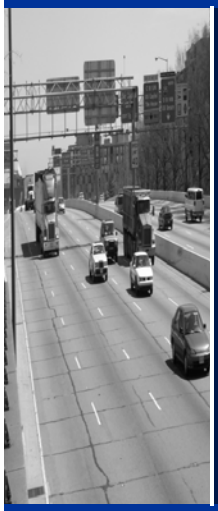
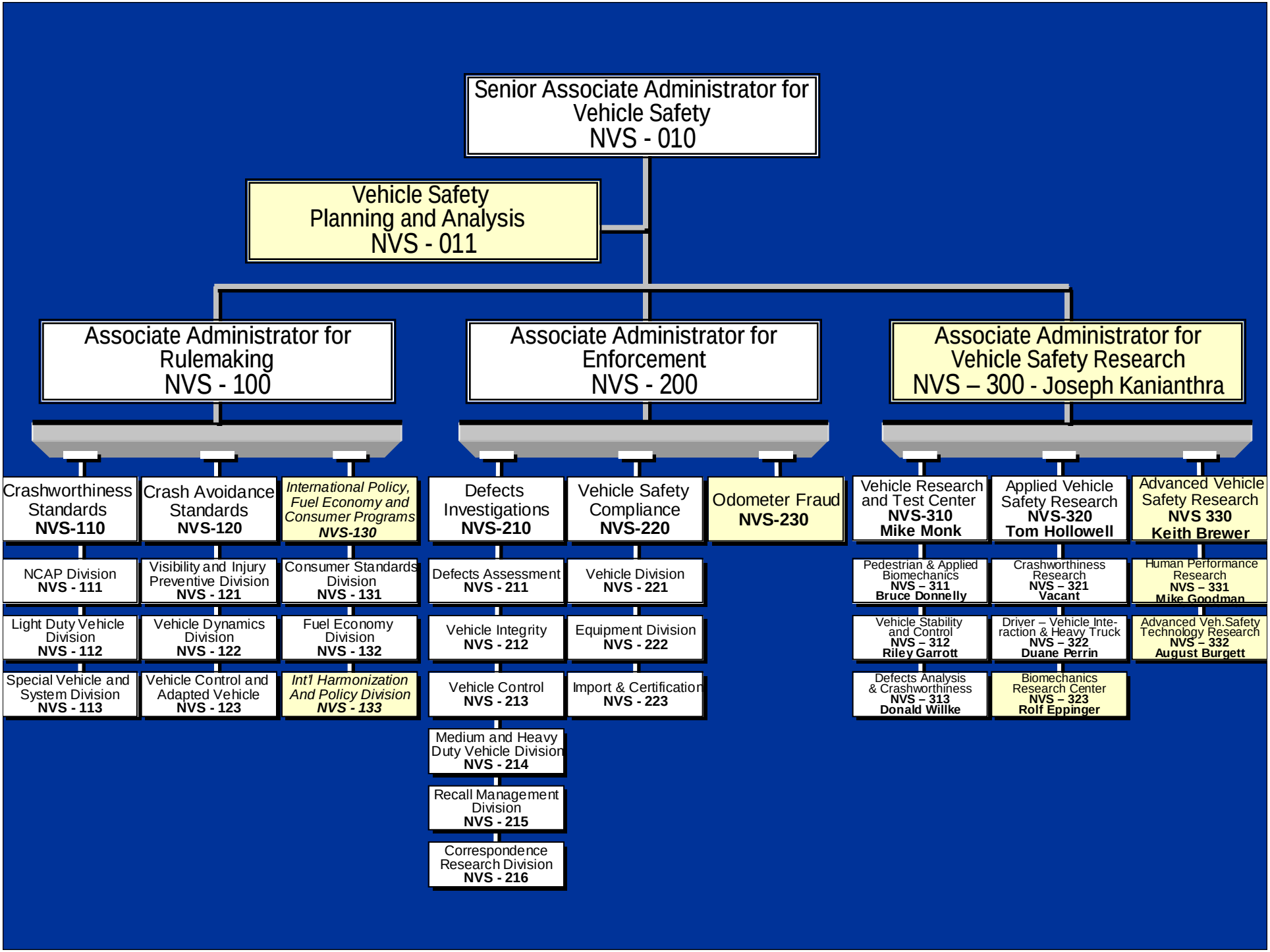


Enhancing Motor Vehicle Safety:

Presentation to Indian Delegation

March 3, 2004

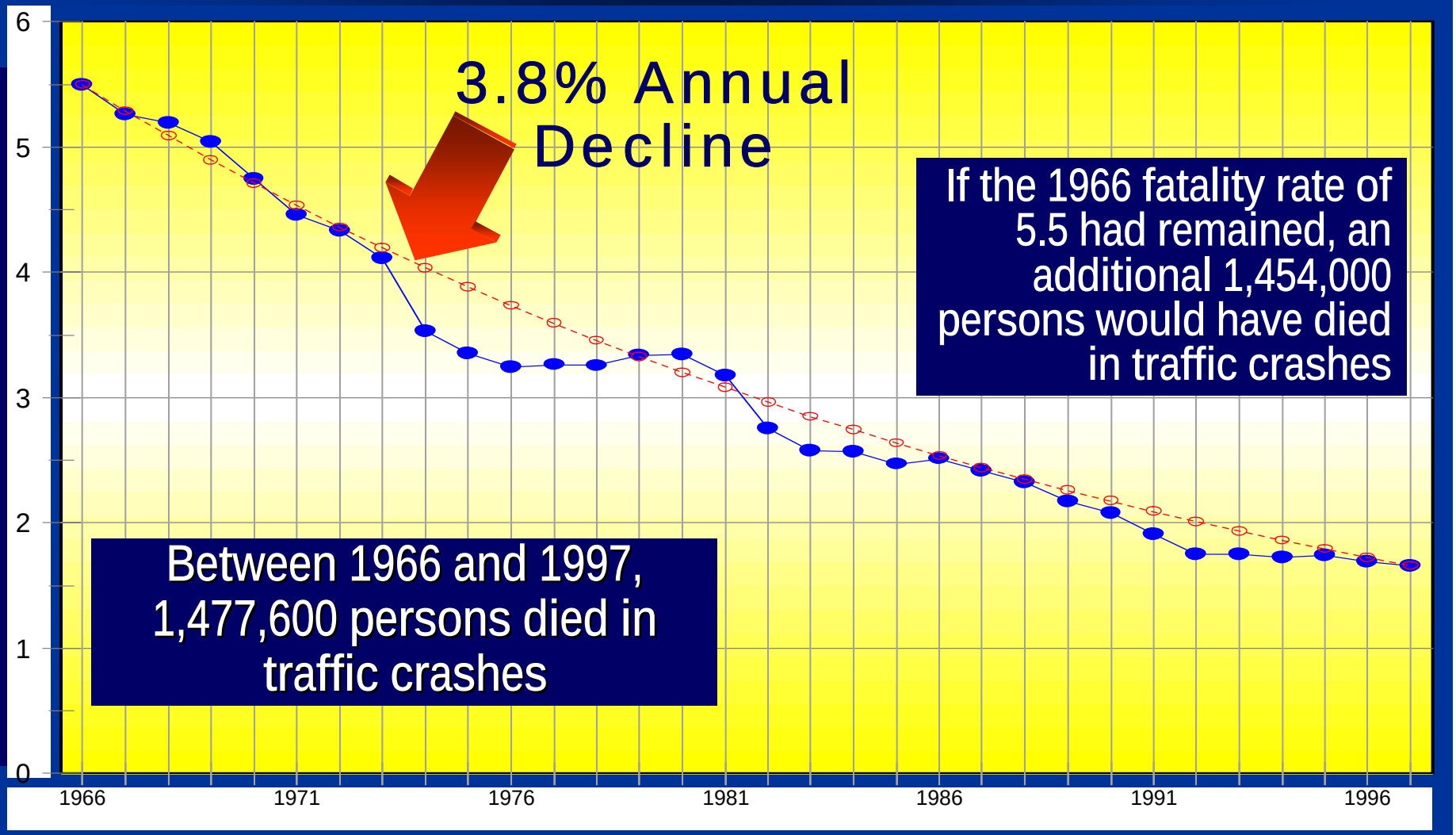
Joseph N. Kanianthra Ph.D. (Mech.Eng.)
Associate Administrator for Vehicle Safety Research
National Highway Traffic Safety Administration


Senior Associate Administrator for Vehicle Safety
NVS - 010
Vehicle Safety Planning and Analysis
NVS - 011
Associate Administrator for Rulemaking
NVS - 100
Associate Administrator for Enforcement
NVS - 200
Associate Administrator for Vehicle Safety Research
NVS – 300 - Joseph Kanianthra
Crashworthiness Standards
NVS-110
Crash Avoidance Standards
NVS-120
International Policy, Fuel Economy and Consumer Programs
NVS-130
Defects Investigations
NVS-210
Vehicle Safety Compliance
NVS-220
Odometer Fraud
NVS-230
Vehicle Research and Test Center
NVS-310
Mike Monk
Applied Vehicle Safety Research
NVS-320
Tom Hollowell
Advanced Vehicle Safety Research
NVS 330
Keith Brewer
NCAP Division
NVS - 111
Visibility and Injury Preventive Division
NVS - 121
Consumer Standards Division
NVS - 131
Defects Assessment
NVS - 211
Vehicle Division
NVS - 221
Pedestrian & Applied Biomechanics
NVS – 311
Bruce Donnelly
Crashworthiness Research
NVS – 321
Vacant
Human Performance Research
NVS – 331
Mike Goodman
Light Duty Vehicle Division
NVS - 112
Vehicle Dynamics Division
NVS - 122
Fuel Economy Division
NVS - 132
Vehicle Integrity
NVS - 212
Equipment Division
NVS - 222
Vehicle Stability and Control
NVS – 312
Riley Garrott
Driver – Vehicle Inte-raction & Heavy Truck
NVS – 322
Duane Perrin
Advanced Veh.Safety Technology Research
NVS – 332
August Burgett
Special Vehicle and System Division
NVS - 113
Vehicle Control and Adapted Vehicle
NVS - 123
Int'l Harmonization And Policy Division
NVS - 133
Vehicle Control
NVS - 213
Import & Certification
NVS - 223
Defects Analysis & Crashworthiness
NVS – 313
Donald Willke
Biomechanics Research Center
NVS – 323
Rolf Eppinger
Medium and Heavy Duty Vehicle Division
NVS - 214
Recall Management Division
NVS - 215
Correspondence Research Division
NVS - 216

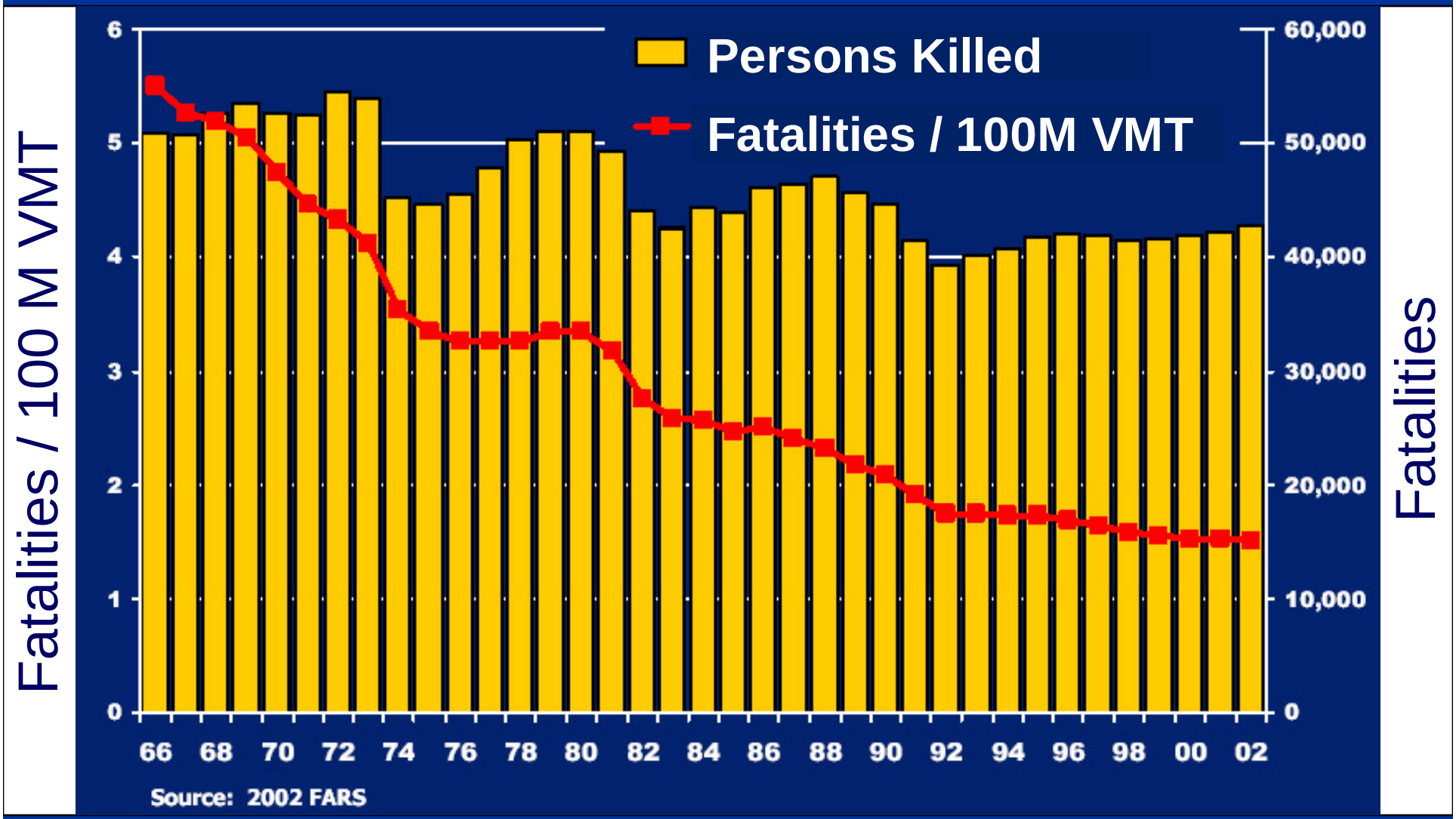
NHTSA Mission

- To Reduce Motor Vehicle Fatalities and Injuries and the Costs Associated With Crashes
- Carrying Out Needed Research, Implementing Education and Enforcement Programs
- Responsible for Issuing Safety Standards

U. S. Fatality Rate



Person Killed and Fatalities per 100M VMT



NHTSA Approach to Safety

- Engineering, Enforcement, Education
- Define Safety Need
- Science Based Regulations
- Performance based requirements
- Technically Feasible Solutions
- Establish Cost Effectiveness
- Aggressive Enforcement

Solving Problems

Human | Vehicle | Environment

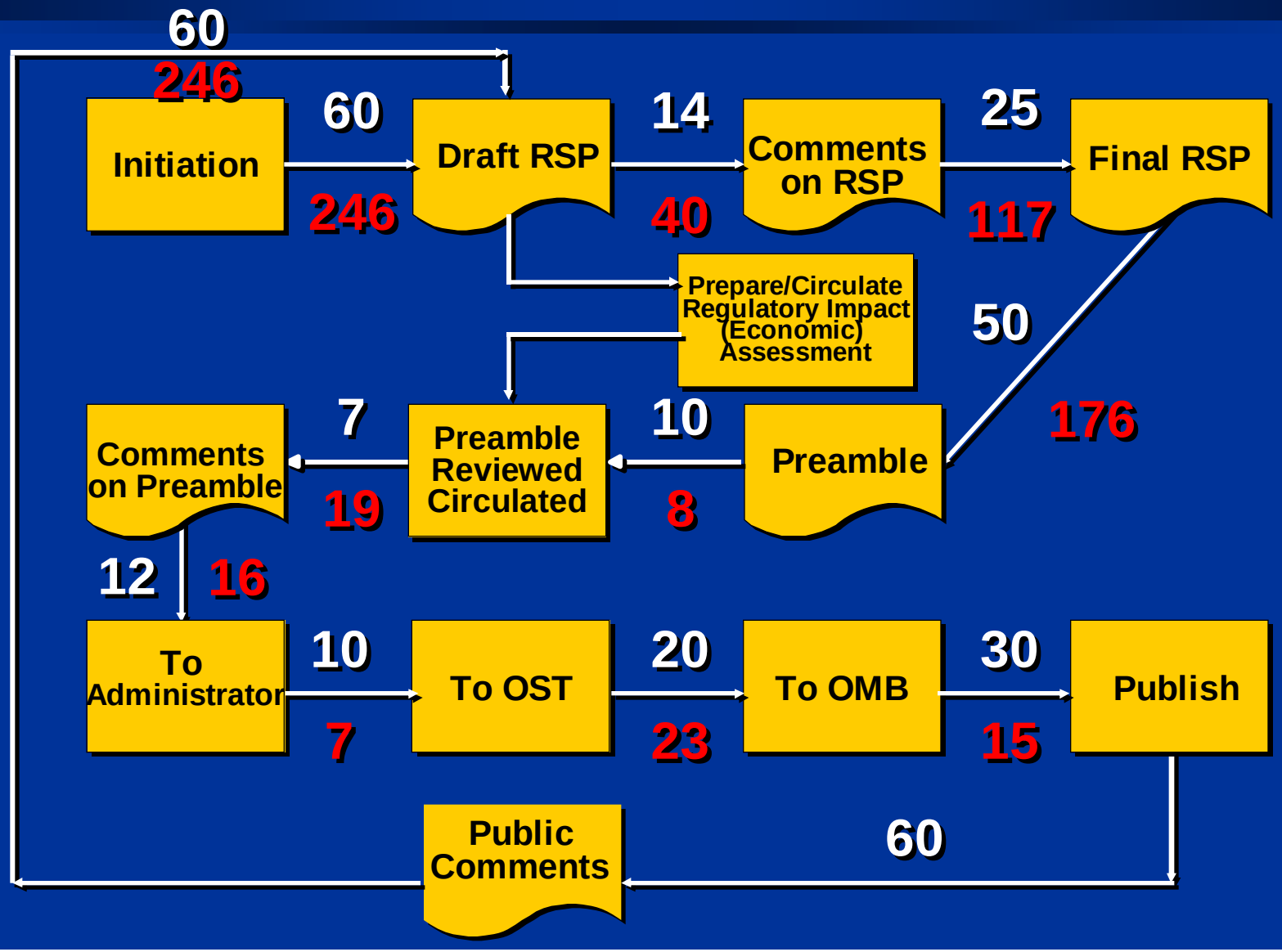
Pre-Event

Event

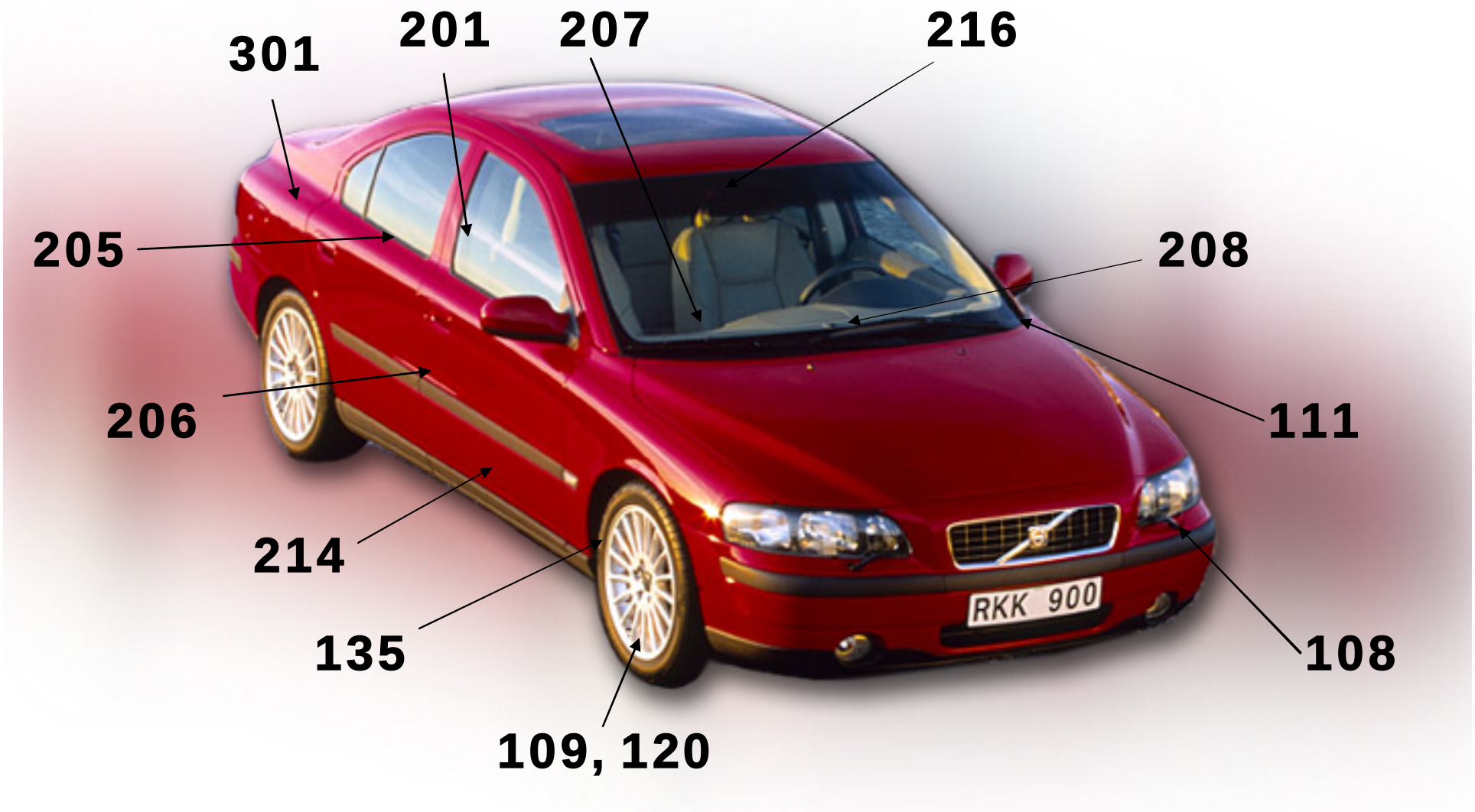
Post-Event

Rulemaking Process:

GOAL (17.9 months) and Actual (45.8 months) [as of 9/30/01]



Federal Motor Vehicle Safety Standards



Enforcement Activities

- Compliance Testing
- Defect Investigations and Recall

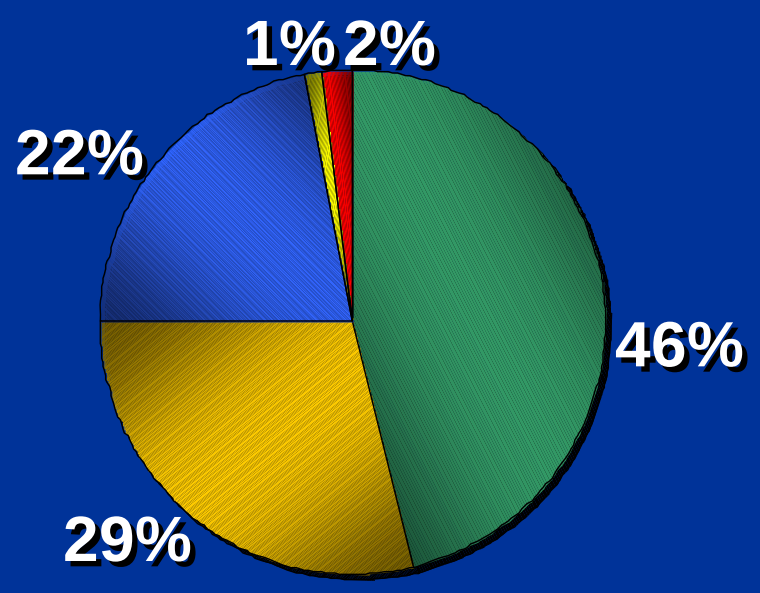
The Safety Problem

- **Major Crash Types**
- **Fatalities and Injuries**
  - Front
  - Side
  - Rear
  - Rollover
  - Compatibility

Vehicles and Fatalities by Collision Type 2002

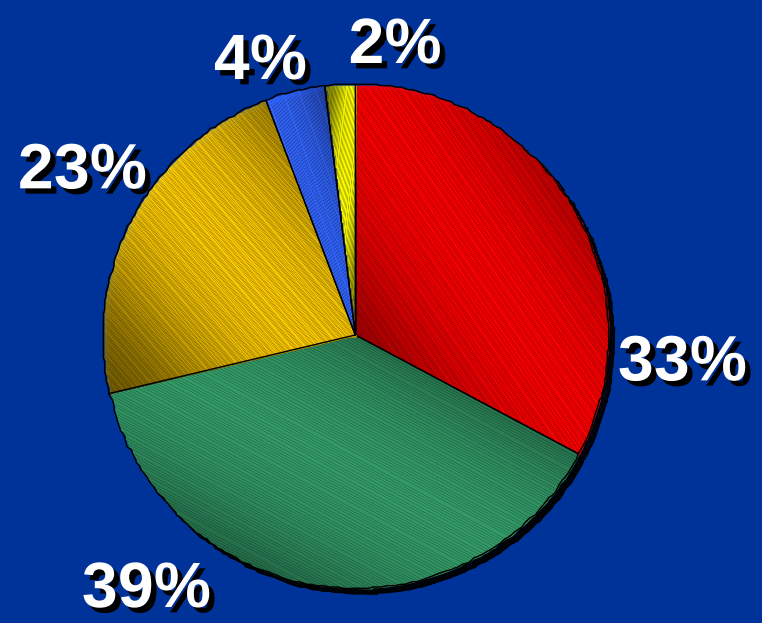
Passenger Vehicles in Crashes

Approx. 10.6 million vehicles involved



Passenger Vehicles Occupant Fatalities

32,335 total occupants killed



Rollover | Front | Side | Rear | Other

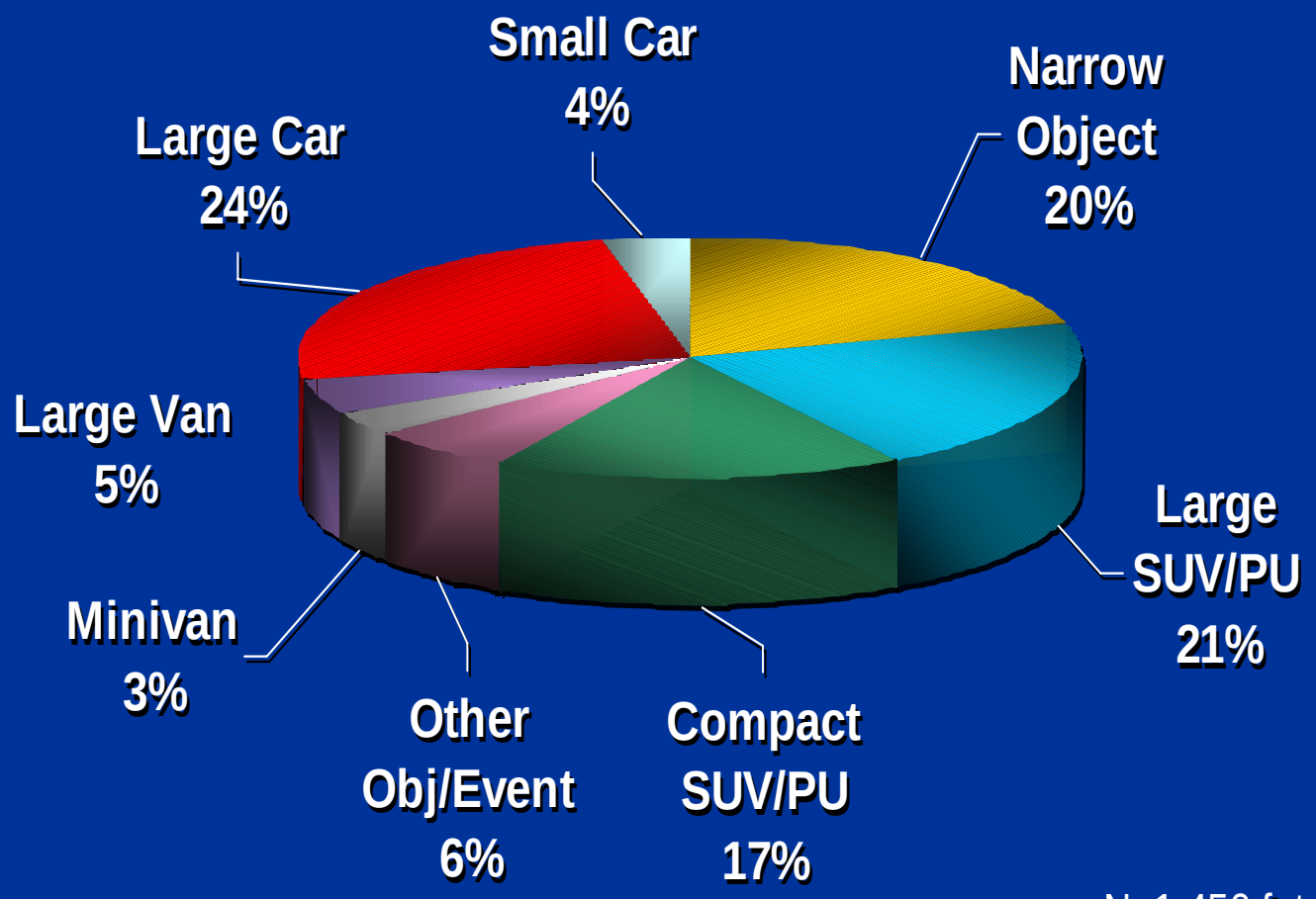
Side Crash Safety

- Chest Protection
- Head Protection
- FMVSS No. 214- In-depth look at the Rule
- Further Improvements in Side Impacts
- Risks of Side Air Bags

Address Increased Risk of Head Injuries From Crashes Involving LTVs and Narrow Object

Current Safety Problem Fatalities

Near Side Belted Fatalities by Crash Partner

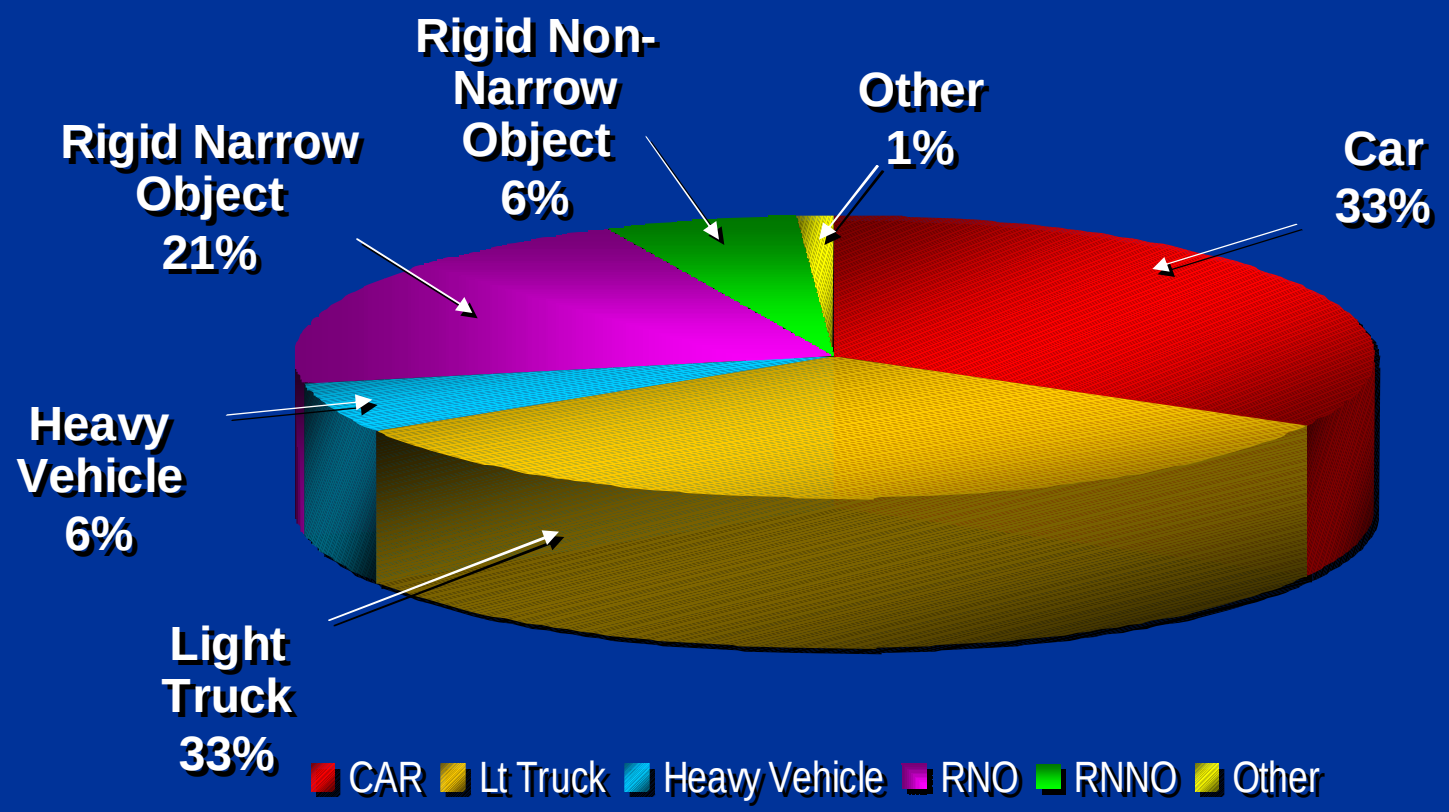


1999 FARS Side Crashes – Model Year 1995+ (light vehicles ≤10,000lbs, no rollover)

N~1,450 fatalities (total)/year
N~805 fatalities (belted)/year

Current Safety Problem Injuries

Occupants with AIS 3+ Injuries - Belted & Unbelted



NASS '95-'99 Weighted…Model Year 1995+ (light vehicles ≤10,000lbs, no rollover)

3,272 Occupants (total)/year

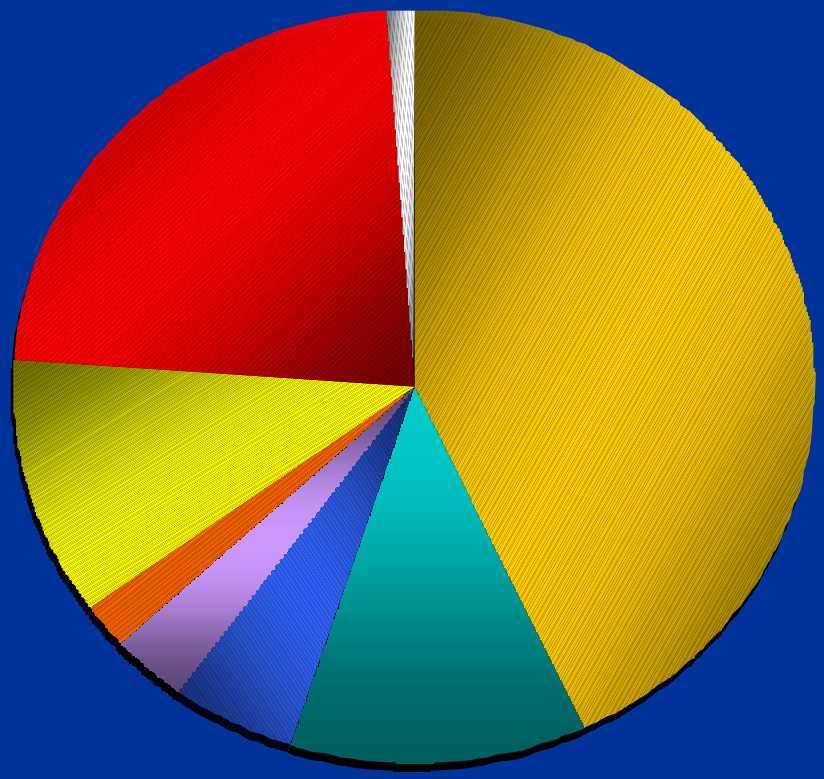
Annual Estimate of Struck Side Occupants

(Non Rollover Towaway Side Crashes)

1991-2000 NASS Weighted Data / Occupant > = 56” in Height

1%	Head/Abdomen/ Chest
2%	Chest/Abdomen
3%	Head/Chest
5%	Unknown
11%	Abdomen
12%	Other
23%	Head
43%	Chest

Distribution of Body Regions Injured Male Occupants

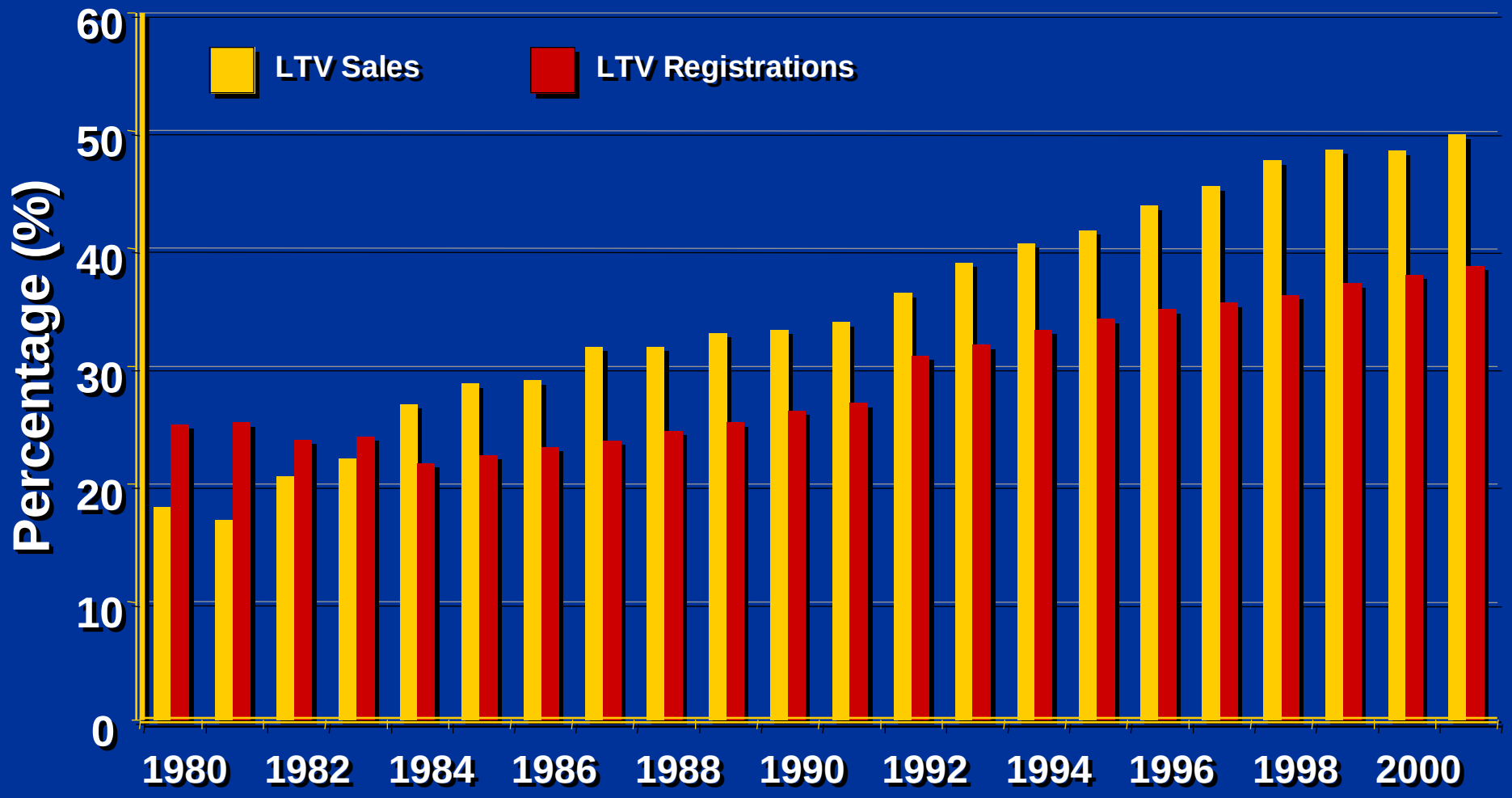


Vehicle Compatibility

Vehicle Compatibility

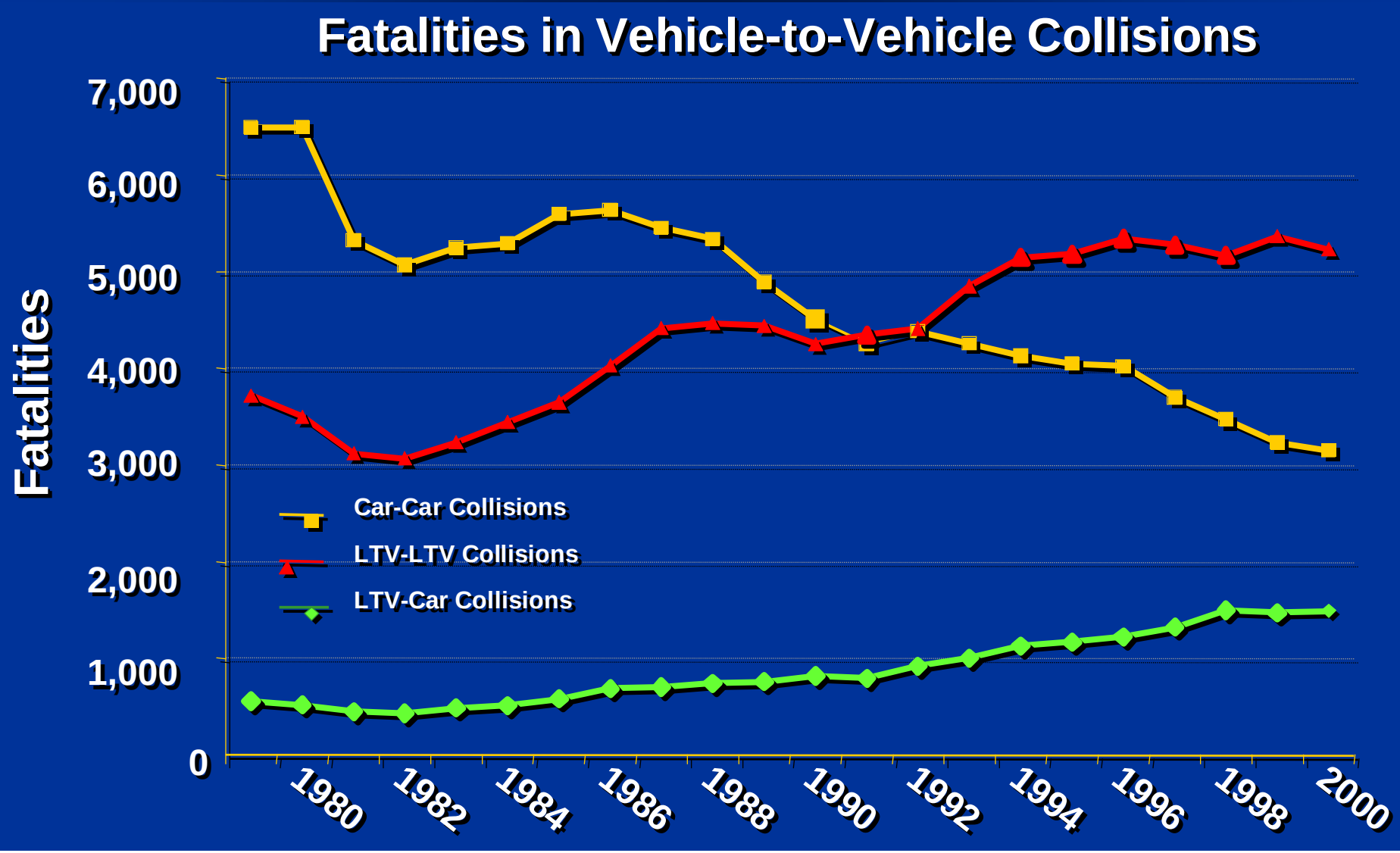
Compatibility Problem

US LTV sales have leveled off at just under 50%

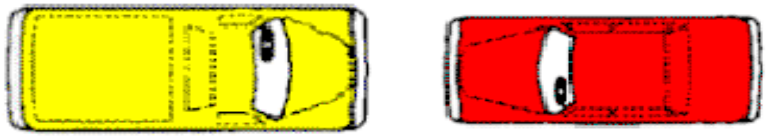
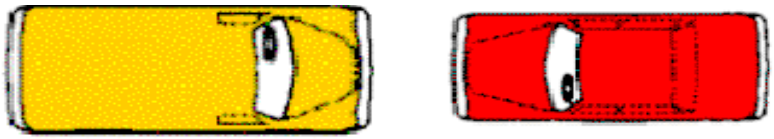
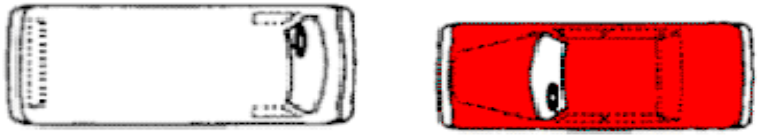
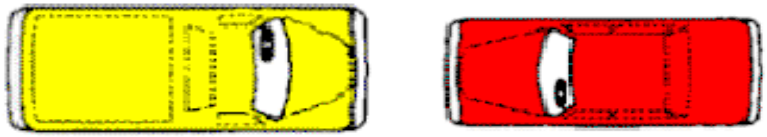


Compatibility Problem

Car – LTV fatalities appear to have leveled off just above 6,000 annually



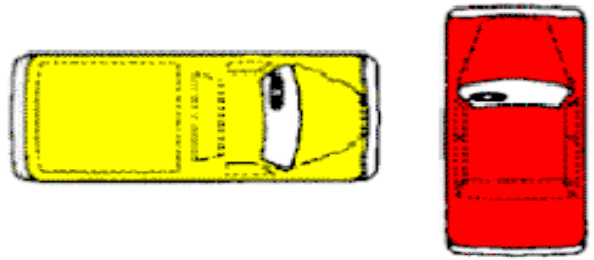
Driver Fatality Ratios for Frontal-Frontal LTV-to-Car Crashes

Large Van		1:8.5
Large Pickup		1:7.9
Sport Utility Vehicle (all)		1:4.5
Minivan		1:3.6
Compact Pickup		1:2.1

1995-2001 FARS, Driver Fatality Ratios Both Vehicles MY >= 1990

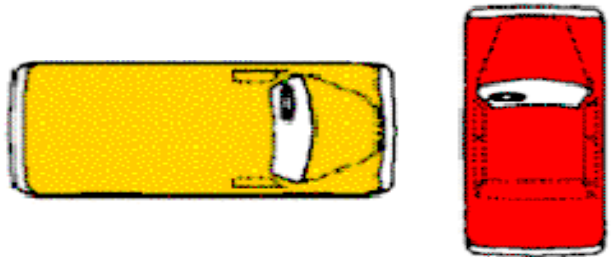
Driver Fatality Ratios for Side Impact Crashes into Passenger Cars

Large Pickup



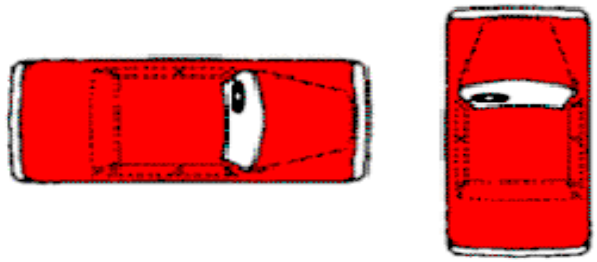
1:39.1

Sport Utility Vehicle (all)



1:22.1

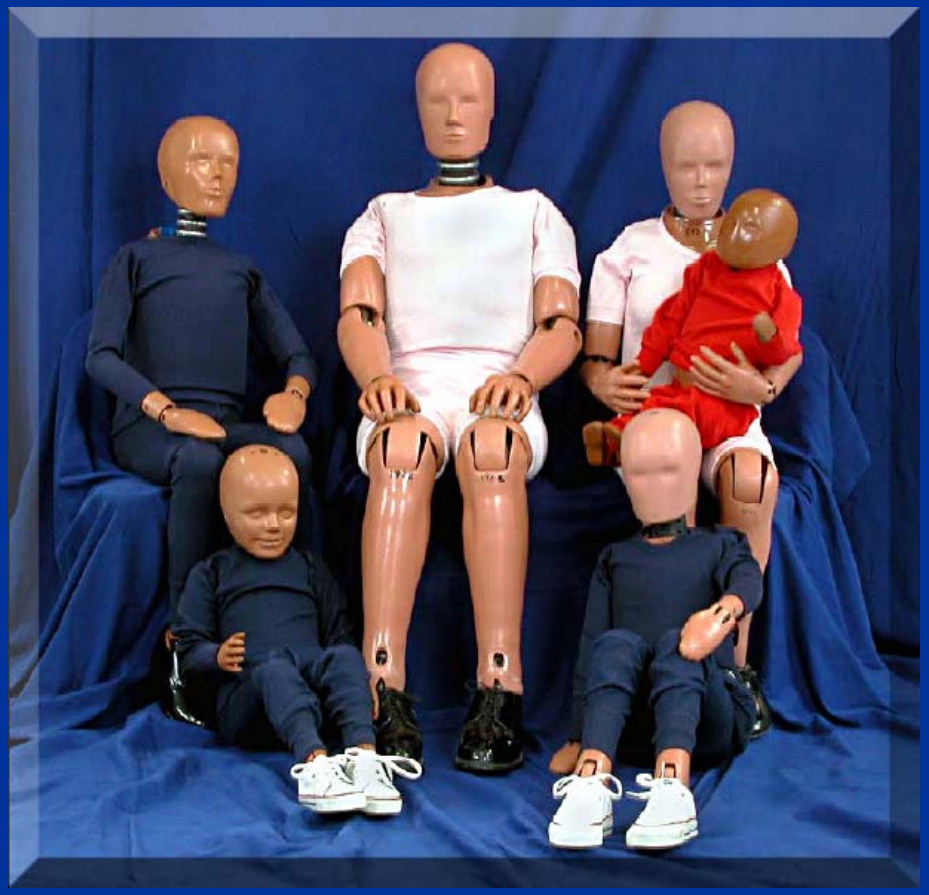
Passenger Car



1:8.2

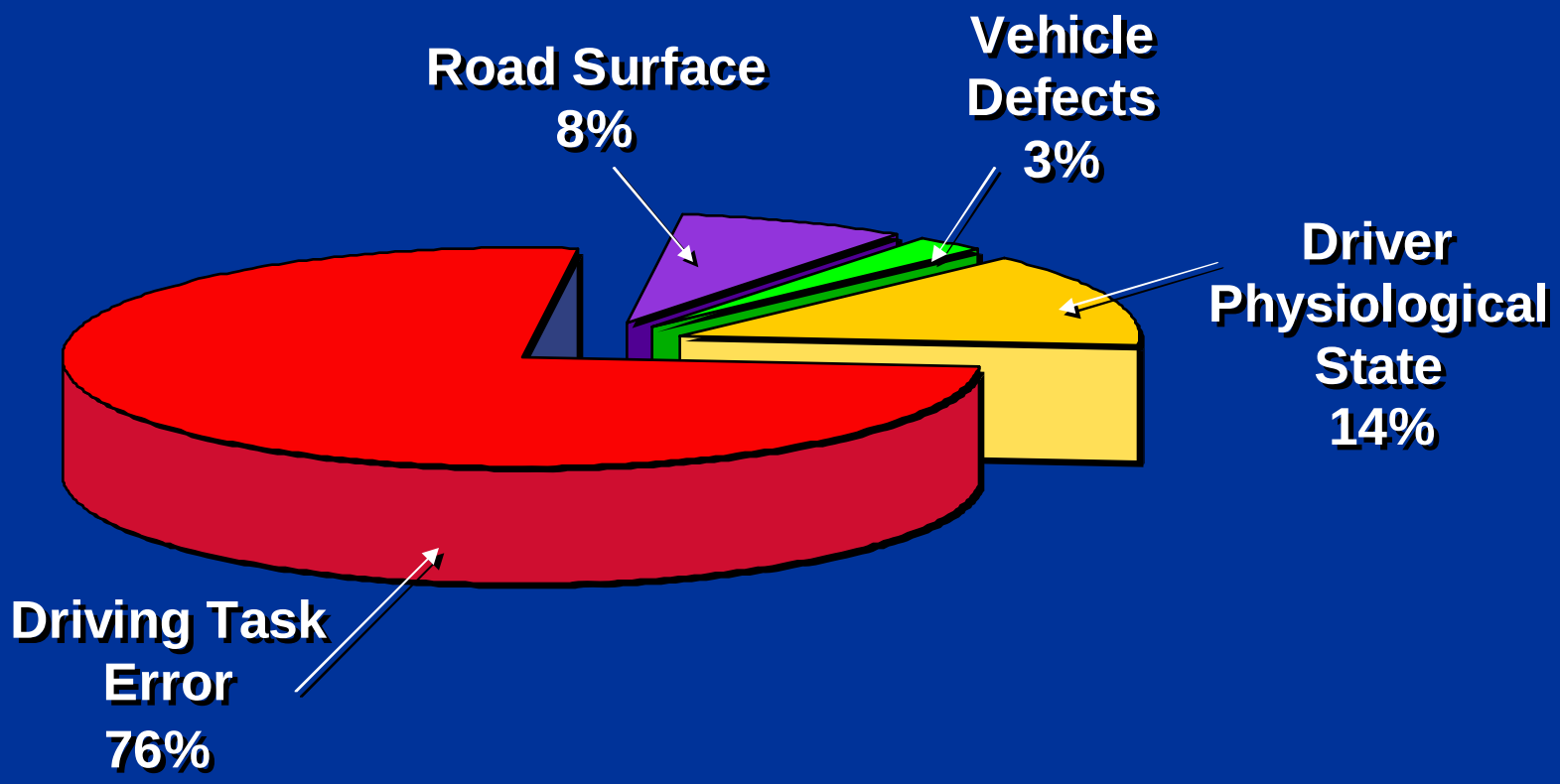
1995-2001 FARS, Driver Fatality Ratios Both Vehicles MY >= 1990

Family of Dummies

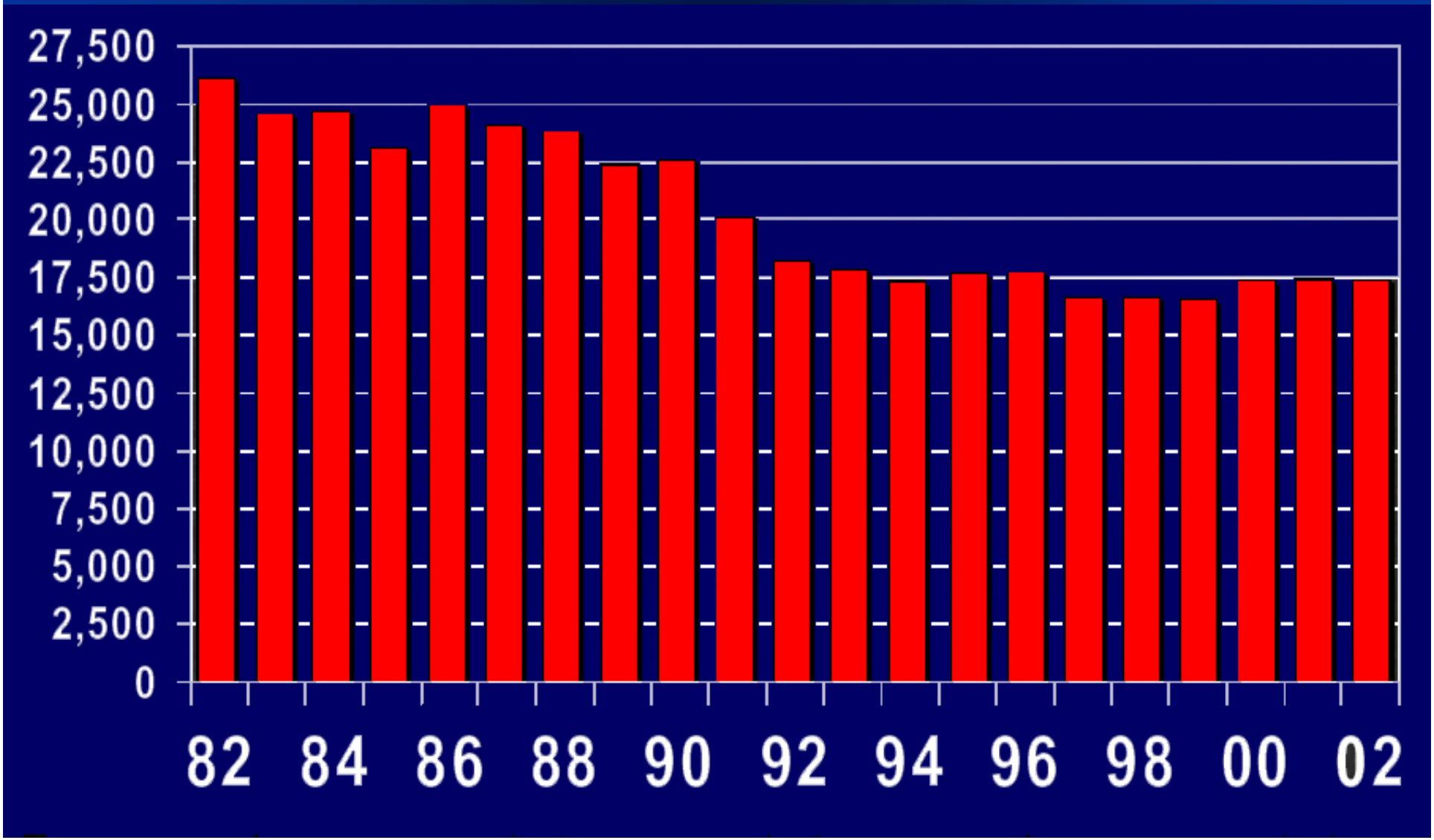


The Safety Problem

Causal Factor Distribution



Number of Alcohol-Related Fatalities



Safety Research in Crash Prevention

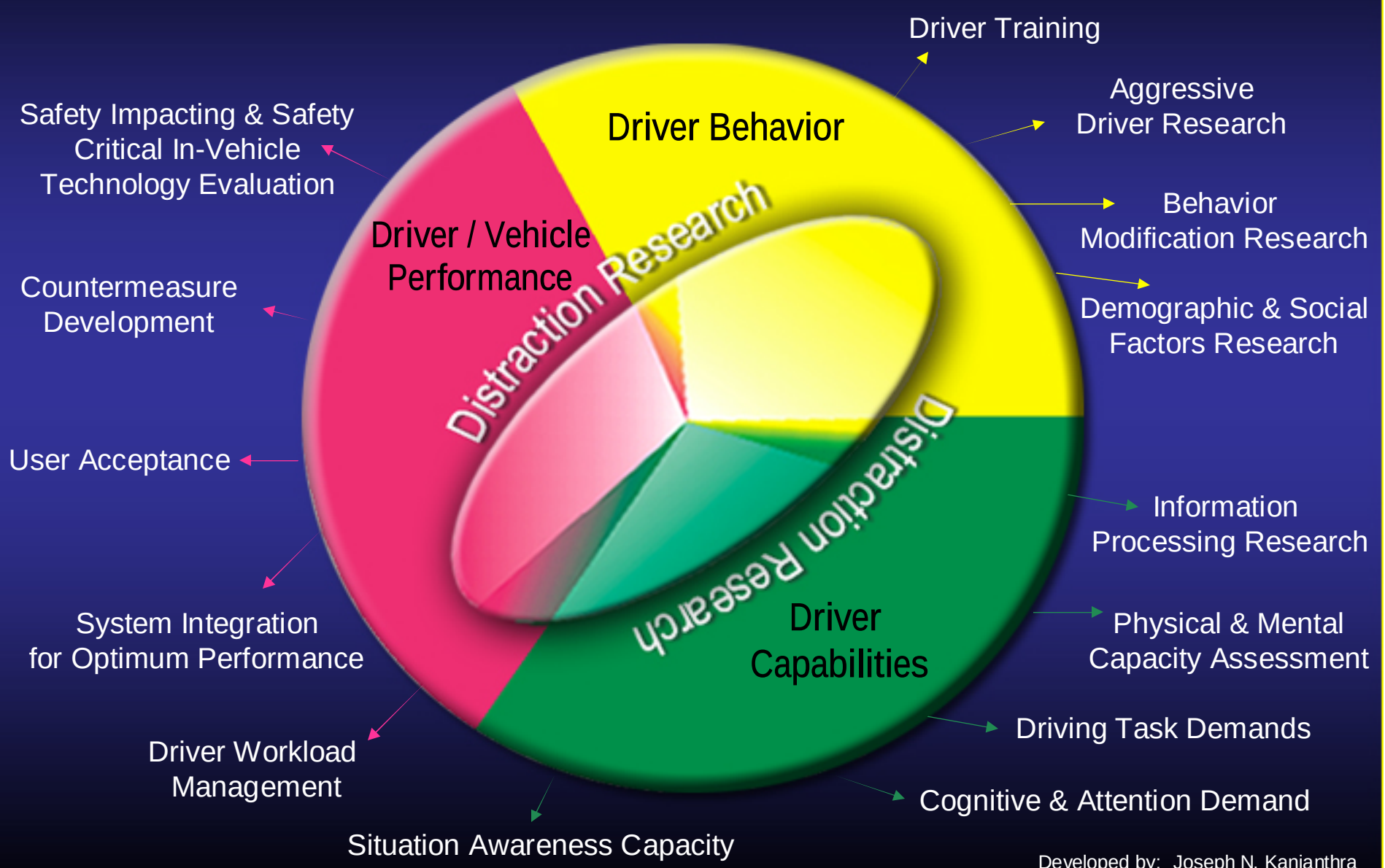
- Crash Avoidance Research
- Lighting, Brakes, Handling & Stability
- Rollover
- Intelligent Technologies
- Tire Research
- Human Factors Research

Technical Highlight:
Programmable Steering Machine

- **Provides accurate and repeatable inputs**
  - Important for NCAP testing
- **Able to receive outputs from other sensors**
  - Roll Velocity
  - Vehicle Speed

Example:
Fishhook Maneuver Effectiveness

Driver Vehicle Safety Research

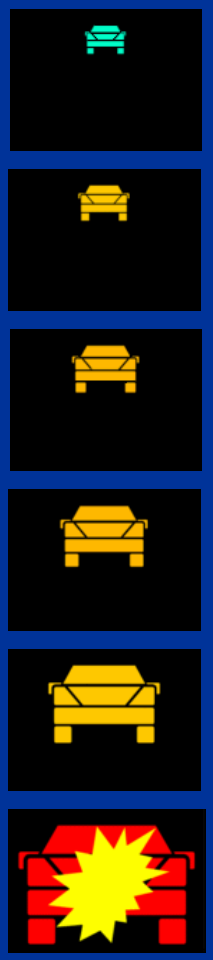


Developed by: Joseph N. Kanianthra

Road Ahead for Safety

- **The Safety Need**
- **The New Paradigm**
- **Near-term Technologies**
- **Advanced Technologies**
- **Available Strategies**
  - Demonstrate Feasibility
  - Collaborative Research
  - Consumer Information
  - Market Pull

Field Test

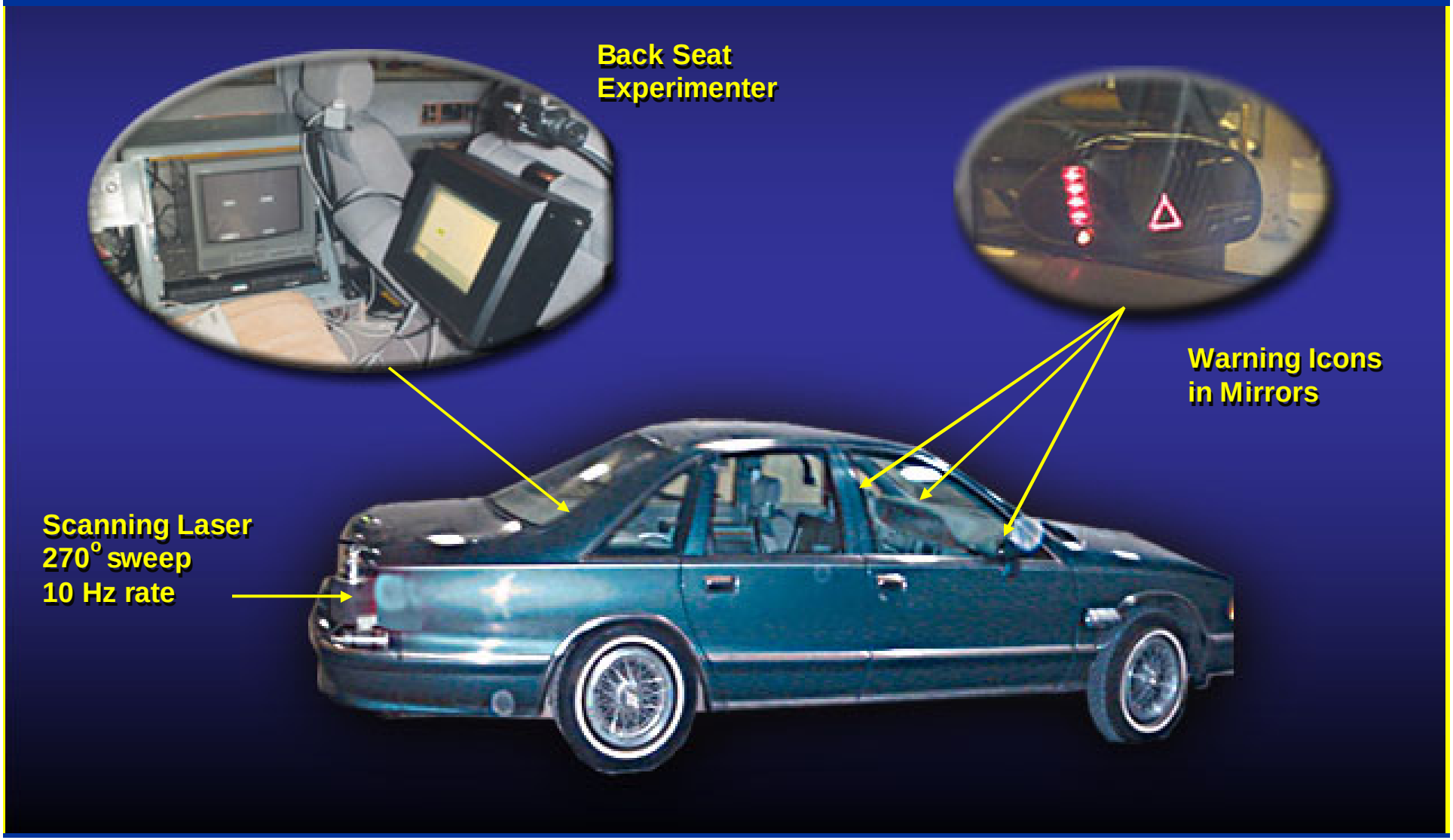


Vehicle Detected Ahead

Looming Cautionary Sequence

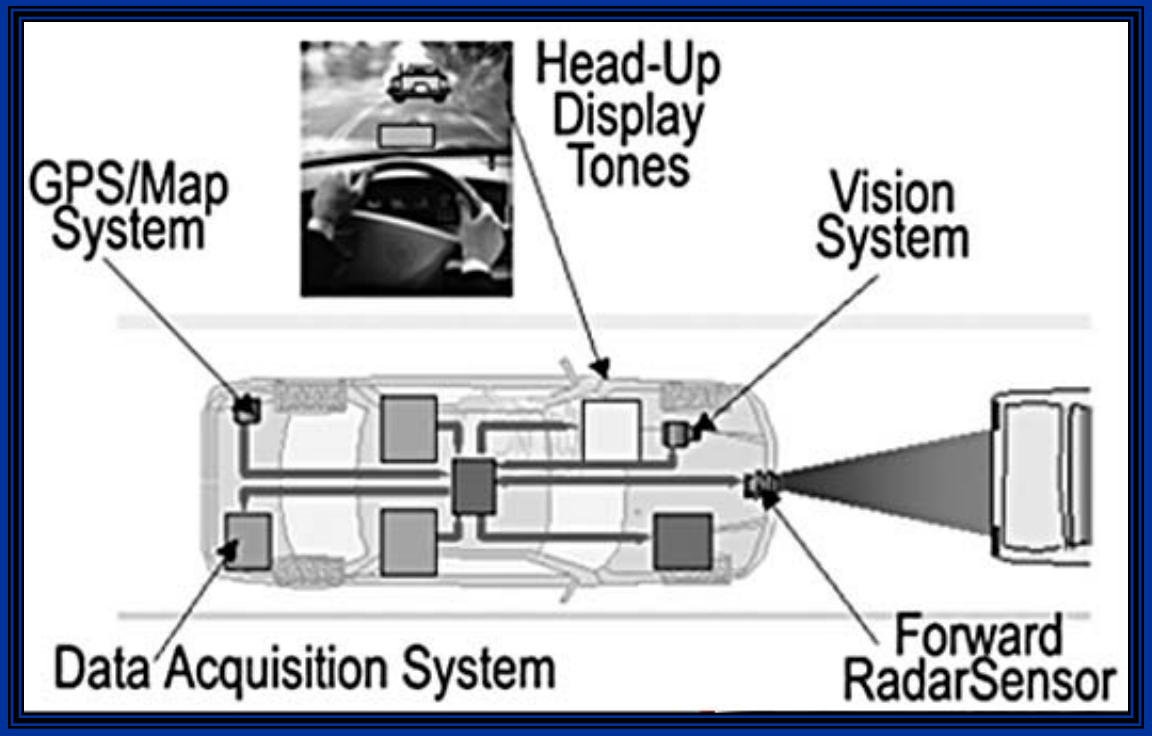
Flashing Imminent Alert

Lane Change / Merge Collision Warning Testbed (TRW)

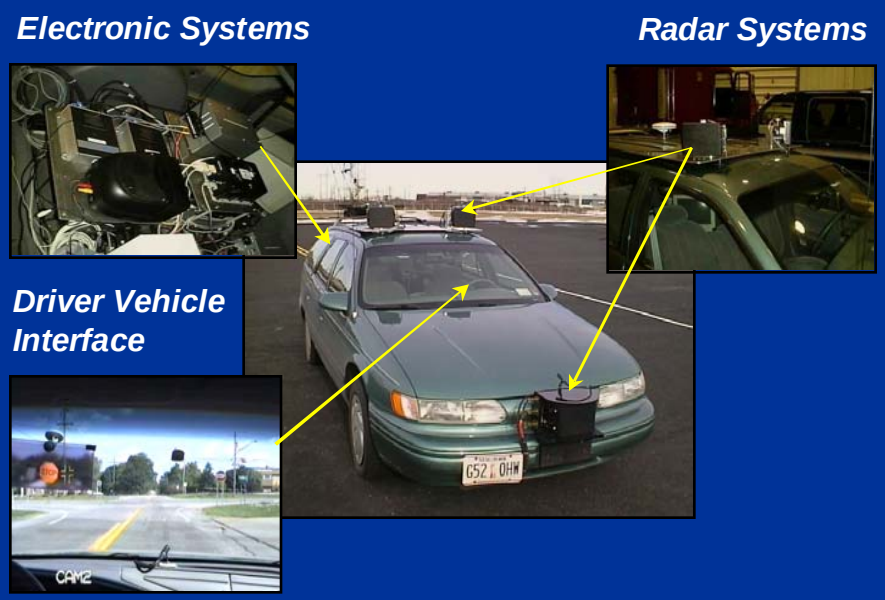


Rear-End Crash Warning FOT

- General Motors and Delphi are primary partners
- Prototype vehicle complete this year
- Data collection in 2002 / 2003

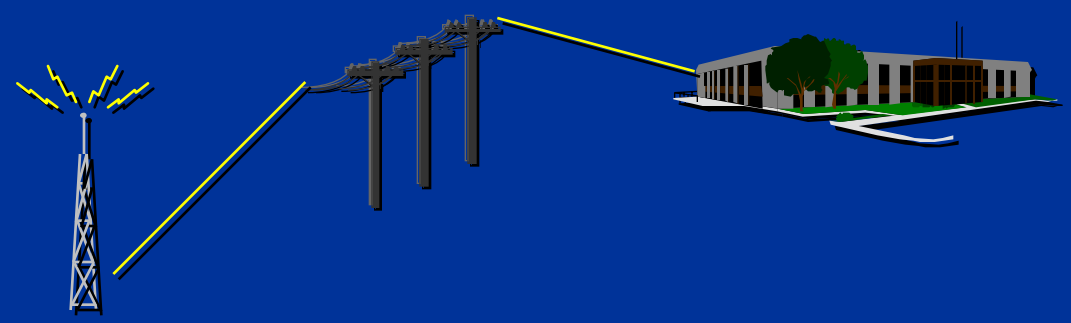


Intersection Crash Warning



- Five major subdivisions of intersection crashes
- Preliminary performance specifications complete
- Cooperative solutions will be needed to fully address some parts of the problem

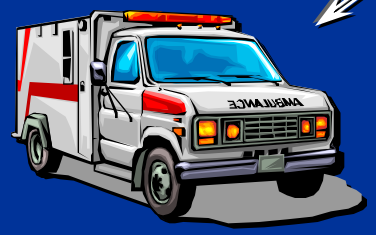
Example ACN System



Emergency Services Dispatch

- Data Message Reception
- Graphic Display of Crash
- Location & Information
- Voice Contact w/Vehicle

Crash Notification Message



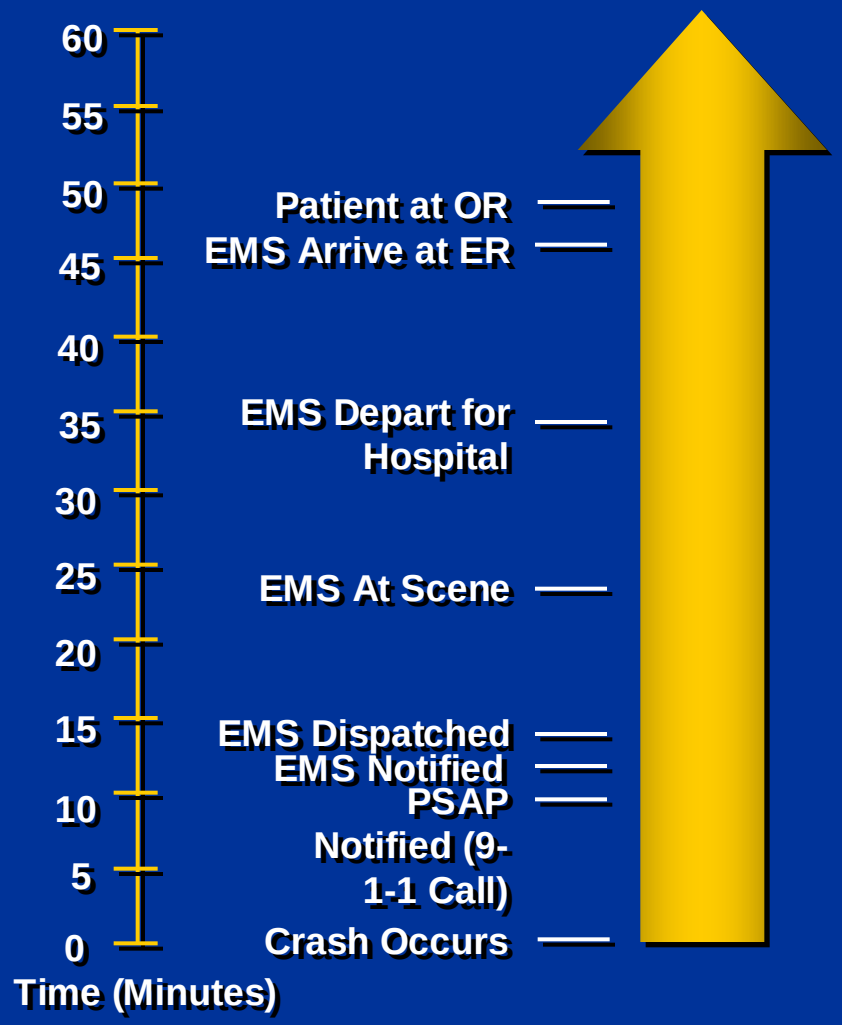
EMS Notification

- Location
- Crash Severity
- Probability of Serious Injury

In-Vehicle System

- Crash Sensor
- GPS Receiver
- Cellular Phone

Typical EMS Response Time Line

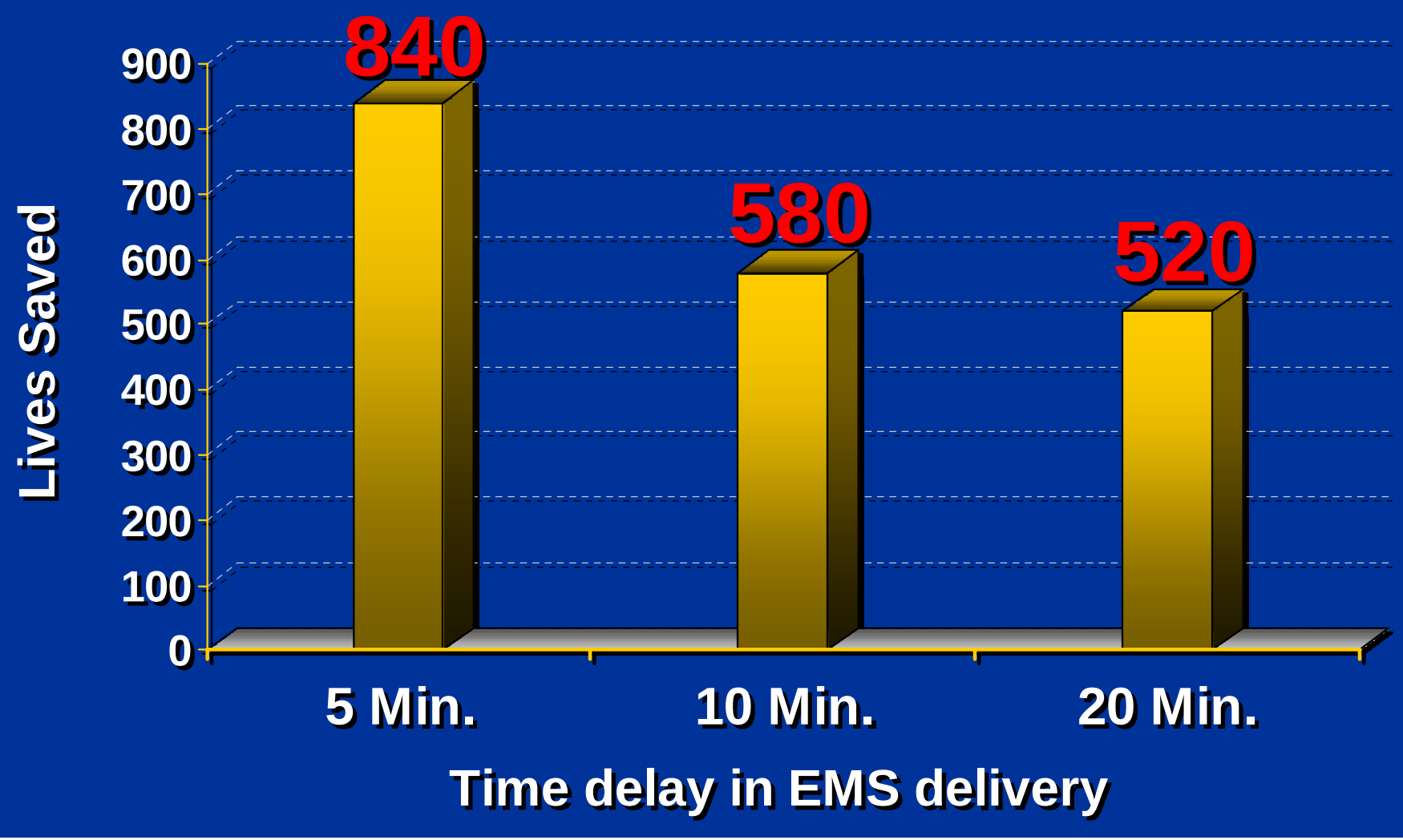


DEFINITIONS

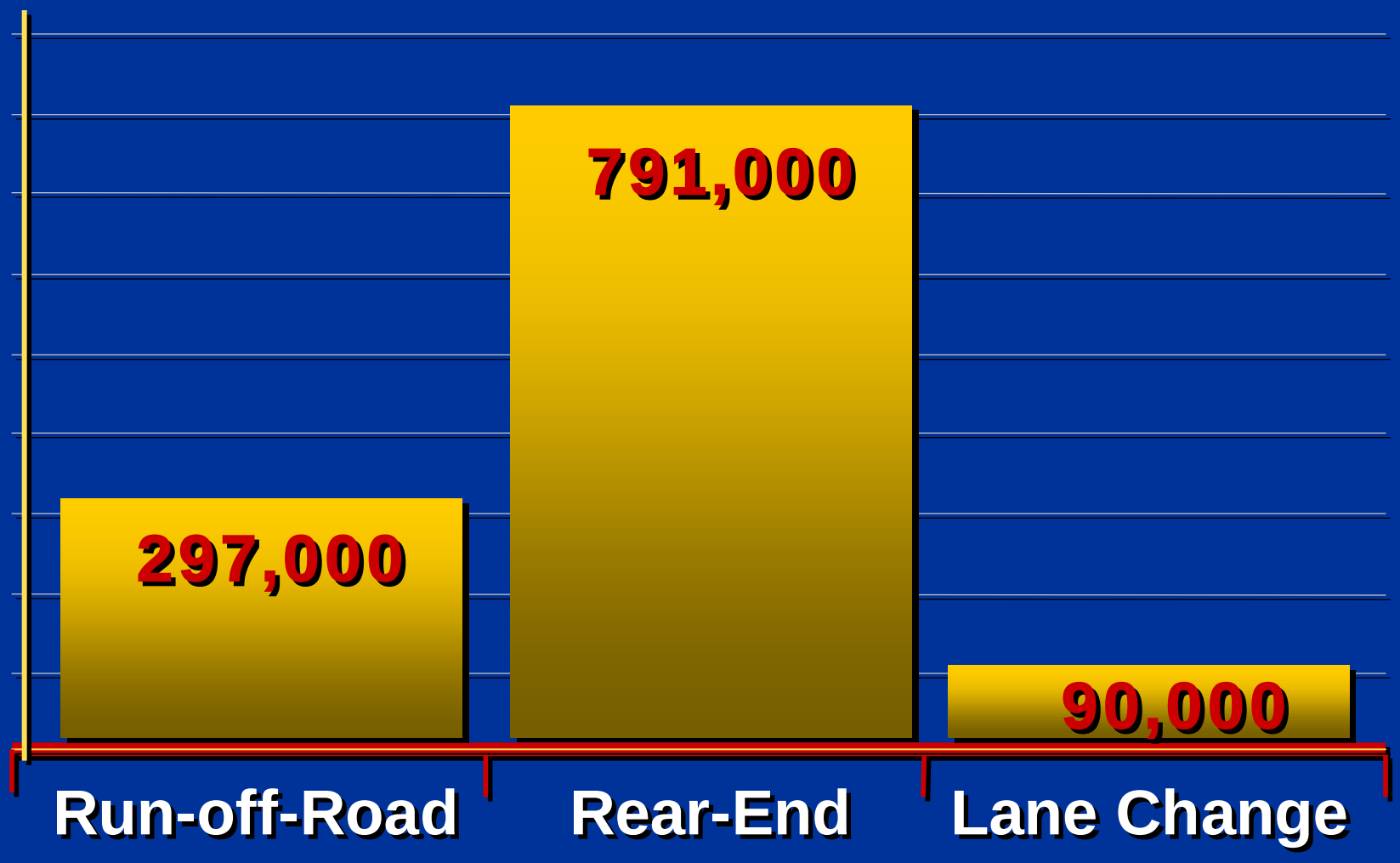
- PSAP Notification - Time Appropriate PSAP Notified by 9-1-1 Call
- EMS Notification - Time Appropriate EMS Provider Notified by PSAP
- EMS Dispatch - Time EMS Unit is Dispatched to Crash

ACN Benefit Estimate

(Based on Annual Light vehicle fatalities of 32,000)
Safety Benefits



Estimated Benefits
Crashes Prevented



Enhancing Safety

Conclusions

- **Promote Technologies**
- **Proper Testing and Evaluation Procedures Needed**
- **Facilitate Deployment Through a Variety of Methods**
  - Establish Regulations and Test Requirements
  - Demonstrate Feasibility
  - Pursue Collaborative Research
  - Seek Novel Methods of Standards Development
  - Disseminate Consumer Information on Total Safety
  - Evaluate Consumer Acceptance