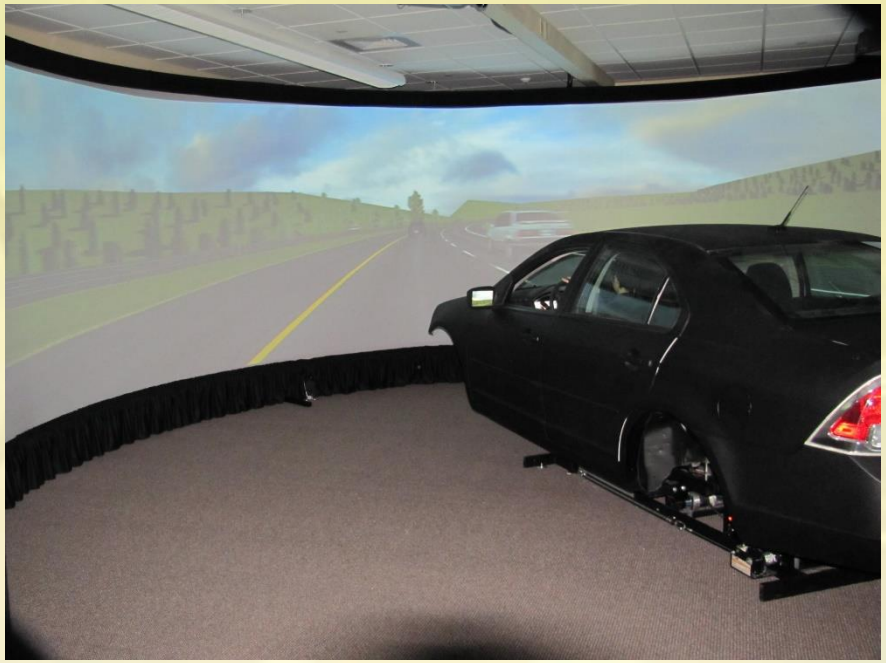
Beyond Quality Data

- Nature and structure of data meets future needs
  - Integration with highway geometric data.
- New safety analysis and planning procedures possible
  - Result of multiple datasets fusion.
- Approach is flexible enough to evolve faster than current system
  - Results from underlying architecture



How the Future of Safety Data Looks

- Faster and ‘Better’ Data
- Rapid Identification and Response to Safety Problems
- Technology at the Heart of Countermeasures Development – Human factor
- Immediate Feedback Loop Between Agencies and Manufacturers



Commercial Vehicle Data

- Automatic XML feed to FMCSA SafetyNet
  - Improved data quality to federal database
- More Thorough Data Elements and Attributes
  - All elements required for commercial vehicles regardless of regulatory licensing
- Data into police vehicles (or elsewhere?) to improve enforcement

Summary

- Improving crash data means improving knowledge and safety
- Better decisions for all vehicles types
- Enhancing the implementation of future technologies
- Challenge – data, and lots of it!

A Unified Approach to Crash Reporting

Efforts to Obtain Better Crash Data

David A. Noyce, PhD, PE, F.ASCE
Chair, Department of Civil and Environmental Engineering
Director, Traffic Operations and Safety Laboratory
University of Wisconsin-Madison

Commercial Vehicle Safety Research Summit: Best Practices for Advancing Safety through Partnerships with Universities
Northampton, MA