

Overview of NHTSA Research

Presentation to Hyundai Researchers

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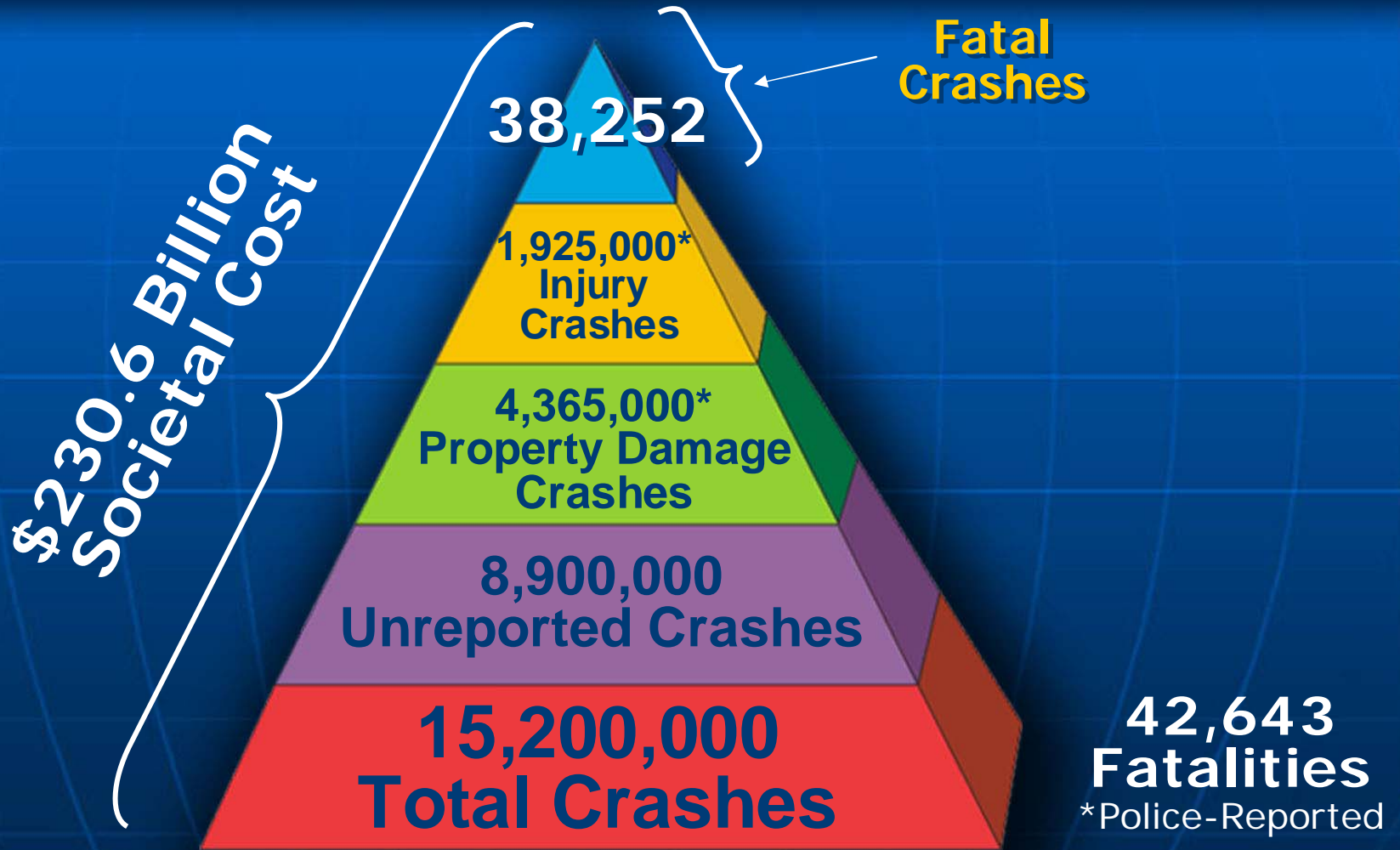
Associate Administrator for Vehicle Safety Research
National Highway Traffic Safety Administration

World Health Organization

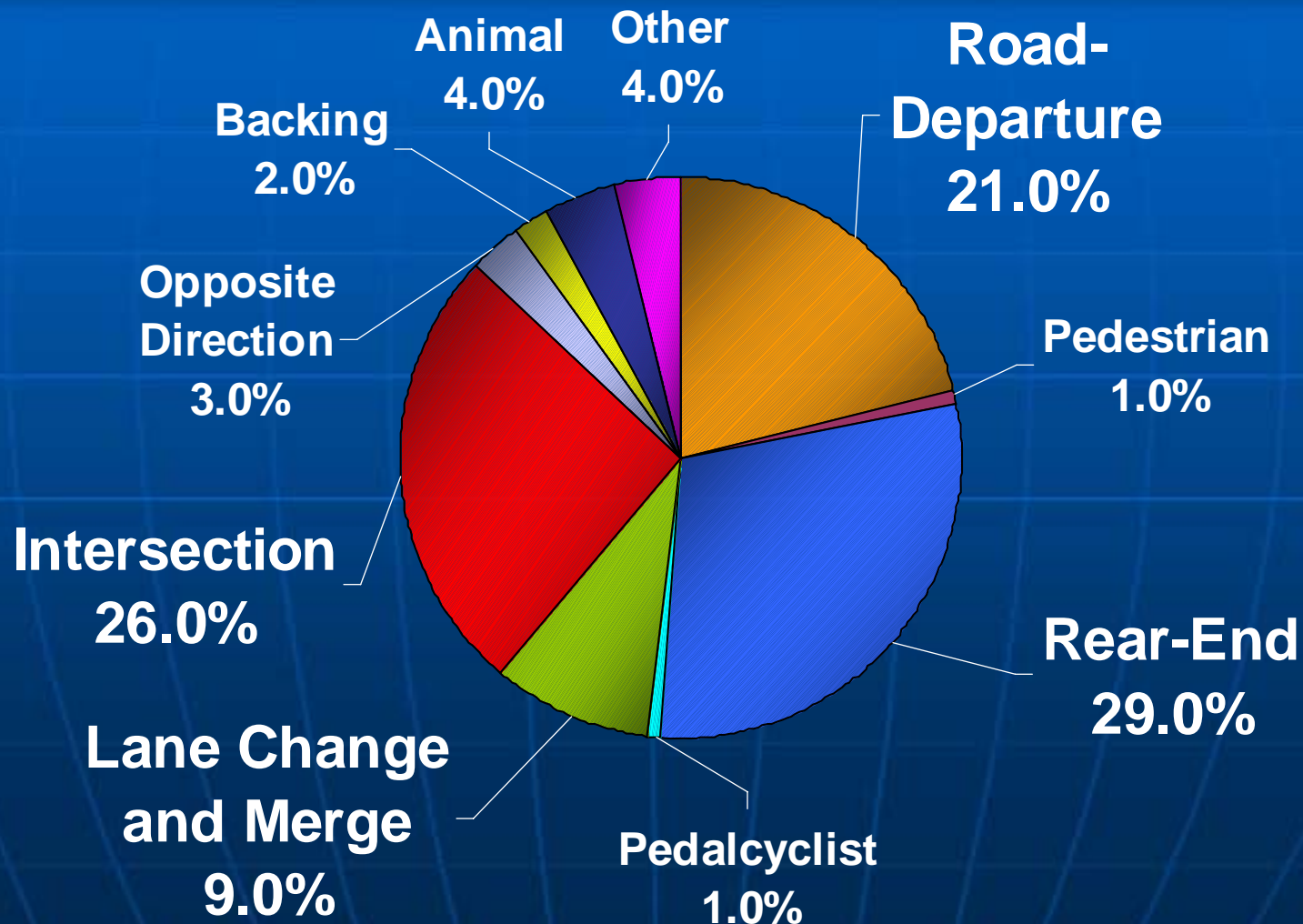
- Road traffic injuries is a huge public health problem
 - Killing nearly 1.2 million people a year
 - Disables 20 – 50 million more
- Road traffic crash problem can be corrected
- Traffic exposure and crash probability results in crash risk
- Accurate data are essential to monitor trends and develop intervention strategies
- Smart vehicles and new technologies are opening new opportunities for road safety.

Extracted from:
World Report on road traffic injury²
prevention, Geneva 2004

The Crash Epidemic

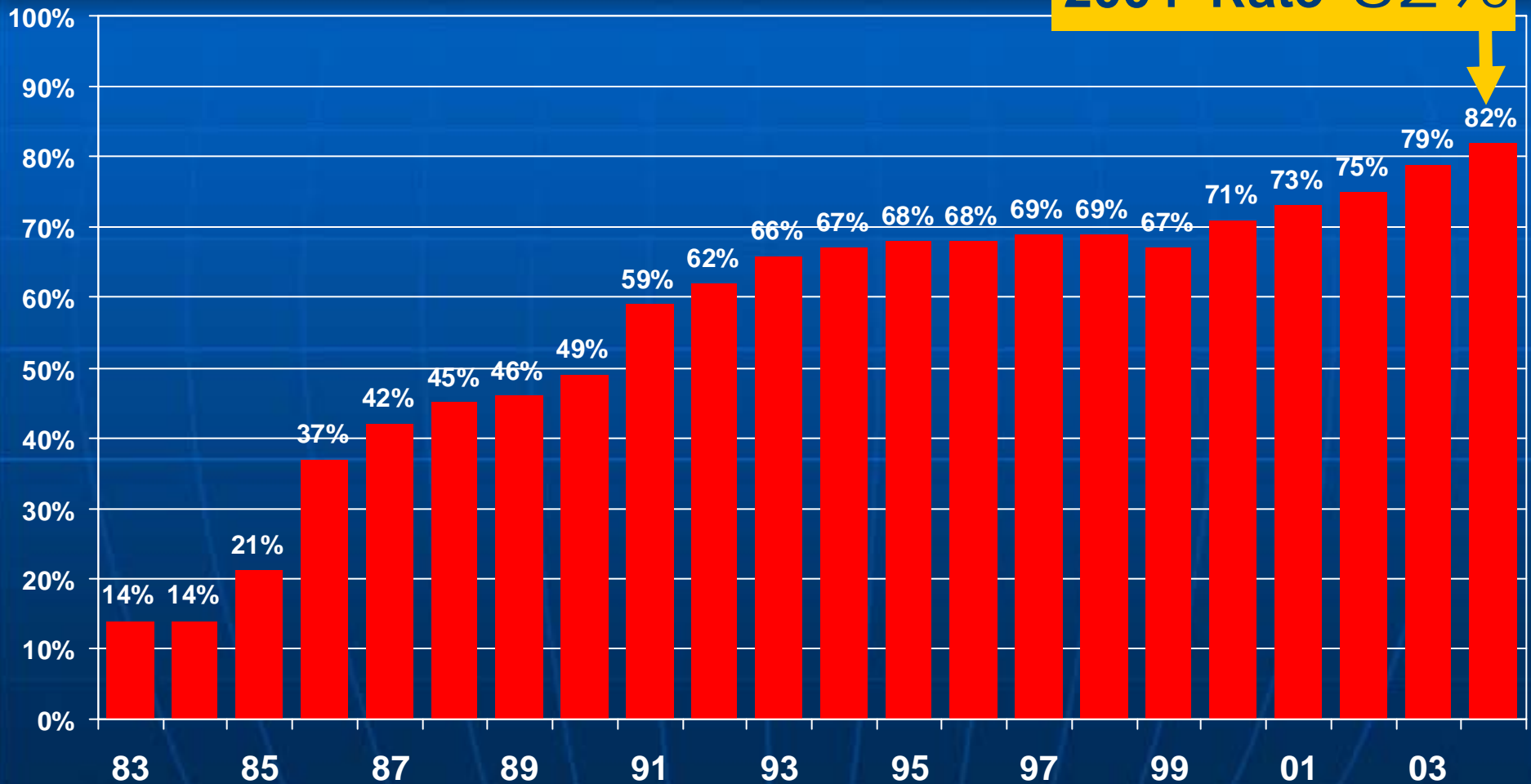


Crashes of all Severities, 2000 GES



Safety Belt Use Rates 1983 - 2004

2004 Rate 82%



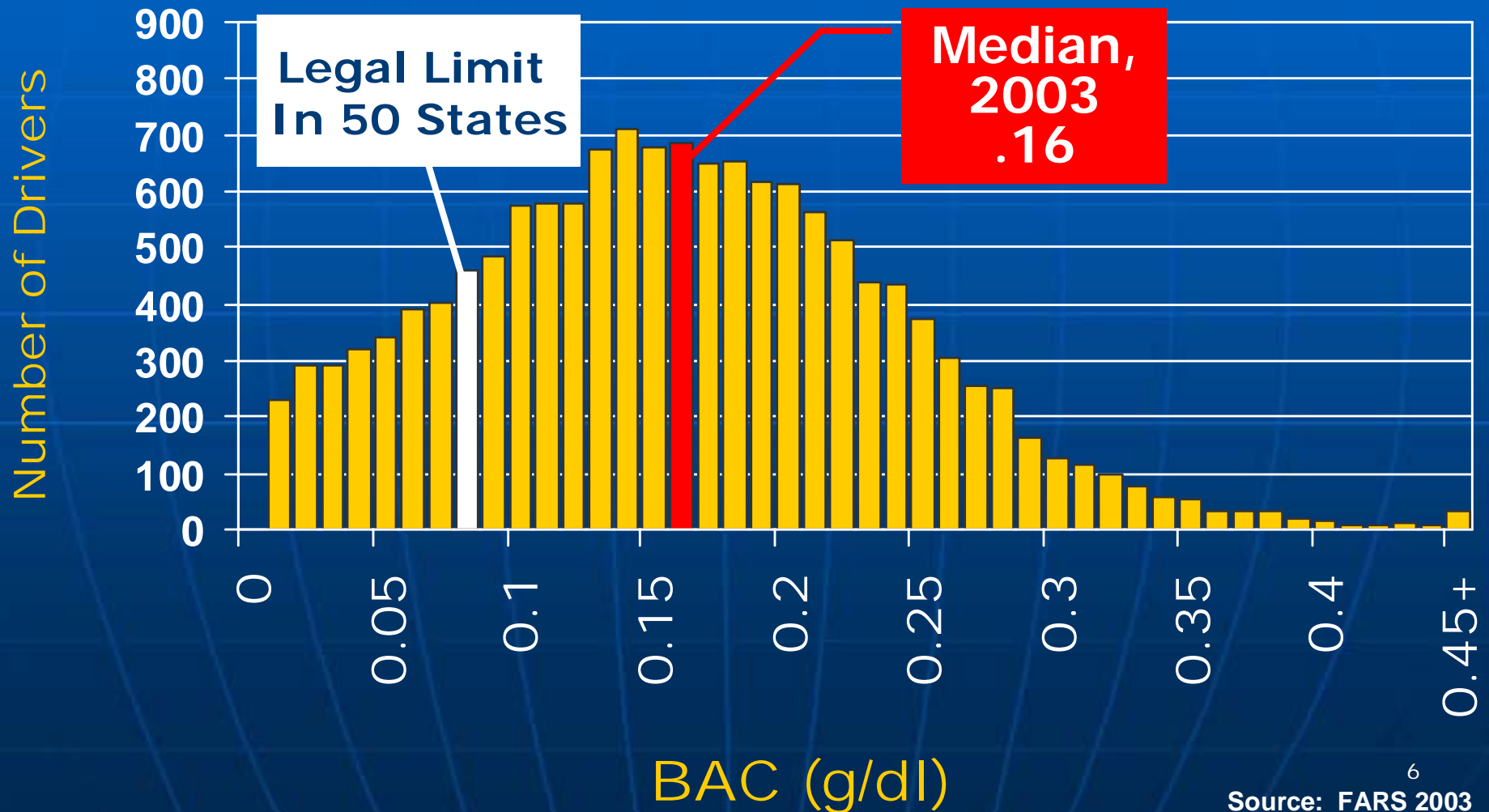
1983-1990 from 19 city surveys

1991-1997 from State surveys

1998-2002 from NOPUS/mini NOPUS surveys

2004 State Observational Surveys

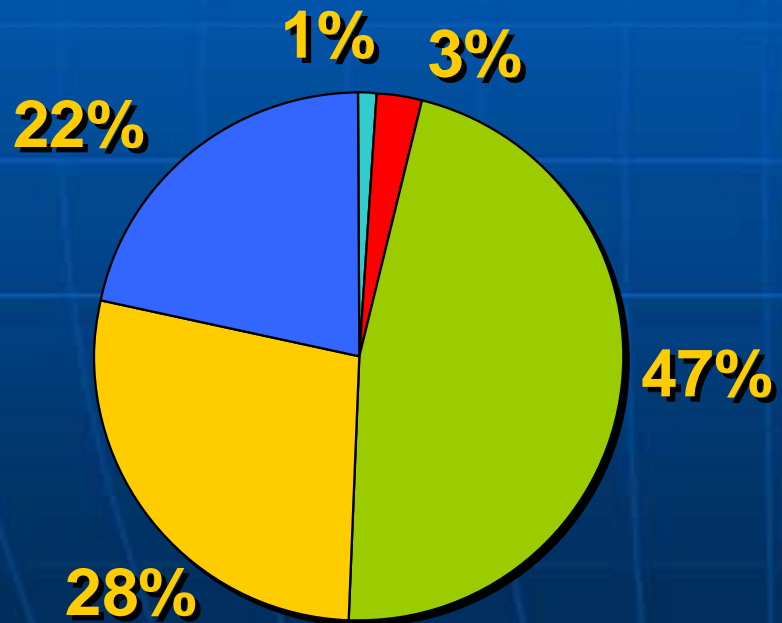
Drivers Involved In Fatal Crashes with Positive BACs (BAC>0), 2003



Vehicles and Fatalities by Collision Type 2003

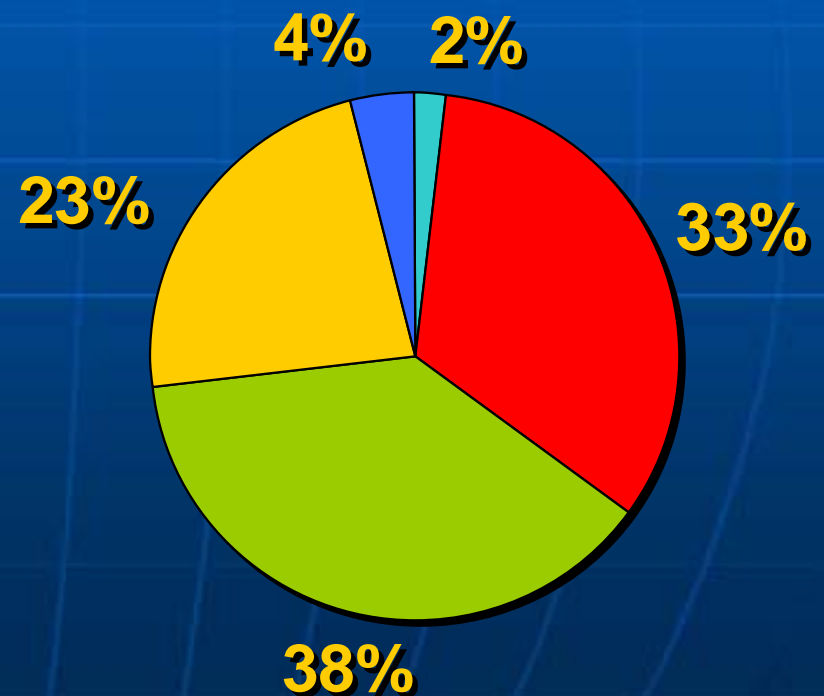
Passenger Vehicles in Crashes

Approx. 10.6 million vehicles involved



Passenger Vehicle Occupant Fatalities

31,904 total occupants killed



Rollover **Front** **Side** **Rear** **Other**

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



Highway Safety Priorities

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

Advanced Car seating Restraint Systems



Alcohol Screening Systems

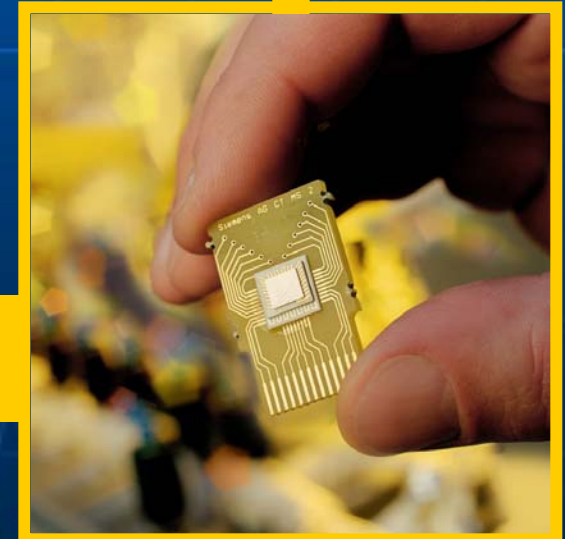
- System needs to be totally unobtrusive
- Nearly 100 percent accuracy essential
- Multiple sensing assures reliability

**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**

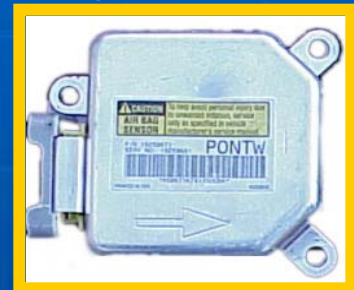


Data Collection

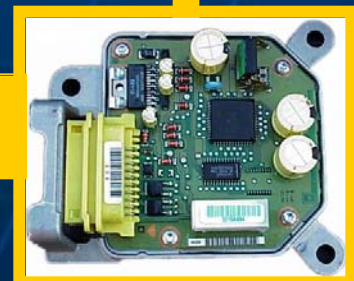
Why do we need EDRs ?

- **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



~5 inches



Cover
removed

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.)

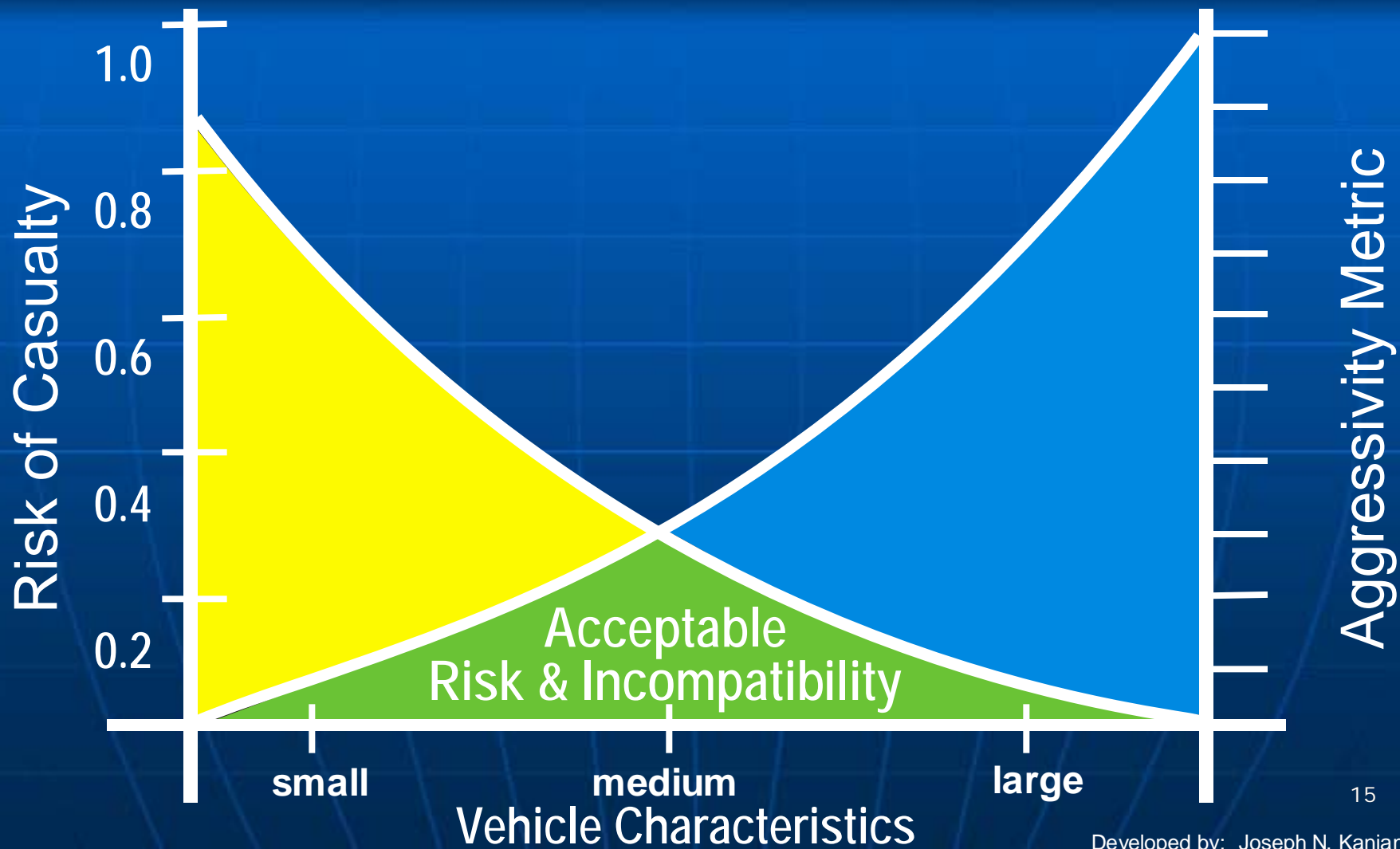


100 CAR NATURALISTIC DRIVING STUDY

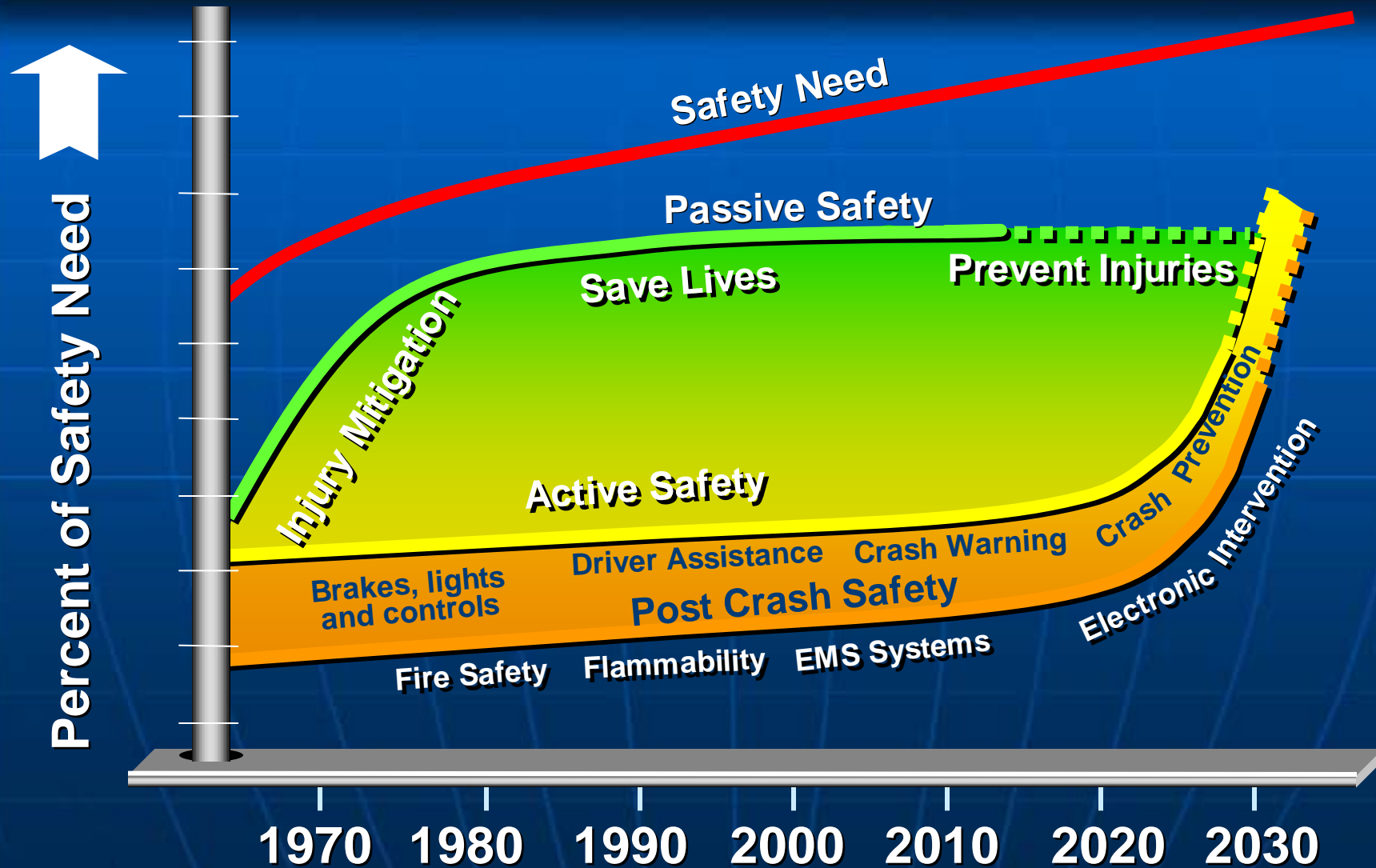
Understanding normal driving performance is important.



Safety Impact of Incompatibility



Future Safety Need



Haddon Matrix

Human

Vehicle

Environment

Pre-Event



Event



Post-Event



Crash Time Line



Prevention

**Severity
Reduction**

**Injury
Mitigation**

**Medical
Attention**

0

Crash may not
be prevented-but
Severity can be
Reduced

100^{m.sec.}

1^{hr}

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



Crash Time Line

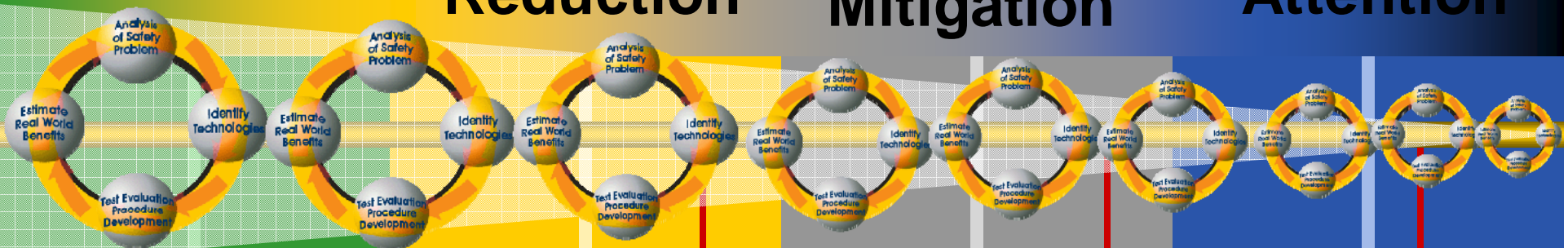


Prevention

Severity Reduction

Injury Mitigation

Medical Attention



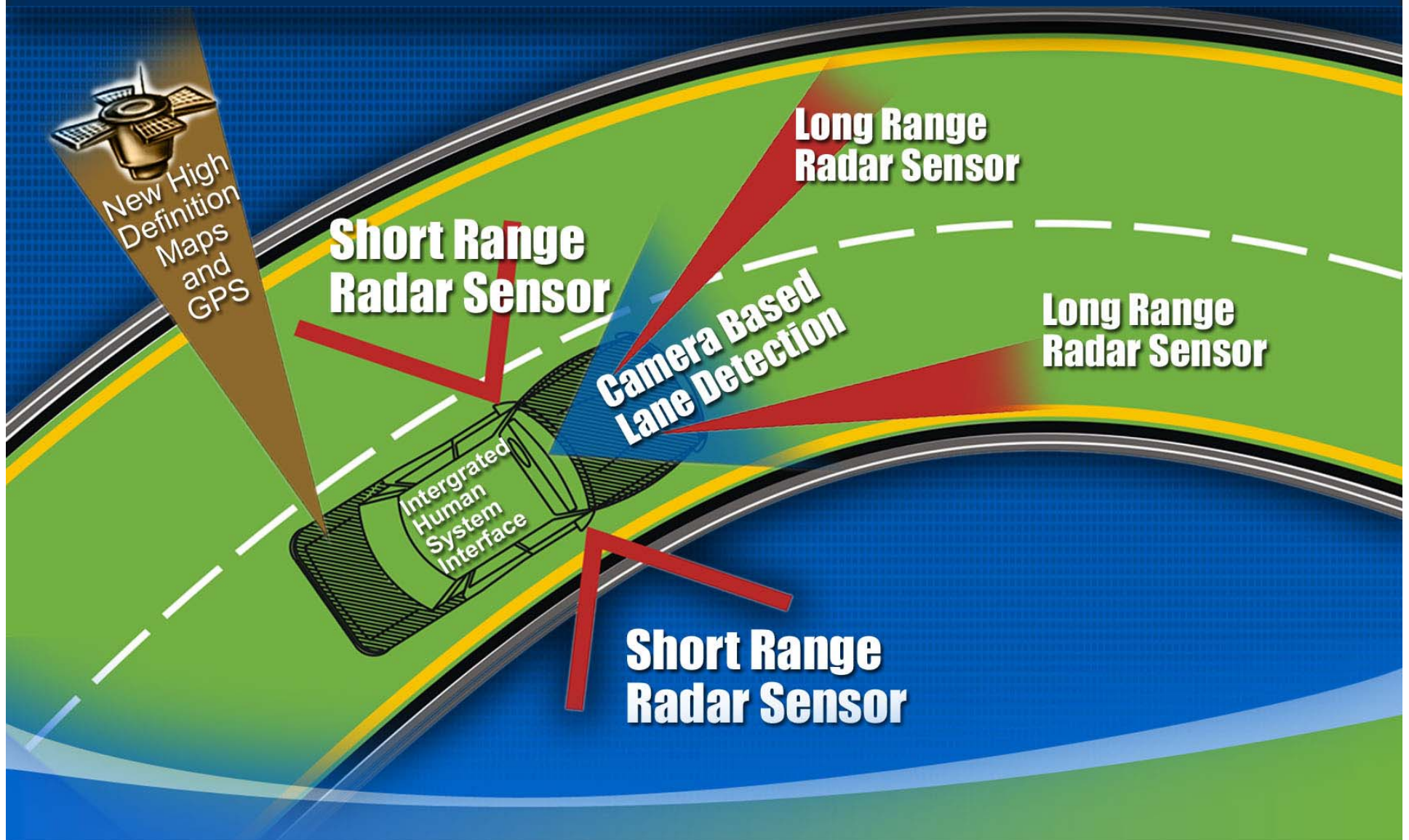
Crash may not be prevented-but **Severity** can be **Reduced**

0

100^{m.sec.}

1 hr

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

Cooperative Intersection Collision Avoidance Systems (CICAS)

- **Every year at intersections:**
 - **9100 Fatalities**
 - **1,500,000 Injuries**
 - **3,000,000 Crashes**
- **To develop and demonstrate cooperative intersection collision avoidance systems**
- **To assess the value and acceptance of collision avoidance systems that utilize cooperative communication**

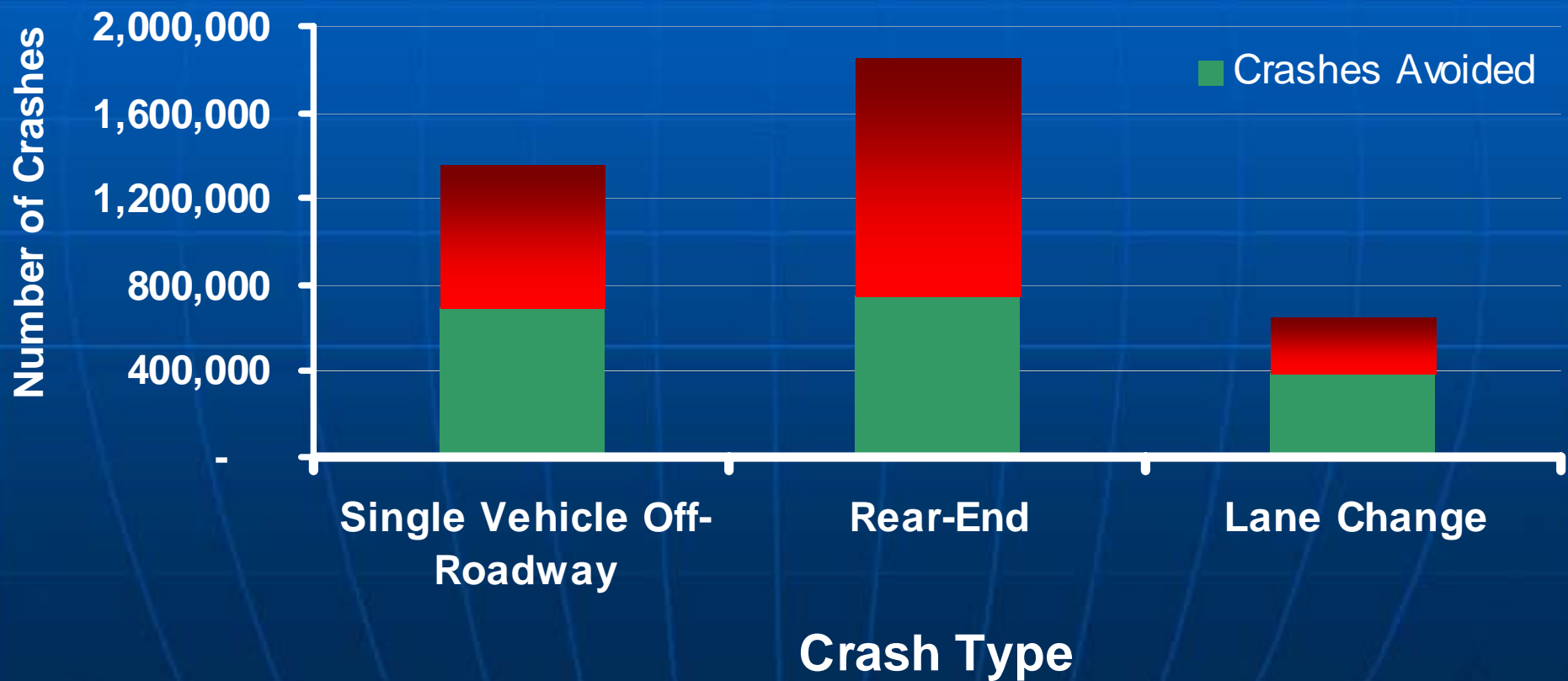
Intersection Collision Avoidance



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

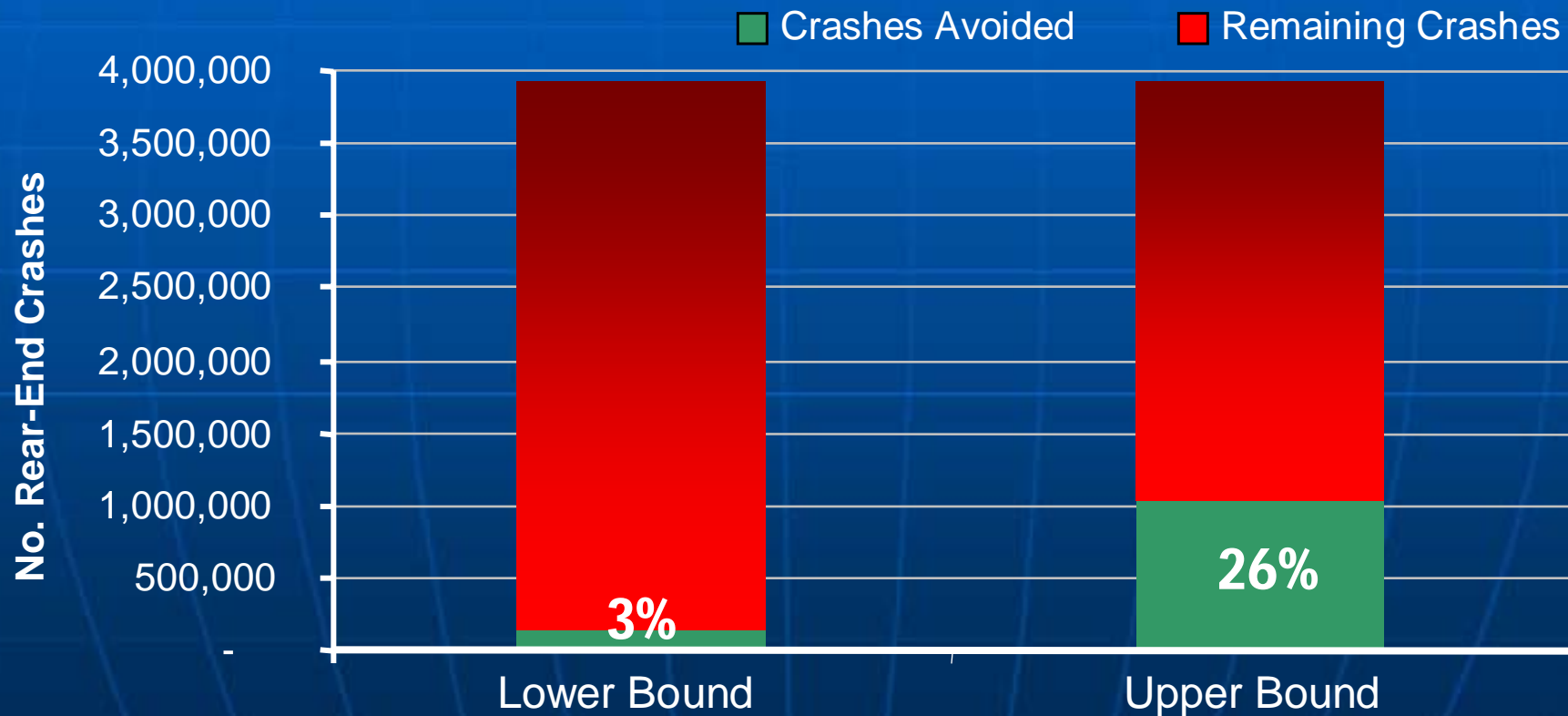
Safety Benefits Estimation of Crash Avoidance Systems Based on Experimental Data



No. of Crashes = No. Police-Reported Crashes

Safety Benefits Estimation of ACAS Based on Field Operational Test Data

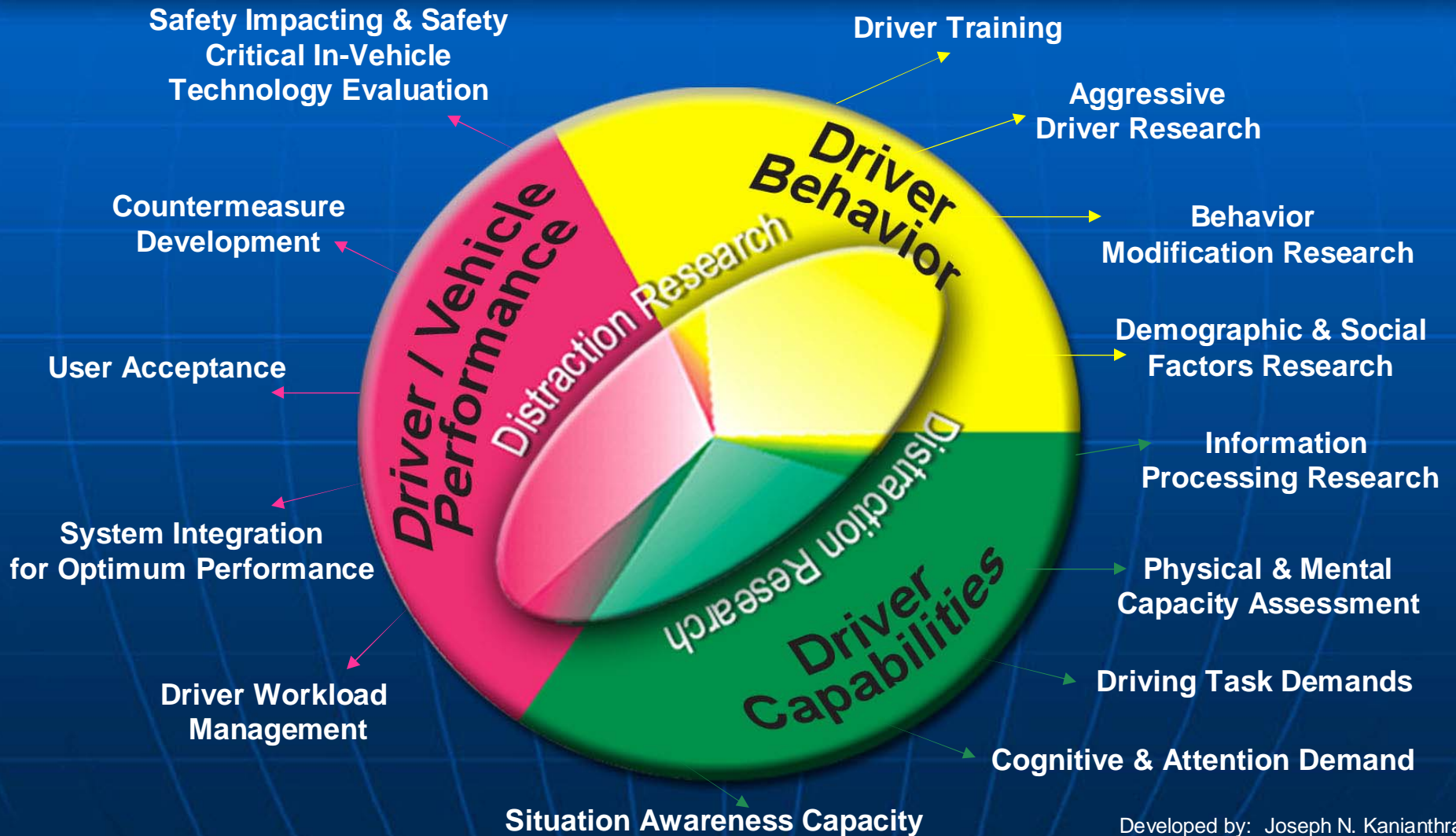
System can potentially prevent up to 26% of rear-end crashes



95% Confidence Level

No. of Crashes = No. Police-Reported + Non-Reported Crashes

Driver Vehicle Safety Research



Total Safety



Conclusions

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