# Overview of NHTSA Research

## Presentation to General Motors

## March 28, 2006

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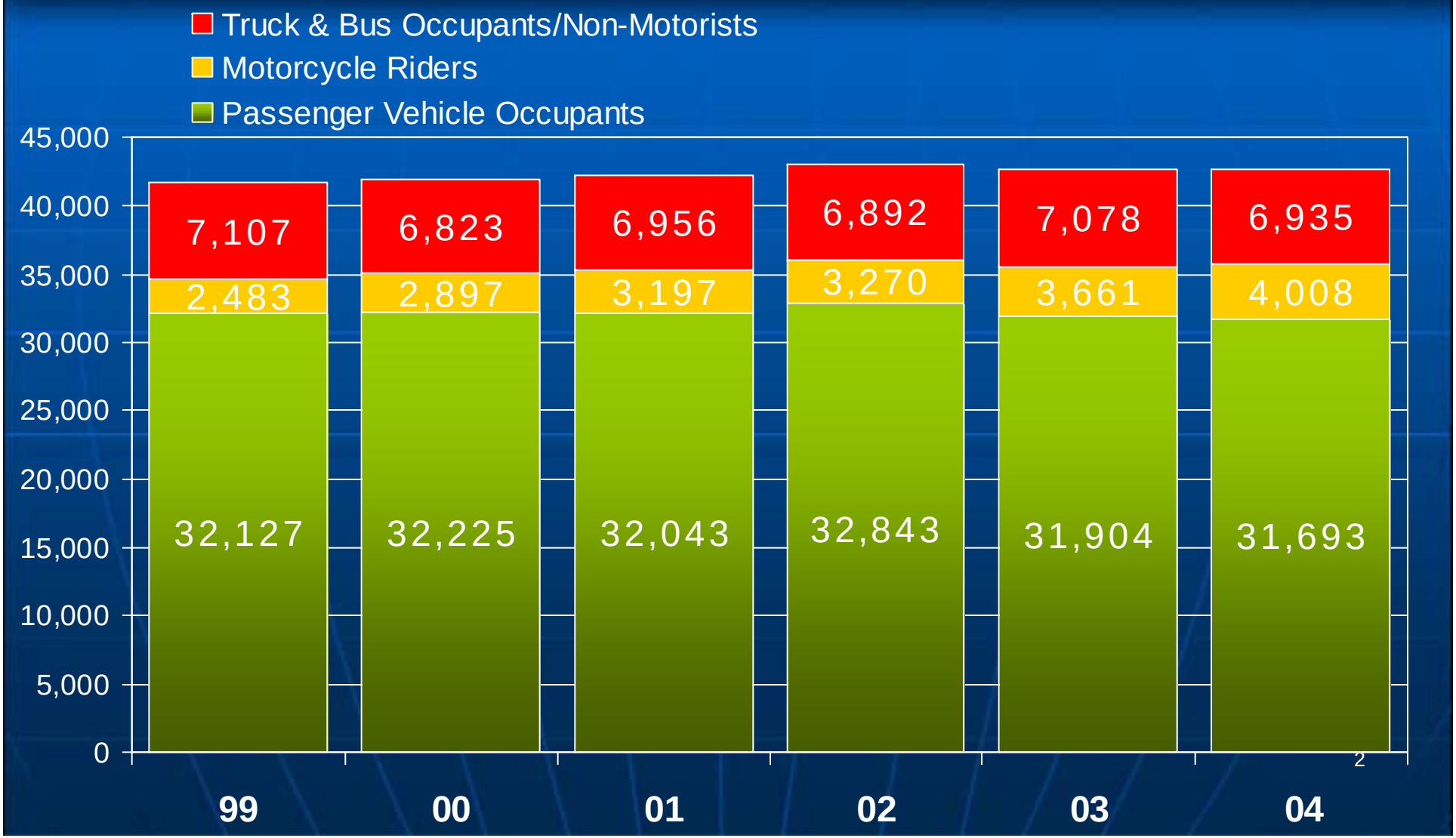
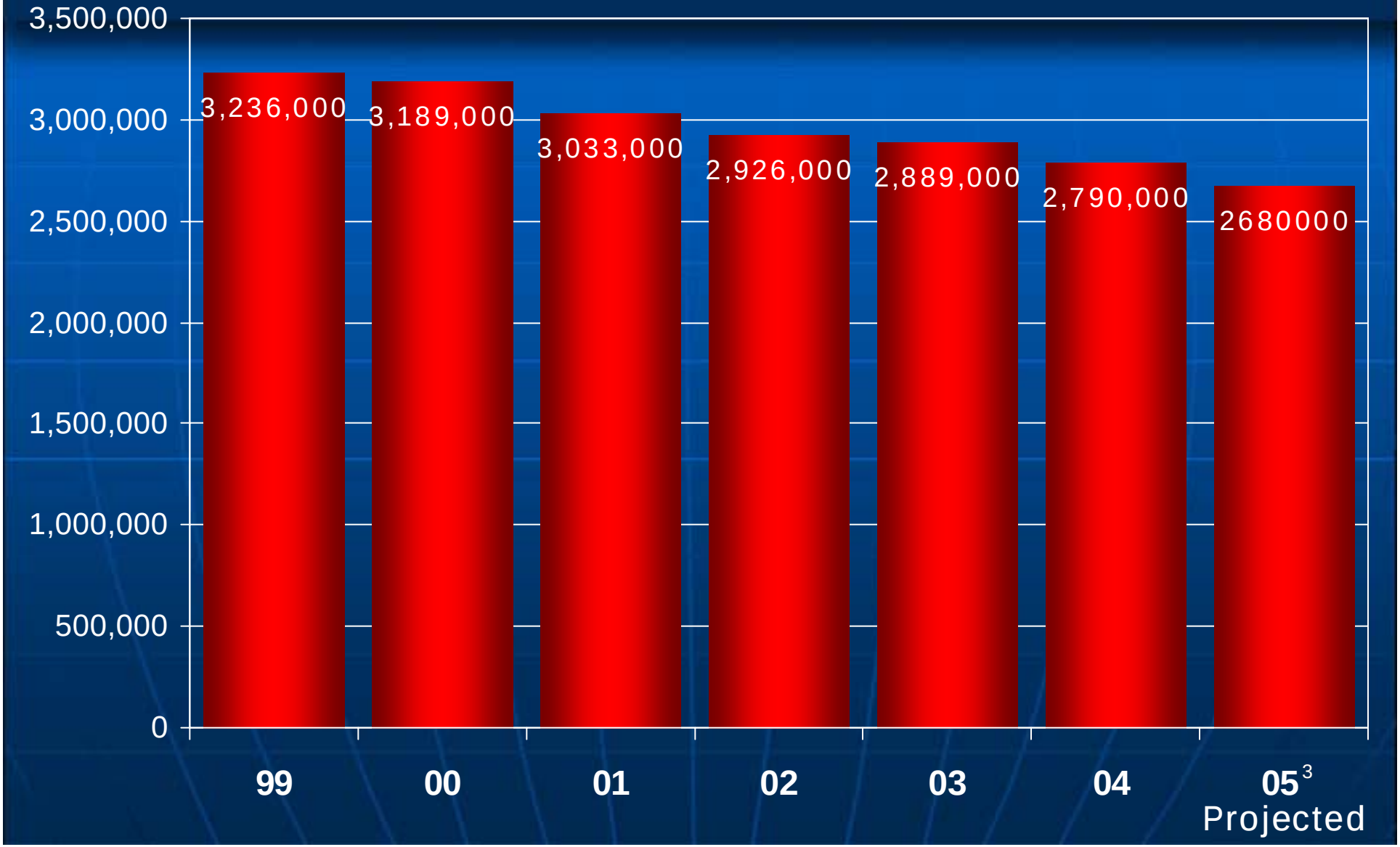
www.nhtsa.dot.gov
nhtsa
people saving people

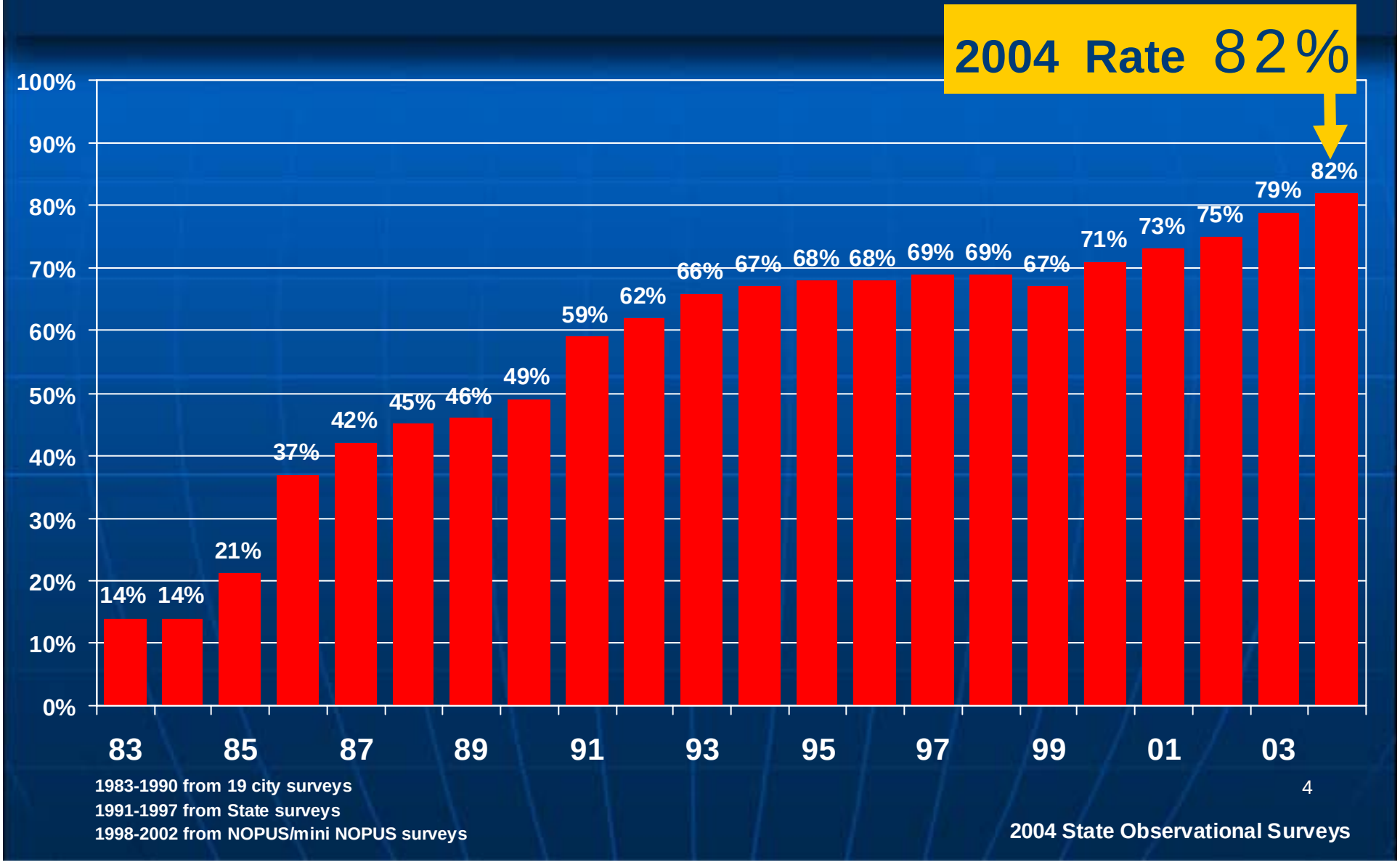
# Motor Vehicle Fatalities



# Motor Vehicle Injuries



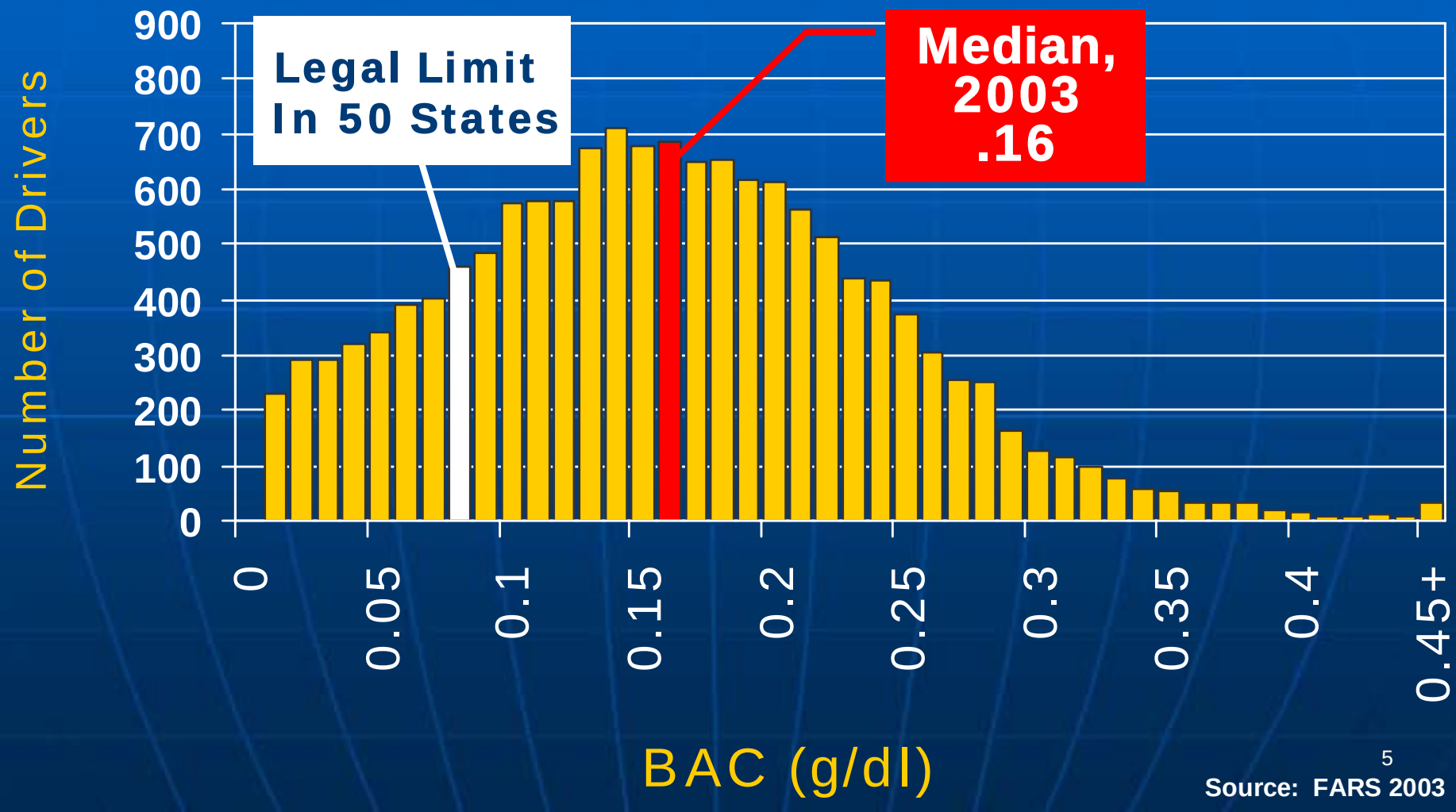
# Safety Belt Use Rates
# 1983 - 2004




1983-1990 from 19 city surveys
1991-1997 from State surveys
1998-2002 from NOPUS/mini NOPUS surveys

2004 State Observational Surveys

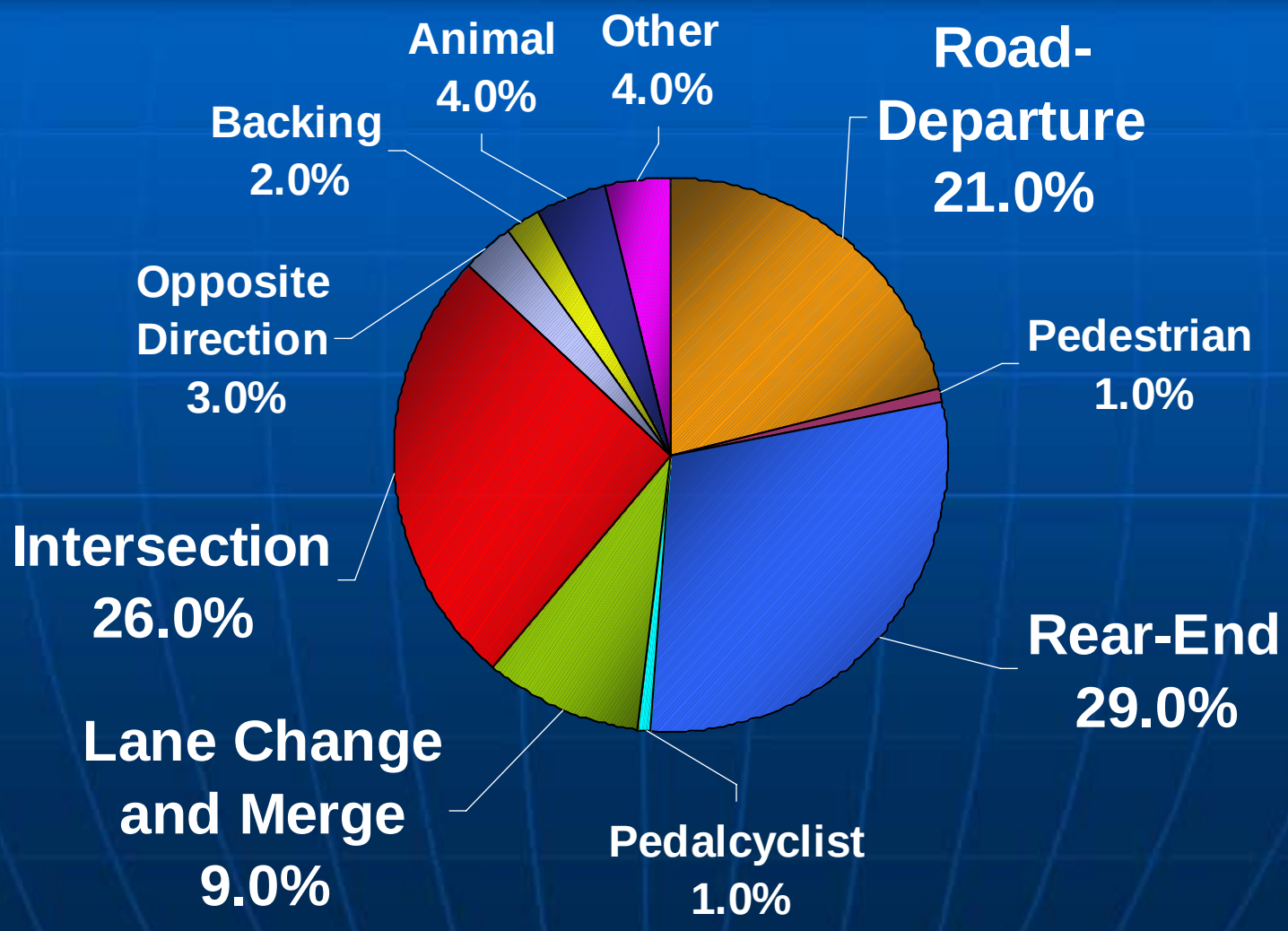
# Drivers Involved in Fatal Crashes with Positive BACs (BAC>0), 2003






Source: FARS 2003

# Crashes of all Severities, 2000 GES



# Highway Safety Priorities

- Increase safety belt use
- Reduce impaired driving
- Improve data
- Reduce rollovers
- Improve vehicle compatibility

# Lives Saved by Safety Technologies, '60 - '02 : 328,551


Source: NHTSA

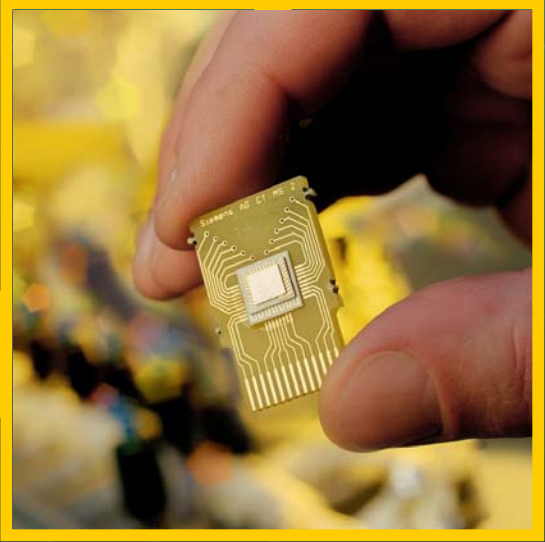
# Advanced Car Seating Restraint Systems

# Alcohol Screening Systems

- System needs to be totally unobtrusive
- Nearly 100 percent accuracy essential
- Multiple sensing assures reliability

**Tru touch skin biometric sensor**

- Passive system that “sniffs” ambient air
- Applications include testing for alcohol in exhaled breath, vehicles, and other enclosed spaces



**Siemens sensor technology to detect gases and smells**

# Data Collection

## Why do we need EDRs ?

- New technologies
  - Stability control systems
  - Advanced air bags
  - Other devices that do not leave evidence
- Better pre-crash data
- Better crash severity parameter estimates
- Better crash reconstruction
- Automated collision notification

GM SDM Units
SDM-Sensing and Diagnostic Module

# The Naturalistic "100 Car" Study: Database Statistics

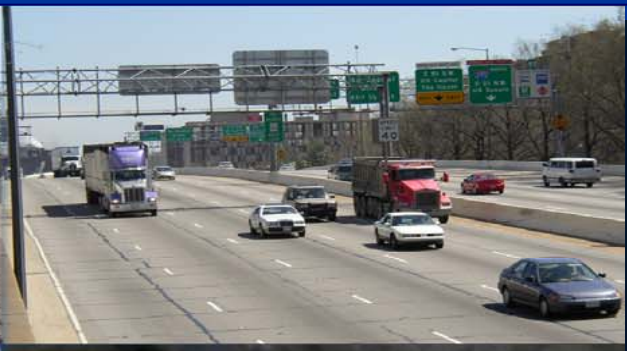
- 42,300 hours of driving data collected
- 82 Crashes and collisions
  - Defined as any contact between the subject vehicle and another vehicle, fixed object, pedestrian pedacyclist, animal.
- 761 Near crashes
  - Defined as a conflict situation requiring a rapid, severe evasive maneuver to avoid a crash.
- 8295 Critical incidents
  - Conflict requiring an evasive maneuver, but of less magnitude than a near crash.

# Data Collection (Cont.)

**100 CAR NATURALISTIC DRIVING STUDY**

Understanding normal driving performance is important.

# Haddon Matrix

| | Human | Vehicle | Environment |
|---|---|---|---|
| Pre-Event |  |  |  |
| Event |  |  |  |
| Post-Event |  |  |  |

# Crash Time Line


**Prevention**

**Severity Reduction**

**Injury Mitigation**

**Medical Attention**

**0**

**200** m.sec.

**1** hr

**Crash** may not be prevented-but **Severity** can be **Reduced**

Developed by: Joseph N. Kanianthra

# Why Advanced Technologies?

- Technologies often bring new opportunities
- Potential for total safety benefits
- Save lives, prevent injuries and reduce the economic costs
- How do we know if these systems, and others, improve or degrade safety?

# The Challenge

How do we know if these systems, and others, improve or degrade **safety?**

- Two prerequisites
  - Objective tests that are related to relevant types of crash
  - Computational foundation for incorporating test results and other data sources into a credible estimate of safety impact

# Total Safety Cycle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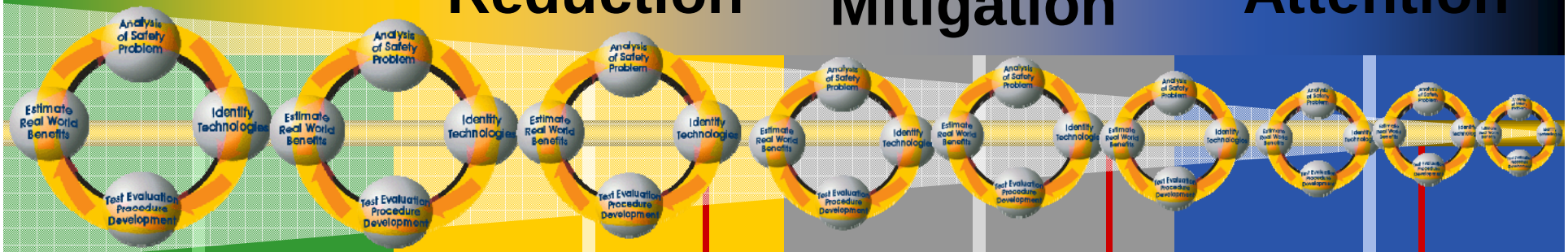
# Crash Time Line


## Prevention

## Severity Reduction

## Injury Mitigation

## Medical Attention




**Crash** may not be prevented-but **Severity** can be **Reduced**

**0**

**200** m.sec.

**1** hr

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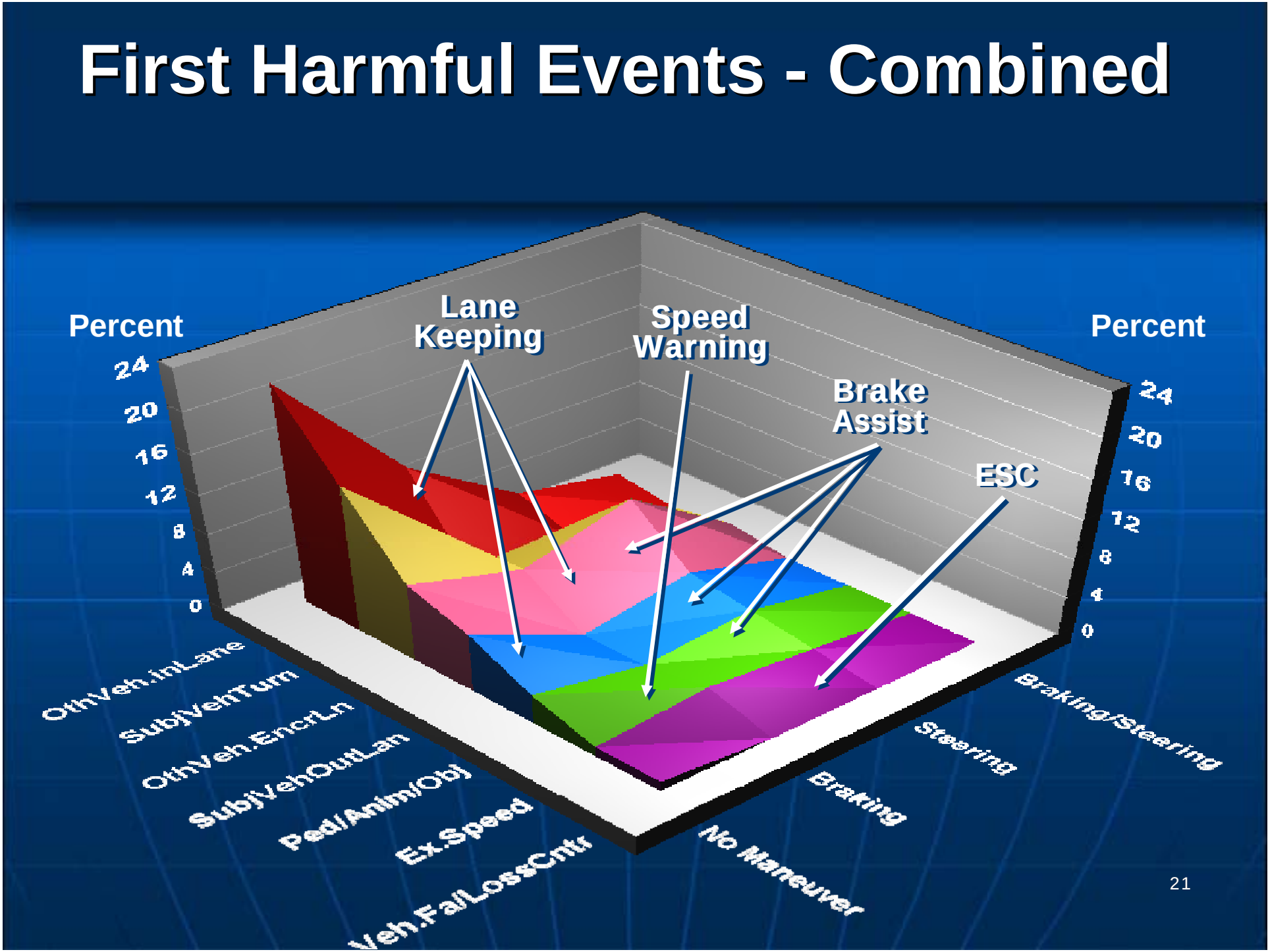
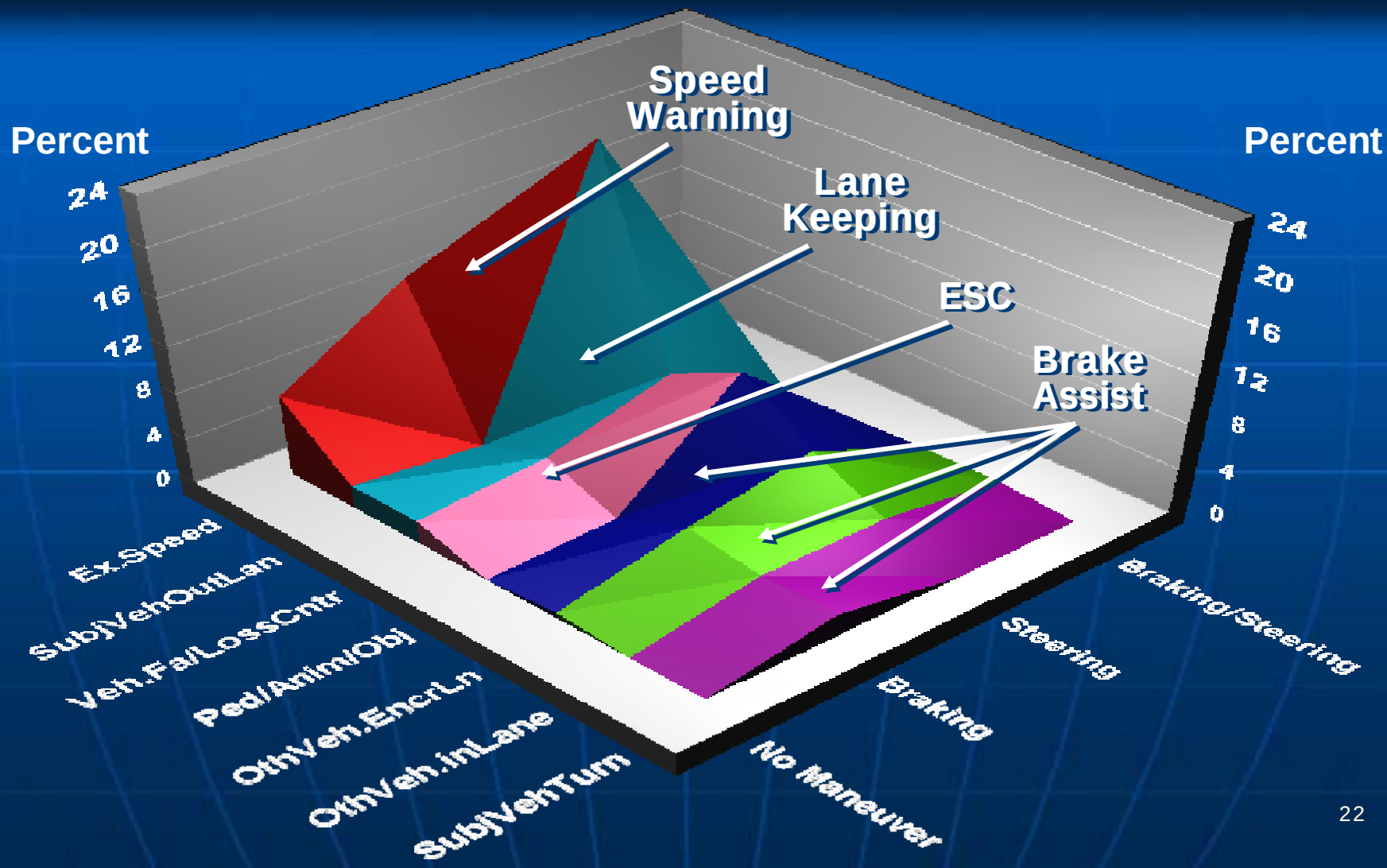
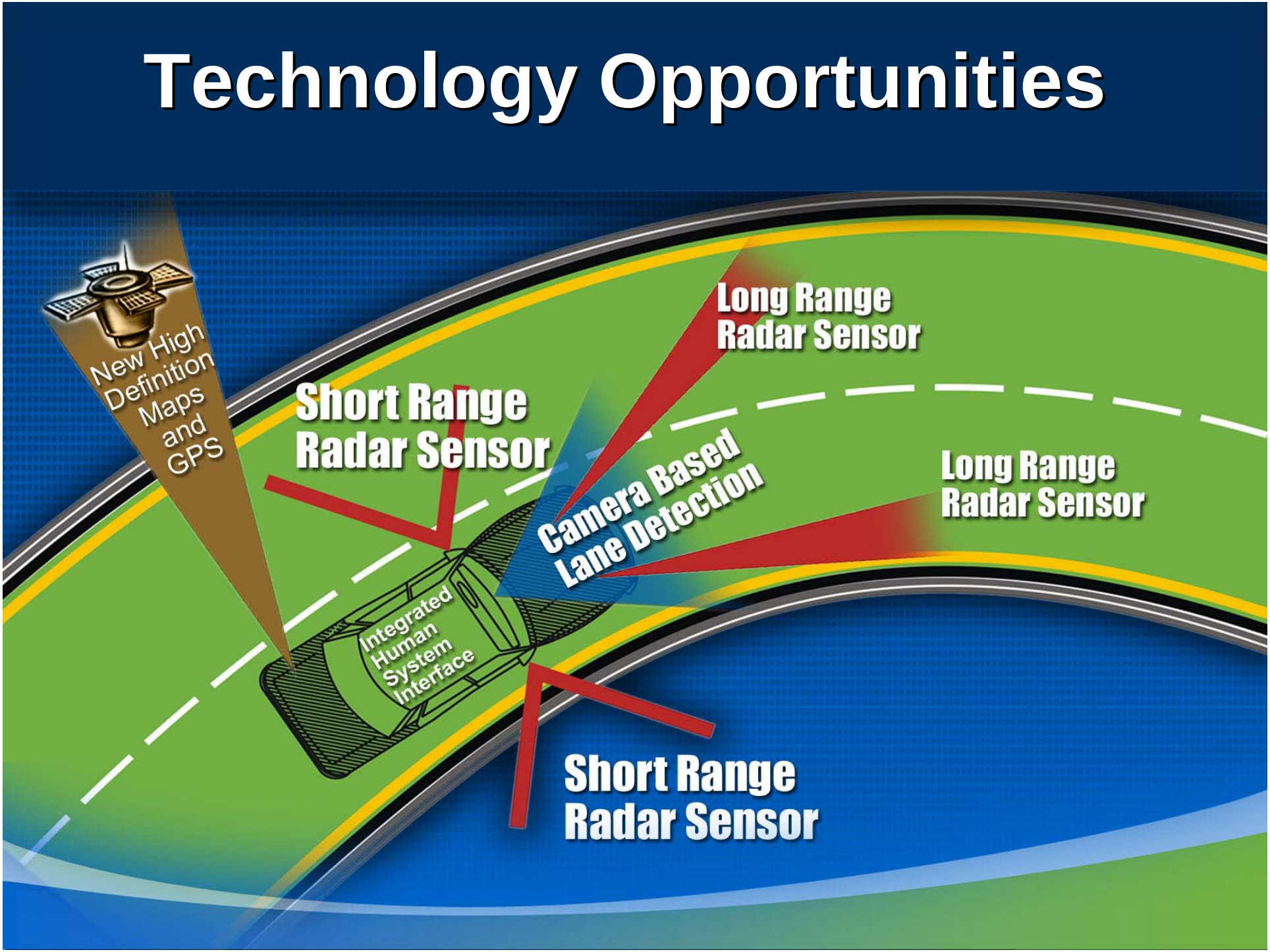
# First Harmful Events - Combined



# Rollover


Percent
24
20
16
12
8
4
0
Speed Warning
Lane Keeping
ESC
Brake Assist
Percent
24
20
16
12
8
4
0
Ex.Speed
SubjVehOutLan
Veh.Fal/LossCntr
Ped/Anim/Obj
OthVeh.EncrLn
OthVeh.inLane
SubjVehTurn
No Maneuver
Braking
Steering
Braking/Steering

# Technology Opportunities



# Longer Term
# New ITS Safety Initiatives

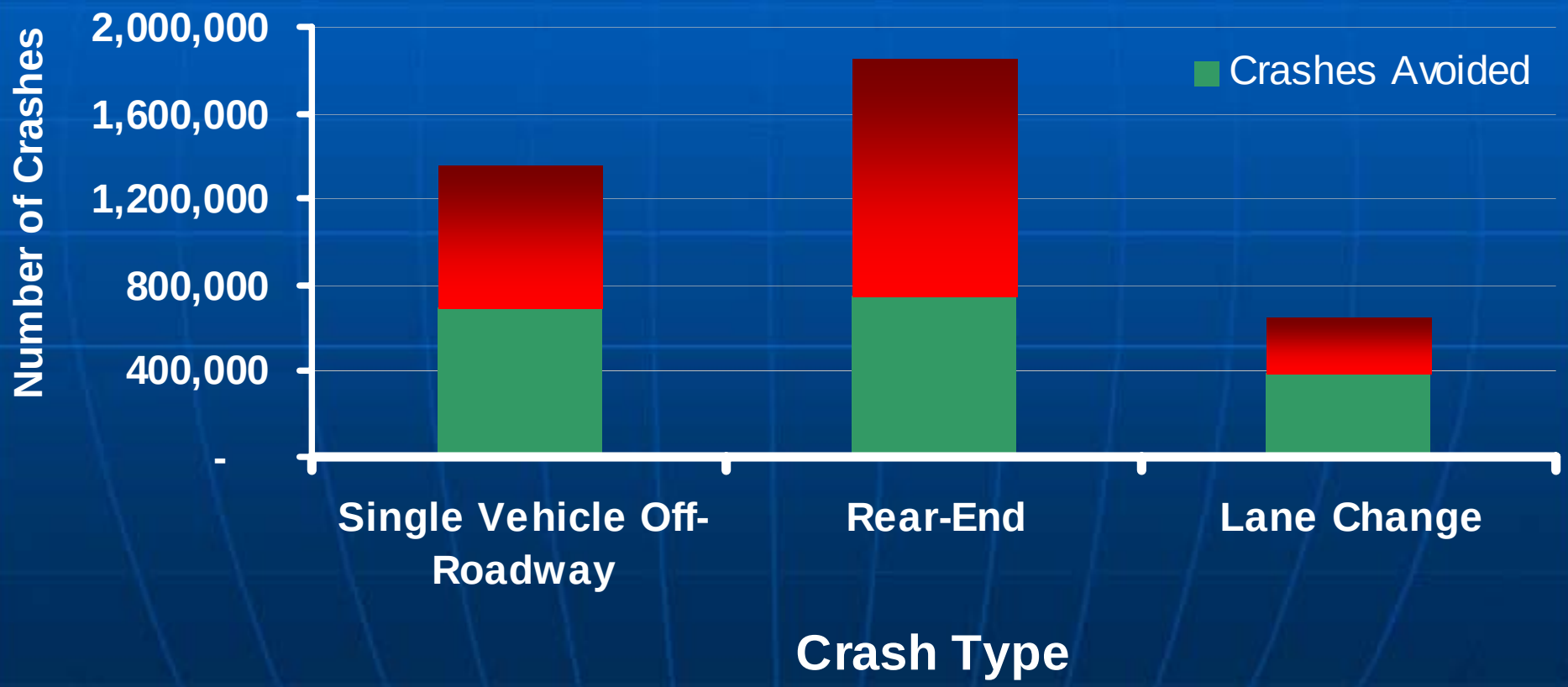
- Integrated Vehicle-Based Safety Systems (IVBSS)
- Intersection Crash Prevention Systems (CICAS)
- Vehicle-Infrastructure Integration (VII)
- Next generation 911

# Vehicle to Vehicle Communication

# Vehicle Infrastructure Integration (VII)

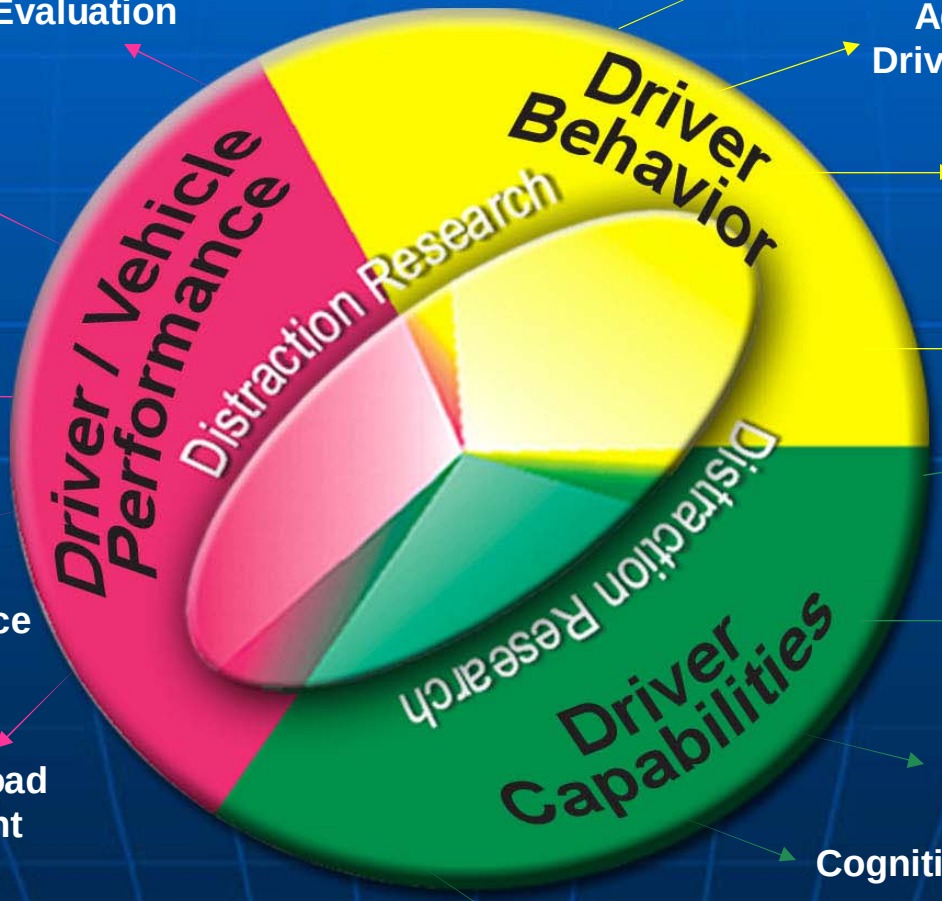
- Facilitates implementation of FCC allocation of frequency at 5.9 GHz for safety communication
- Creating an “enabling communication infrastructure”
- Emphasis on safety applications

# Safety Benefits Estimation of Crash Avoidance Systems Based on Experimental Data




No. of Crashes = No. Police-Reported Crashes

# Driver Vehicle Safety Research




Safety Impacting & Safety Critical In-Vehicle Technology Evaluation

Countermeasure Development

User Acceptance

System Integration for Optimum Performance

Driver Workload Management

Driver Training

Aggressive Driver Research

Behavior Modification Research

Demographic & Social Factors Research

Information Processing Research

Physical & Mental Capacity Assessment

Driving Task Demands

Cognitive & Attention Demand

Situation Awareness Capacity

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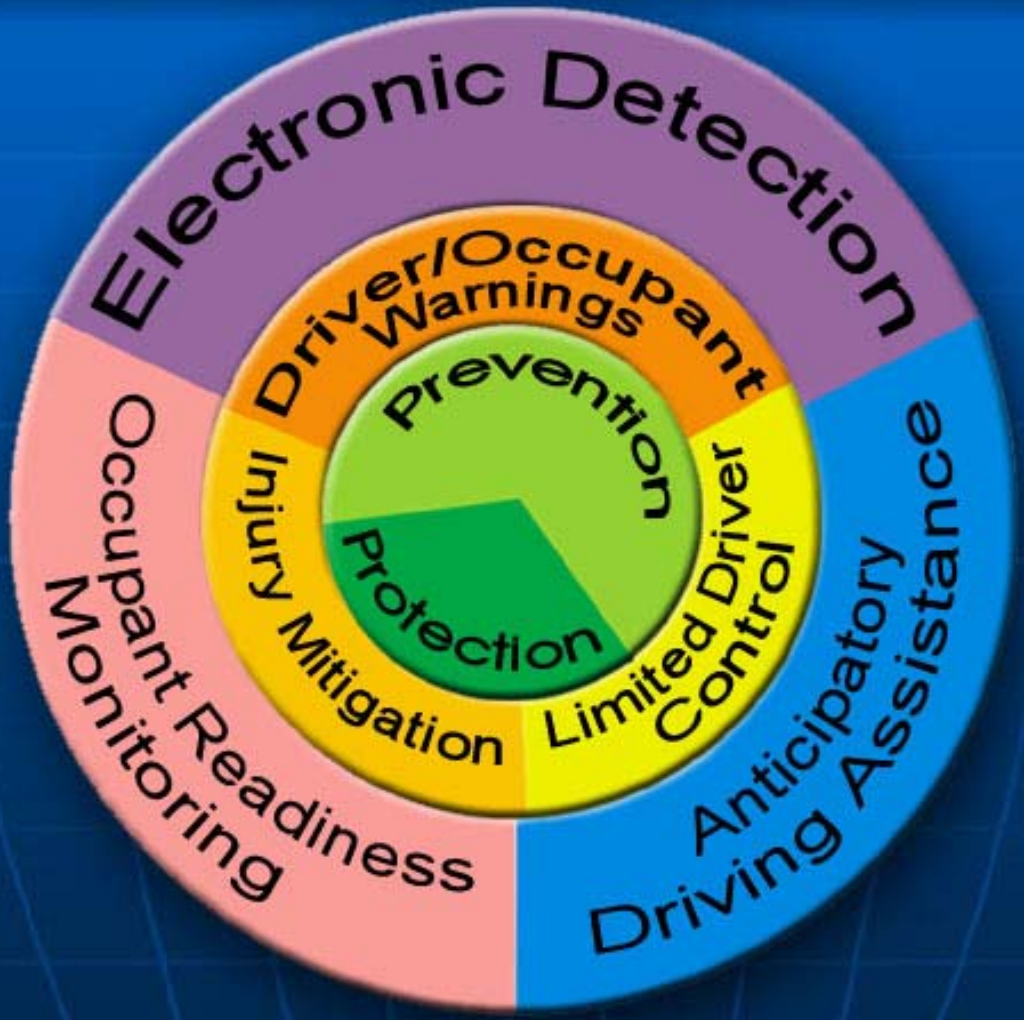
# Total Safety

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# Conclusions

- Safety Needs Novel Approaches
  - Use market forces
  - Innovative regulatory approaches
  - Consumer information and education
  - Closer cooperation between Government and Industry