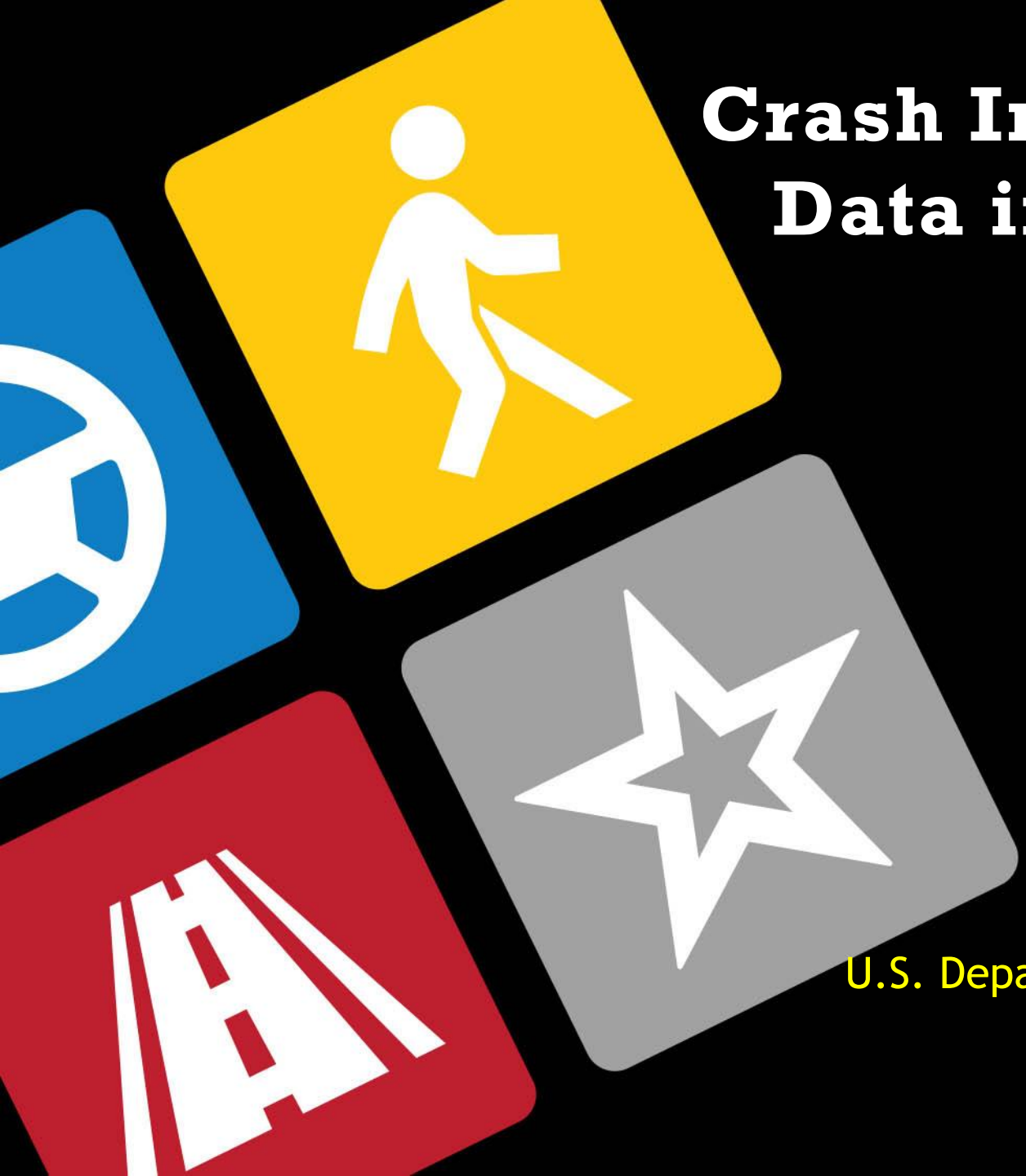


Crash Investigation Data in the United States

October 2017

Terry Shelton
National Highway Traffic Safety Administration
U.S. Department of Transportation

NHTSA
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

NHTSA's Mission

Save lives, prevent injuries and reduce economic costs due to road traffic crashes, through education, research, safety standards and enforcement activity.

NHTSA - a data-driven agency

Crash Numbers in the United States

Economic Costs
Of Motor Vehicle Crashes

$242 Billion

Police-Reported Crashes
(2015)

6,296,000

People Injured in Crashes
(2015)

2,443,000

Lives Lost in Crashes
(2015)

35,092

NHTSA

Investigation-Based Programs

- **Crash Investigation Sampling System (CISS)**
  - 1977 – Present
  - Updated in 2015

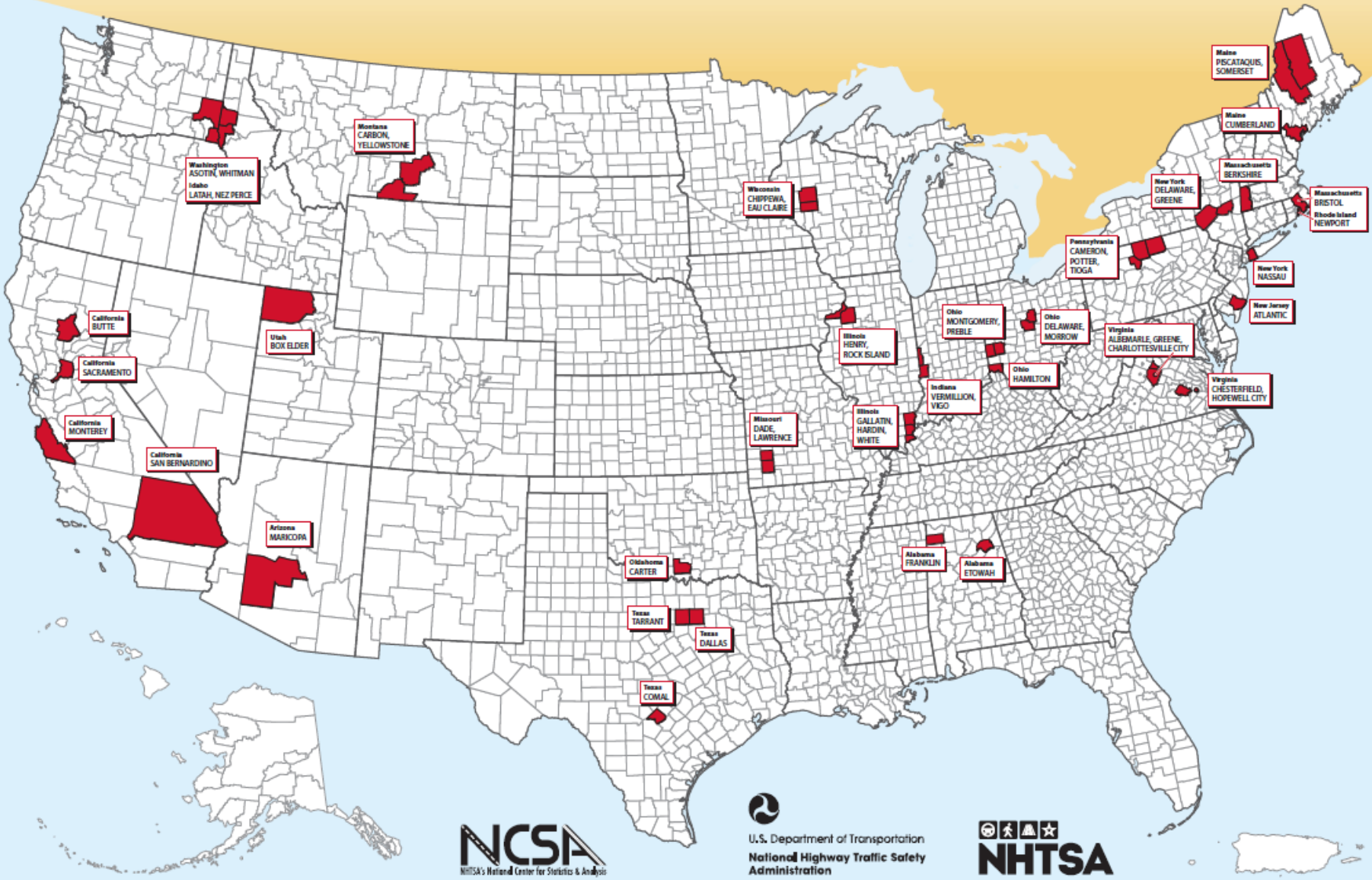
- **Special Crash Investigations (SCI)**
  - 1972-Present

- **Crash Injury Research and Engineering Network (CIREN)**
  - 1997-Present

Crash Investigation Sampling System

32 Phase I Data Collection Sites

CRASH INVESTIGATION SAMPLING SYSTEM



NCSA
NHTSA's National Center for Statistics & Analysis

U.S. Department of Transportation
National Highway Traffic Safety Administration

NHTSA

Crash Investigation Sampling System (CISS)

- National Sample of police-reported crashes involving
  - At least one passenger vehicle towed from the scene
  - Emphasis on more recent model year vehicles
  - Weighted data represent the national crash picture

- Locations
  - 24 sites operational today
  - 32 operational by end 2018

- Crash Investigators
  - 6 months of intense training, combining 6 weeks class room training with on-the-job training

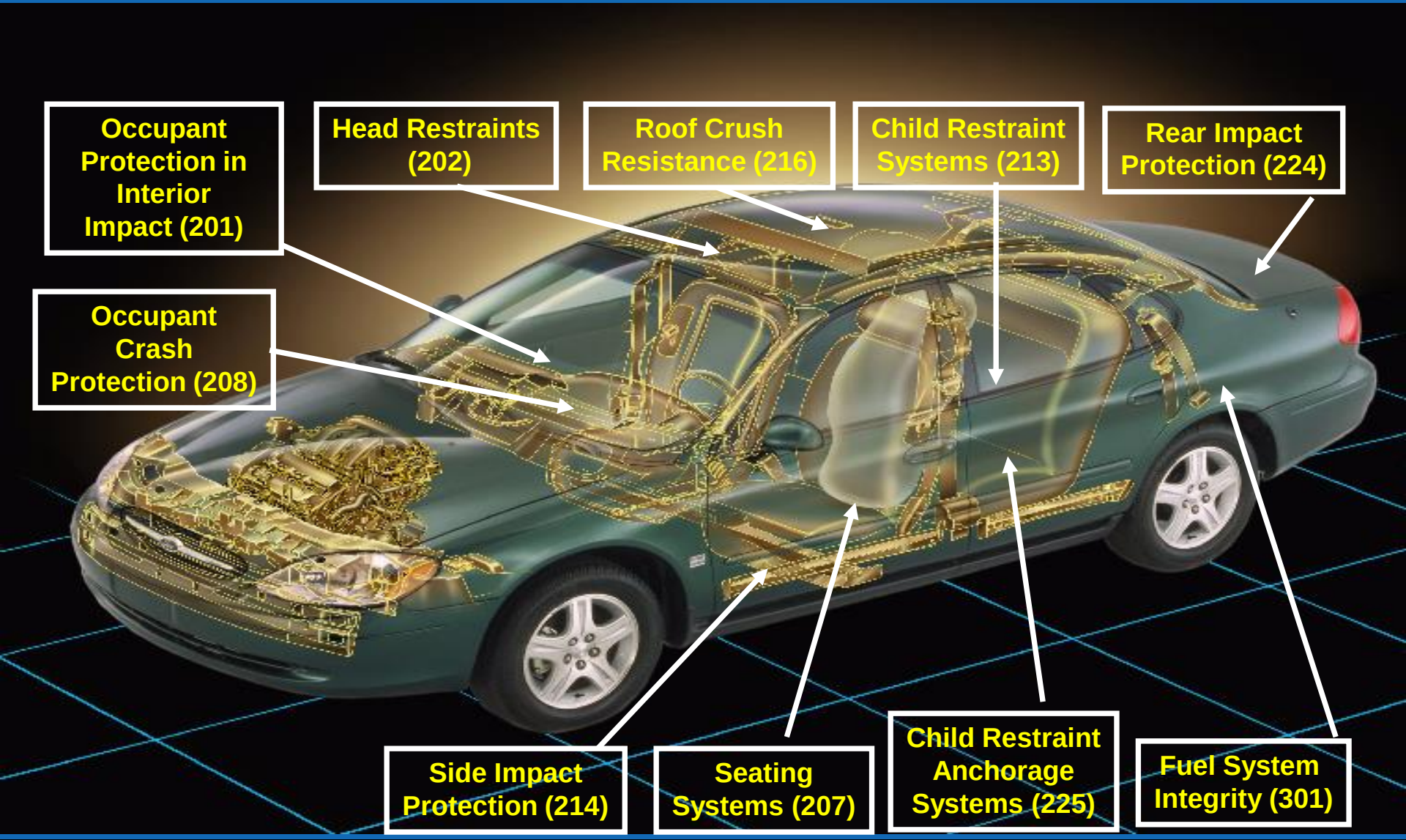
- 4,500 to 5,000 cases per year

Detailed Investigations

- **Provide consistent data on:**
  - Crash Events
  - Damage to Vehicle
  - Crash Forces Involved
  - Injuries to Victims
  - Injury Mechanisms
  - Detailed restraint data
  - Over 600 data elements per case

- **Multiple Data Sources**
  - Police crash reports
  - Scene inspections
  - Vehicle inspections
  - Driver and occupant interviews
  - Autopsy and hospital records

Federal Motor Vehicle Safety Standards



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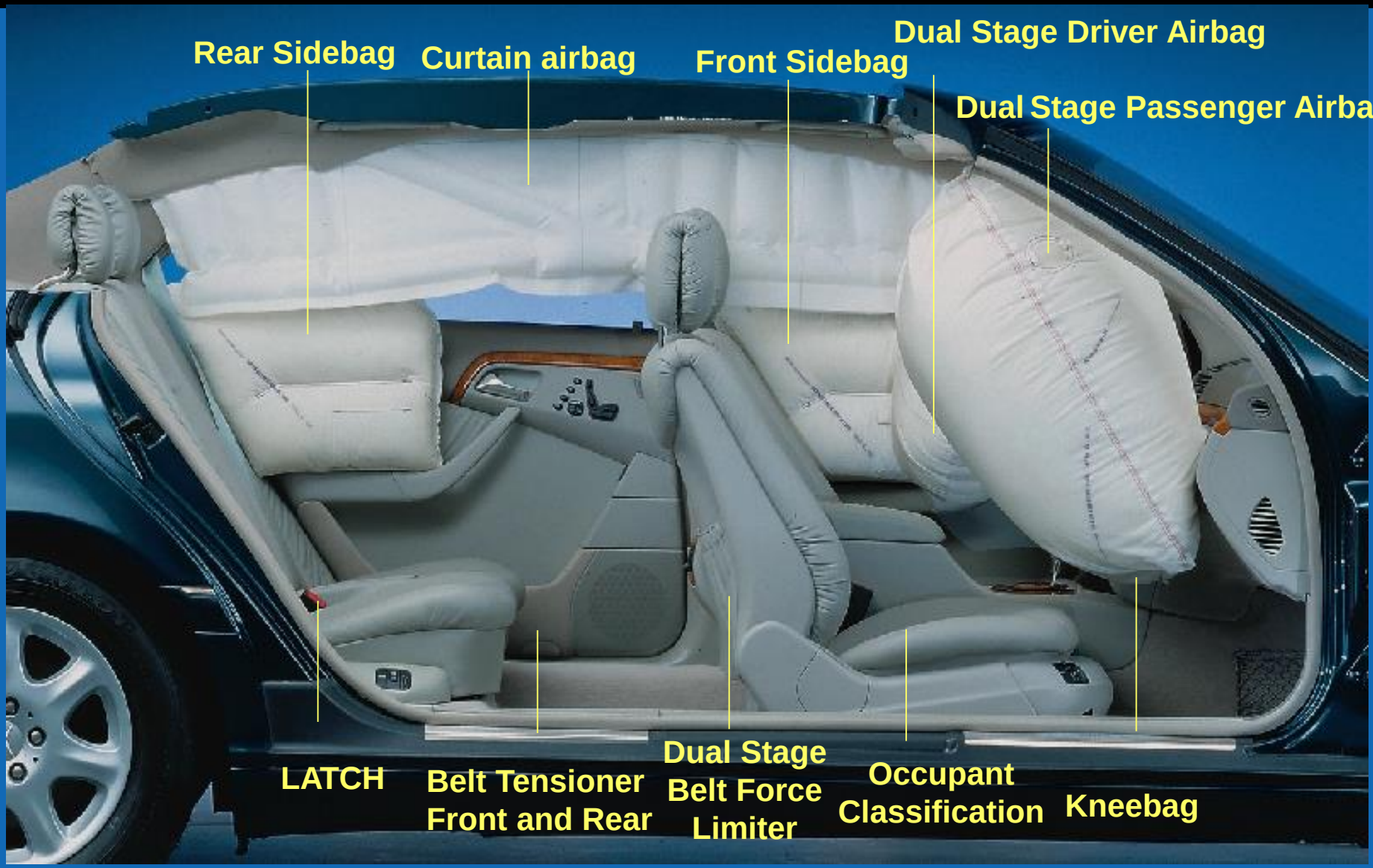

Rear Sidebag
Curtain airbag
Front Sidebag
Dual Stage Driver Airbag
Dual Stage Passenger Airbag
LATCH
Belt Tensioner Front and Rear
Dual Stage Belt Force Limiter
Occupant Classification
Kneebag

NHTSA

Air Bag Redesign Example

- Investigation data
  - Children and others were getting injured and killed from airbags

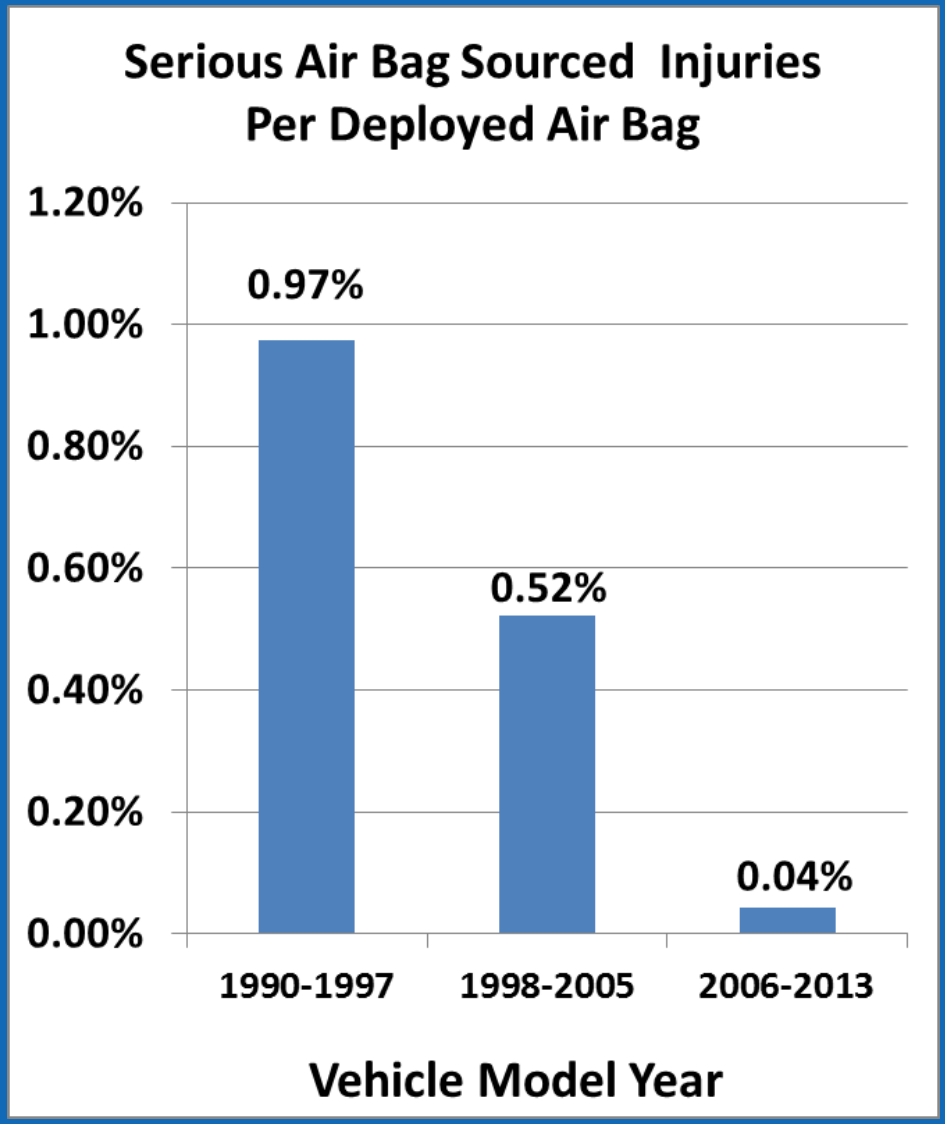
- Redesigned air bags
  - Modified FMVSS 208* to allow air bags to deploy less forcefully
  - Reduced unintended injuries, but some injuries continued
- Advanced Certified Advanced Compliant air bags
  - Upgraded FMVSS again circa 2004 model year vehicles
  - Virtually eliminated serious air bag injuries
  - More use of sensors

*FMVSS 208 = Frontal air bags

Air Bag Redesign Example, cont.

Air Bags

- Since the new certified advanced compliant air bags were introduced, serious injuries from air bags declined tremendously!



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Fires in Rear Impact Crashes

Fires seen in investigation data led to:

- Upgraded Rear Impact Test
  - Upgraded FMVSS 301* to higher level of crash forces, impact velocity, and absorbed crush energy
  - Mimic real world crash data
  - Reduced fuel spillage and fires

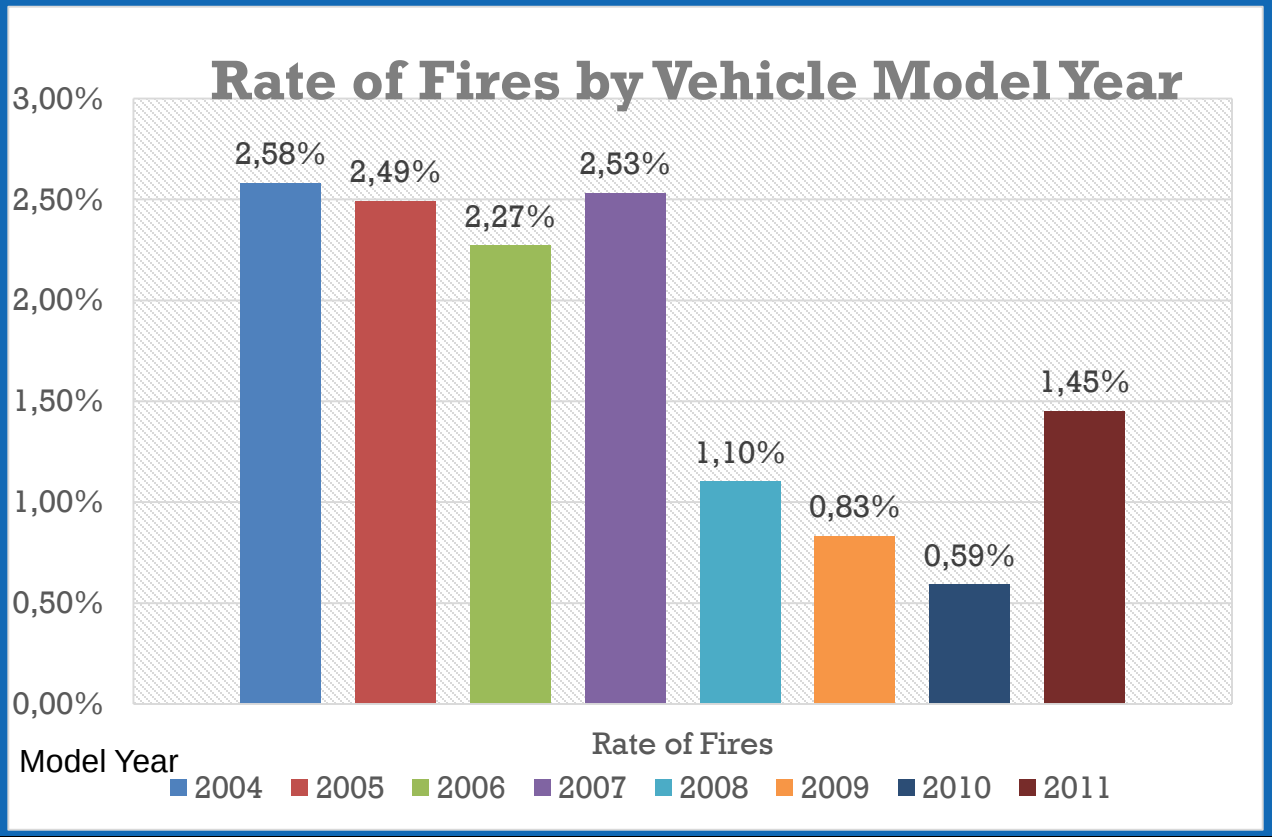
- NHTSA Phase-In Ungraded Test

Model Year (MY)	Required Certification Percentage
2007	40 %
2008	70 %
2009 and later	100 %

*FMVSS = Federal Motor Vehicle Safety Standard for Fuel System Integrity

Fires in Rear Impact Crashes, cont.

- Significant decrease in the rate (and number) of post-crash fires in fatal rear impacts in vehicles of model year 2007 and later, when vehicles certified to upgraded test!



Source: FARS 2004-2011

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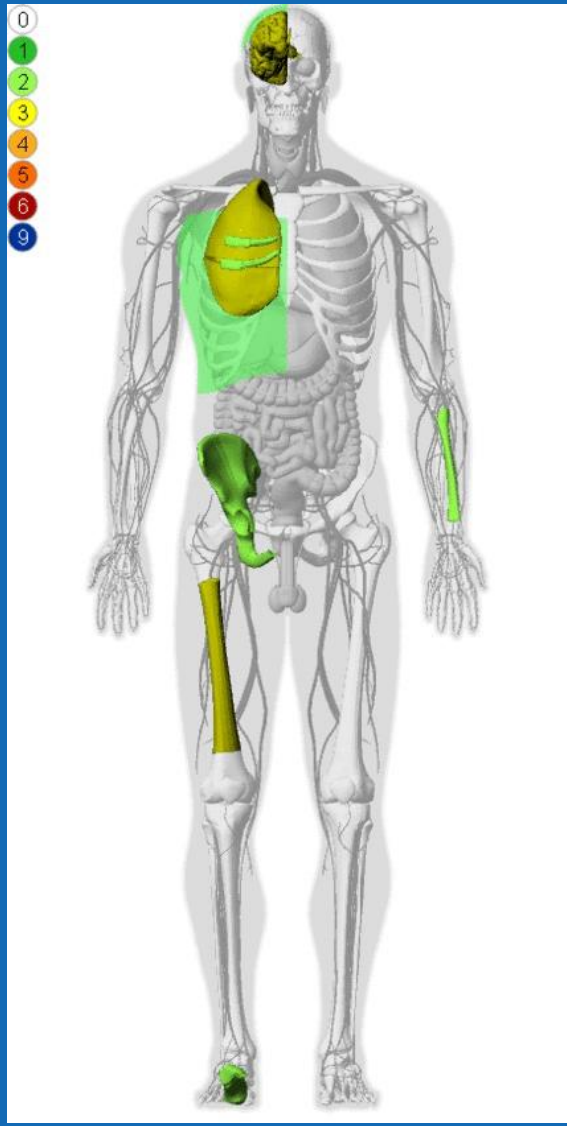
Times Change

- The data needs of the Agency and the transportation community have increased and changed over the last three decades

Dodge Charger – 1970 and 2018

Visual Anatomical Injury Descriptor (VisualAid or VAID)

- Developed and used by Department of Defense Army Research Laboratory
- Adopted new version of Abbreviated Injury Scale - AIS 2015
- Collecting Injury Causation Scenarios
- Produces color-coded anatomical 3D diagram

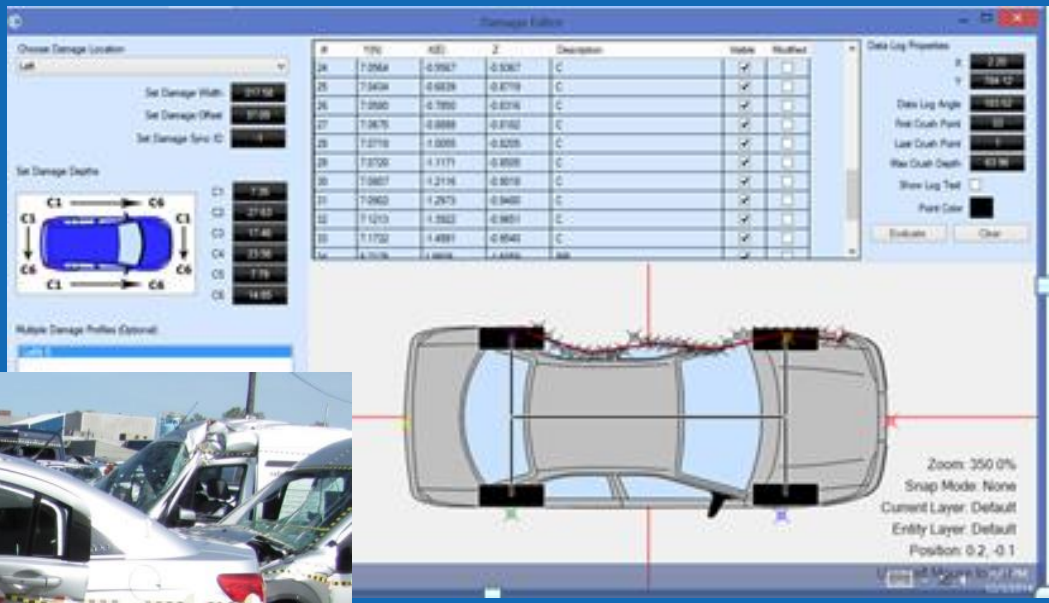


Scene Documentation

- Use Electronic Measurement Device
- Safe -Reduces time in the roadway
- High degree of precision
- Cost effective - one person operation
- Captures measurements in 3-dimensions (X, Y, Z axes)
- Produces scalable 2-D diagrams
- Makes raw measurement collected available in multiple common formats

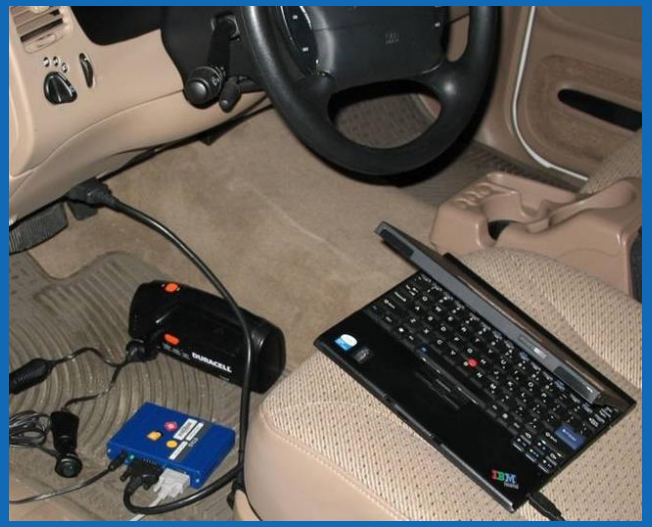
Vehicle Documentation

- Software allows Total Station to be used to document various crush and reference points on vehicle
  - More efficient
  - More crush measurements
    - Every 10cm
  - Scaled vehicle damage



Vehicle Documentation

- Provide Event Data Recorder (EDR) equipment for all field Crash Technicians
- Delta V, Speed, Brake and Throttle Application, Driver Belt use, Air Bag Deployment
- EDR data will be made available in electronic format



Conclusions

- Police crash reports are not uniform--generally unable to capture vehicle/occupant related safety data in a consistent and precise format
- NHTSA needs real-world crash investigation data to make informed decisions and evaluate rules
- Through its network of field investigation programs NHTSA can capture field data quickly and accurately

Thank you for your attention

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NHTSA