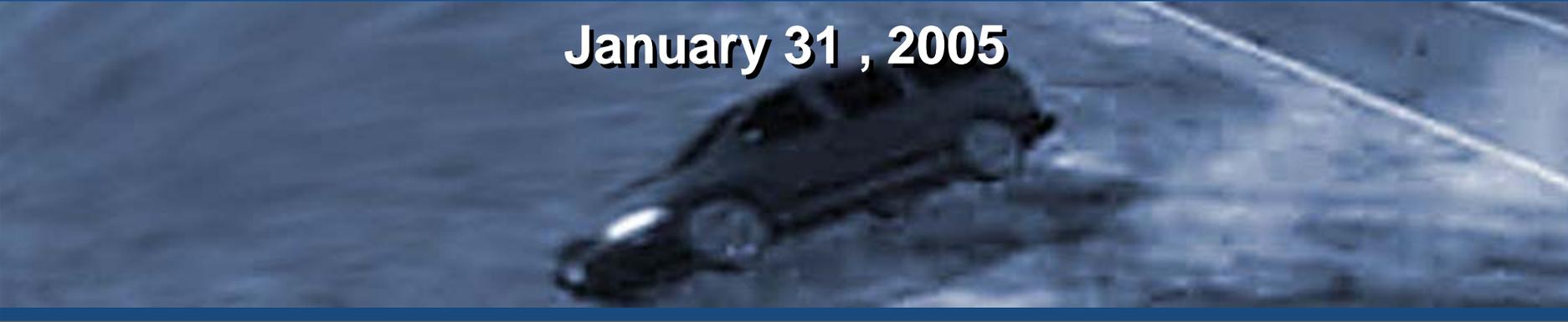


Overview of NHTSA Research

Future Options That Will Make a Difference
Presentation to Nissan Researchers

January 31 , 2005



Joseph N. Kaniyanthra Ph.D. (Mech. Eng)

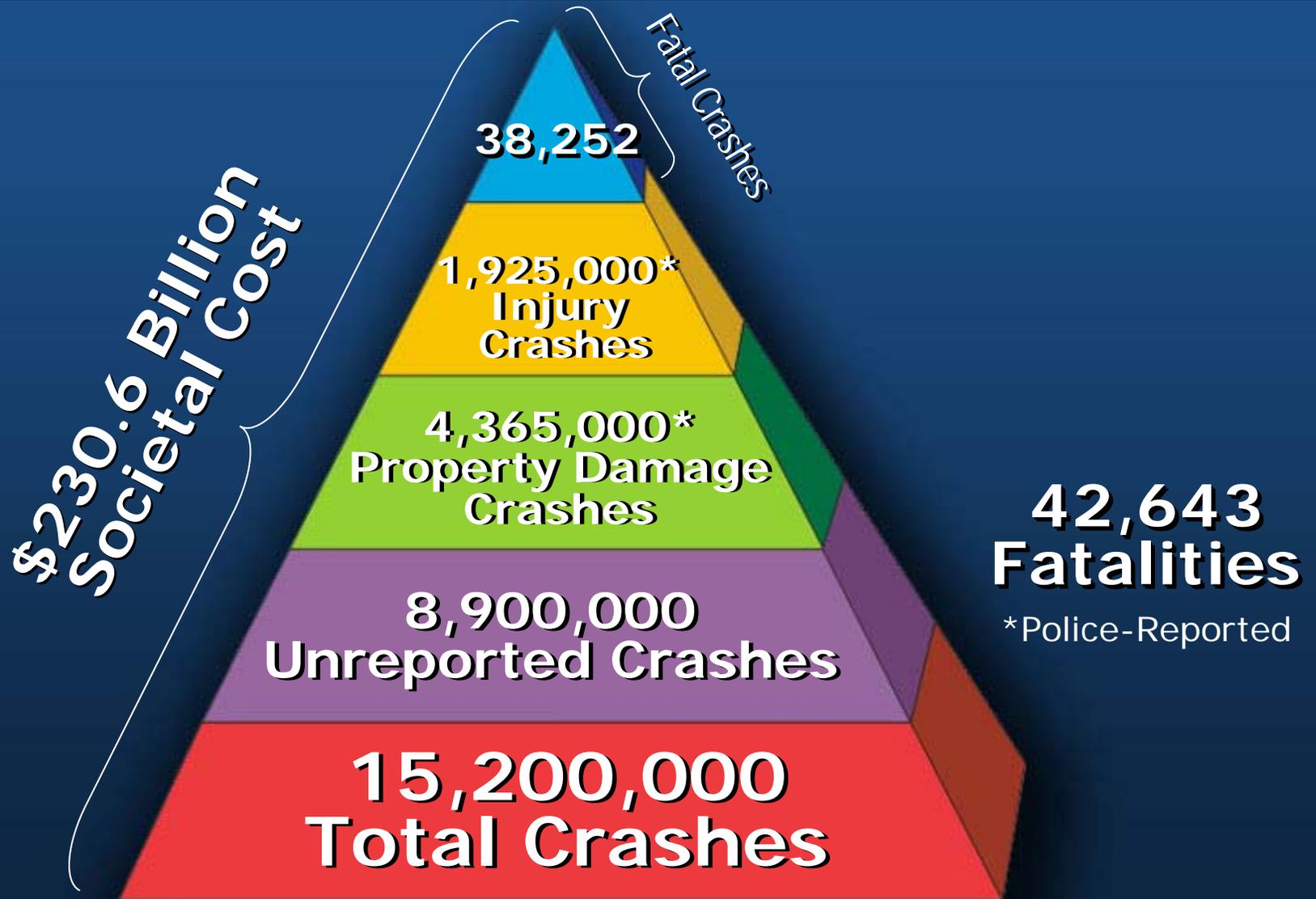
Associate Administrator for Vehicle Safety Research

National Highway Traffic Safety Administration

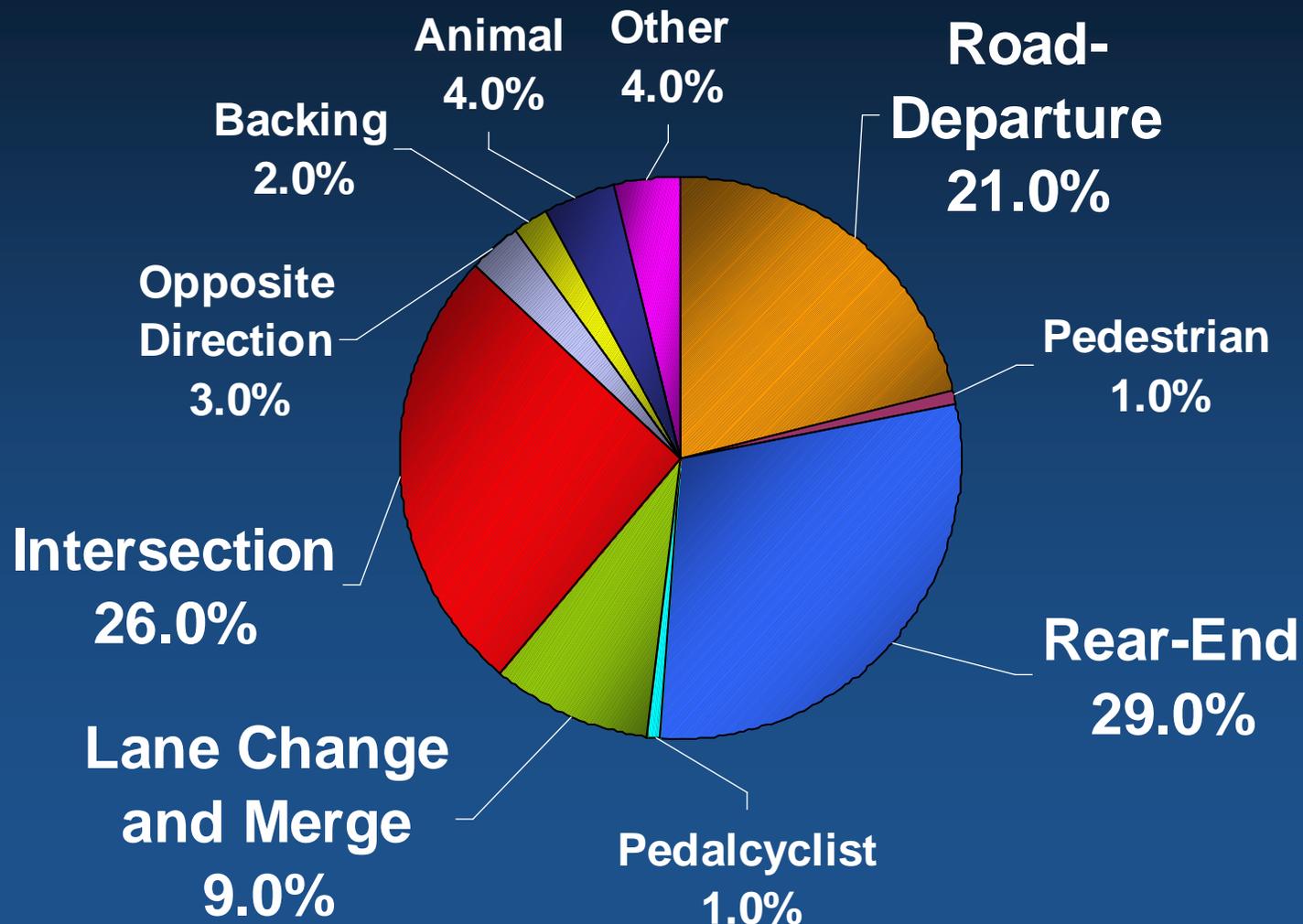
World Health Organization

- 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.

The Crash Epidemic



Crashes of all Severities, 2000 GES

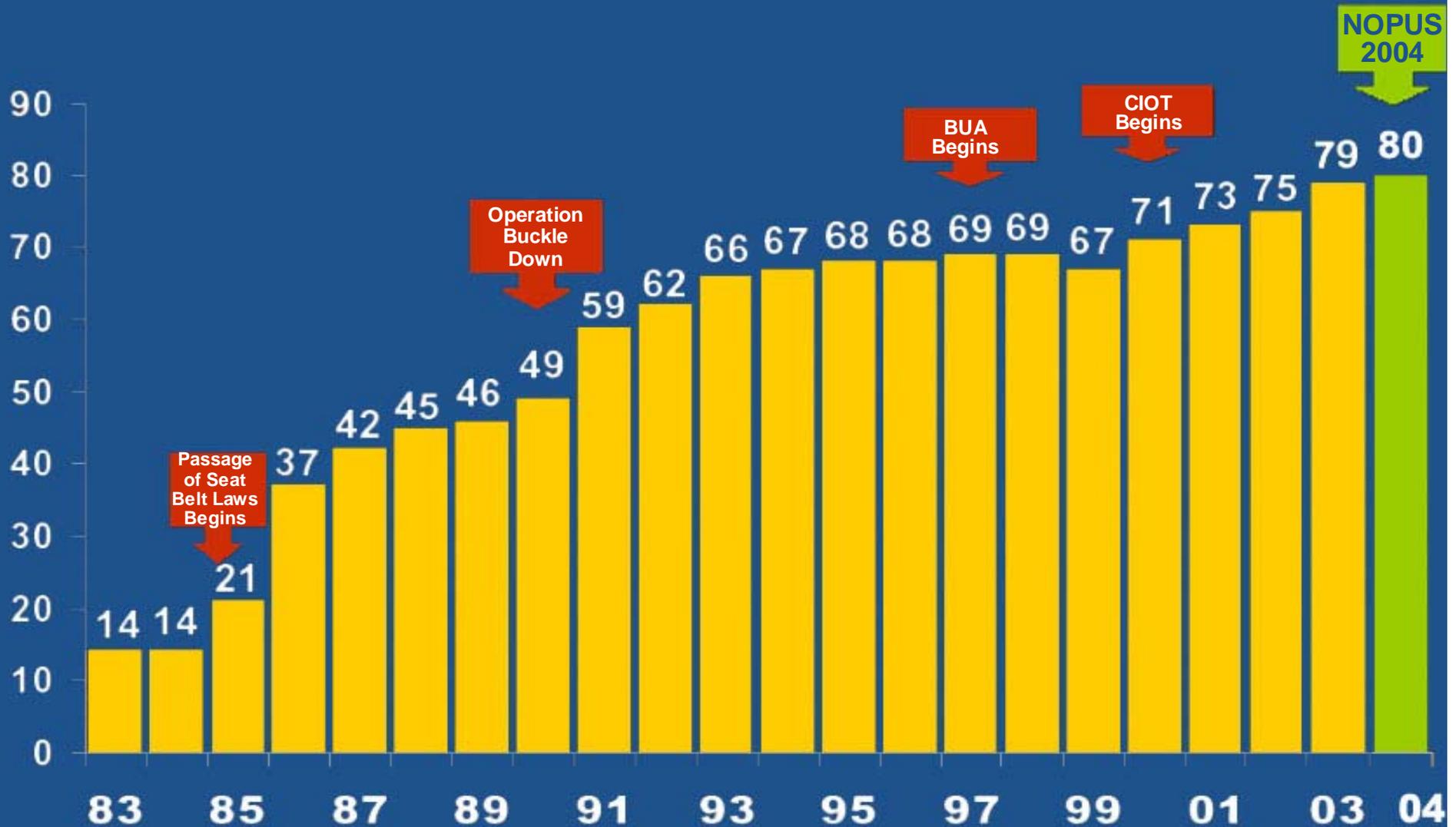


Top 10 Leading Causes of Death in the United States for 2002, by Age Group

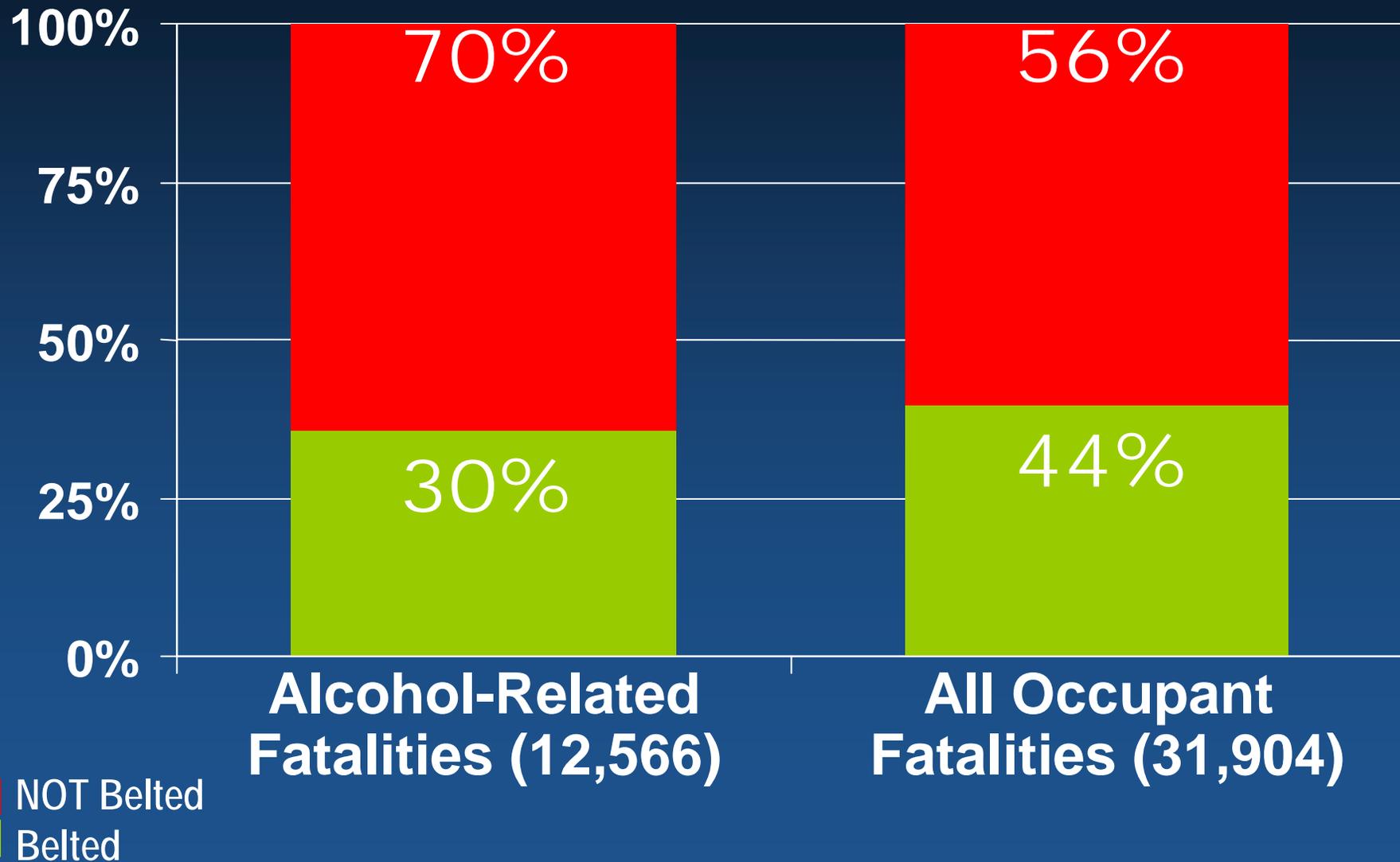


RANK	Cause and Number of Deaths											Years of Life Lost
	Infants Under 1	Toddlers 1-3	Young Children 4-7	Children 8-15	Youth 16-20	Young Adults 21-24	Other Adults			Elderly 65+	All Ages	
							25-34	35-44	45-64			
1	Perinatal Period 14,106	Congenital Anomalies 474	MV Traffic Crashes 495	MV Traffic Crashes 1,584	MV Traffic Crashes 6,327	MV Traffic Crashes 4,446	MV Traffic Crashes 6,933	Malignant Neoplasms 16,085	Malignant Neoplasms 143,028	Heart Disease 576,301	Heart Disease 696,947	Malignant Neoplasms 23% (8,686,782)
2	Congenital Anomalies 5,623	MV Traffic Crashes 410	Malignant Neoplasms 449	Malignant Neoplasms 842	Homicide 2,422	Homicide 2,650	Suicide 5,046	Heart Disease 13,688	Heart Disease 101,804	Malignant Neoplasms 391,001	Malignant Neoplasms 557,271	Heart Disease 22% (8,140,300)
3	Heart Disease 500	Accidental Drowning 380	Congenital Anomalies 180	Suicide 428	Suicide 1,810	Suicide 2,036	Homicide 4,489	MV Traffic Crashes 6,883	Stroke 15,952	Stroke 143,293	Stroke 162,672	MV Traffic Crashes 5% (1,766,854)
4	Homicide 303	Homicide 366	Accidental Drowning 171	Homicide 426	Malignant Neoplasms 805	Accidental Poisoning 974	Malignant Neoplasms 3,872	Suicide 6,851	Diabetes 15,518	Chronic Lwr. Resp. Dis. 108,313	Chronic Lwr. Resp. Dis. 124,816	Stroke 5% (1,682,465)
5	Septicemia 296	Malignant Neoplasms 285	Exposure to Smoke/Fire 151	Congenital Anomalies 345	Accidental Poisoning 679	Malignant Neoplasms 823	Heart Disease 3,165	Accidental Poisoning 6,007	Chronic Lwr. Resp. Dis. 14,755	Influenza/Pneumonia 58,826	Diabetes 73,249	Chronic Lwr. Resp. Dis. 4% (1,466,004)
6	Influenza/Pneumonia 263	Exposure to Smoke/Fire 163	Homicide 134	Accidental Drowning 270	Heart Disease 449	Heart Disease 518	Accidental Poisoning 3,116	HIV 5,707	Chronic Liver Disease 13,313	Alzheimer's 58,289	Influenza/Pneumonia 65,681	Suicide 3% (1,109,748)
7	Nephritis/Nephrosis 173	Heart Disease 144	Heart Disease 73	Heart Disease 258	Accidental Drowning 345	Accidental Drowning 238	HIV 1,839	Homicide 3,239	Suicide 9,926	Diabetes 54,715	Alzheimer's 58,866	Perinatal Period 3% (1,099,767)
8	MV Traffic Crashes 120	Influenza/Pneumonia 92	Influenza/Pneumonia 41	Exposure to Smoke/Fire 170	Congenital Anomalies 254	Congenital Anomalies 186	Diabetes 642	Chronic Liver Disease 3,154	MV Traffic Crashes 9,412	Nephritis/Nephrosis 34,316	MV Traffic Crashes 44,065	Diabetes 3% (1,050,798)
9	Stroke 117	MV NonTraffic Crashes 69	Septicemia 38	Chr. Lwr. Resp. Dis. 131	MV NonTraffic Crashes 121	Accidental Falls 134	Stroke 567	Stroke 2,425	HIV 5,821	Septicemia 26,670	Nephritis/Nephrosis 40,974	Homicide 2% (822,762)
10	Meningitis 74	Septicemia 63	Benign Neoplasms 36	MV NonTraffic Crashes 115	Acc. Dischg. of Firearms 113	HIV 130	Congenital Anomalies 475	Diabetes 2,165	Accidental Poisoning 5,780	Hypertension Renal Dis. 17,345	Septicemia 33,865	Accidental Poisoning 2% (675,348)
ALL	28,034	4,079	2,586	6,760	16,239	15,390	41,355	91,140	425,727	1,798,420	2,416,425	All Causes 100% (37,341,511)

Safety Belt Use Rates 1983 – 2004 Percentage Use

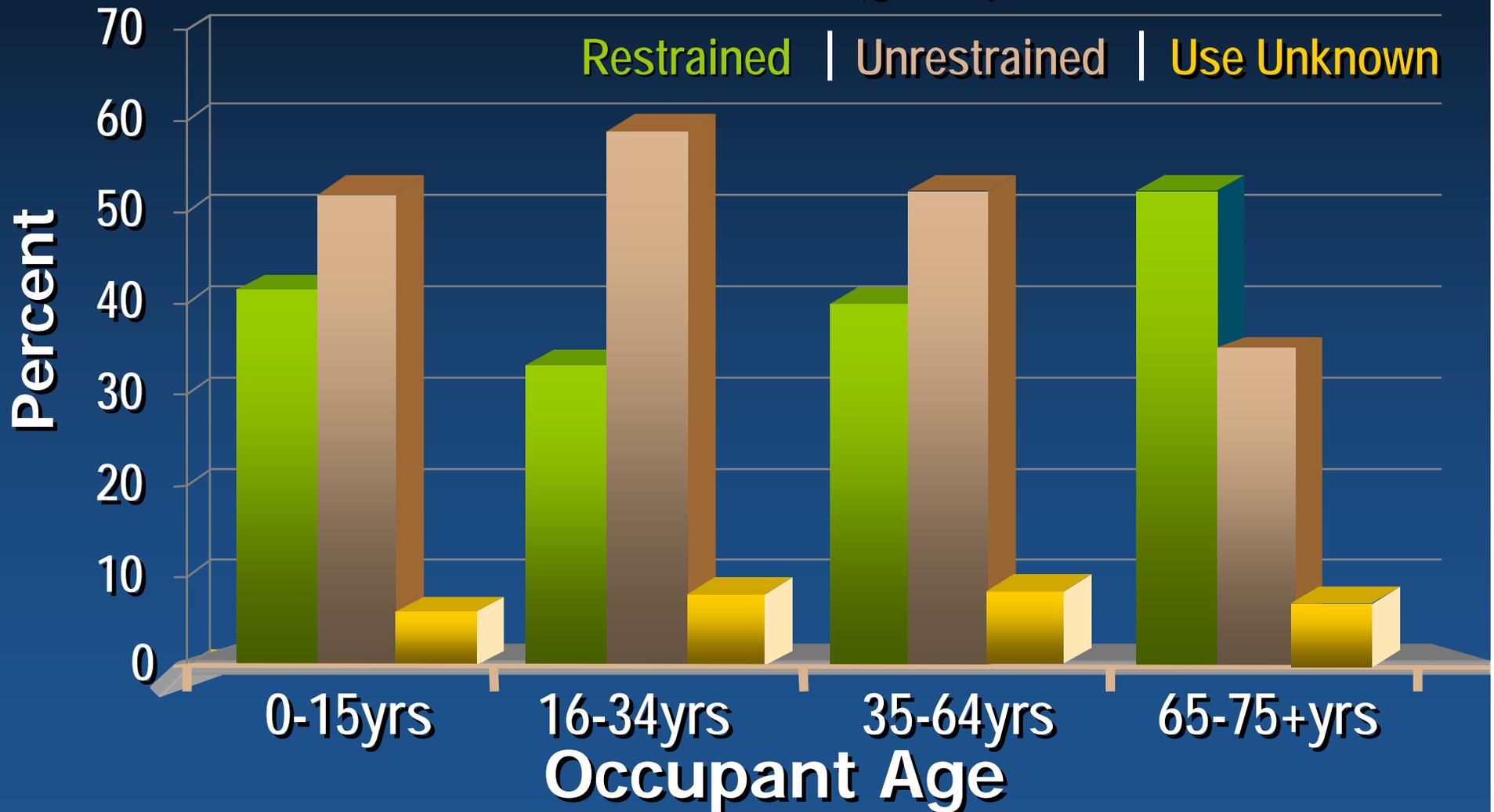


2003 Passenger Vehicle Occupant Fatalities: 31,904

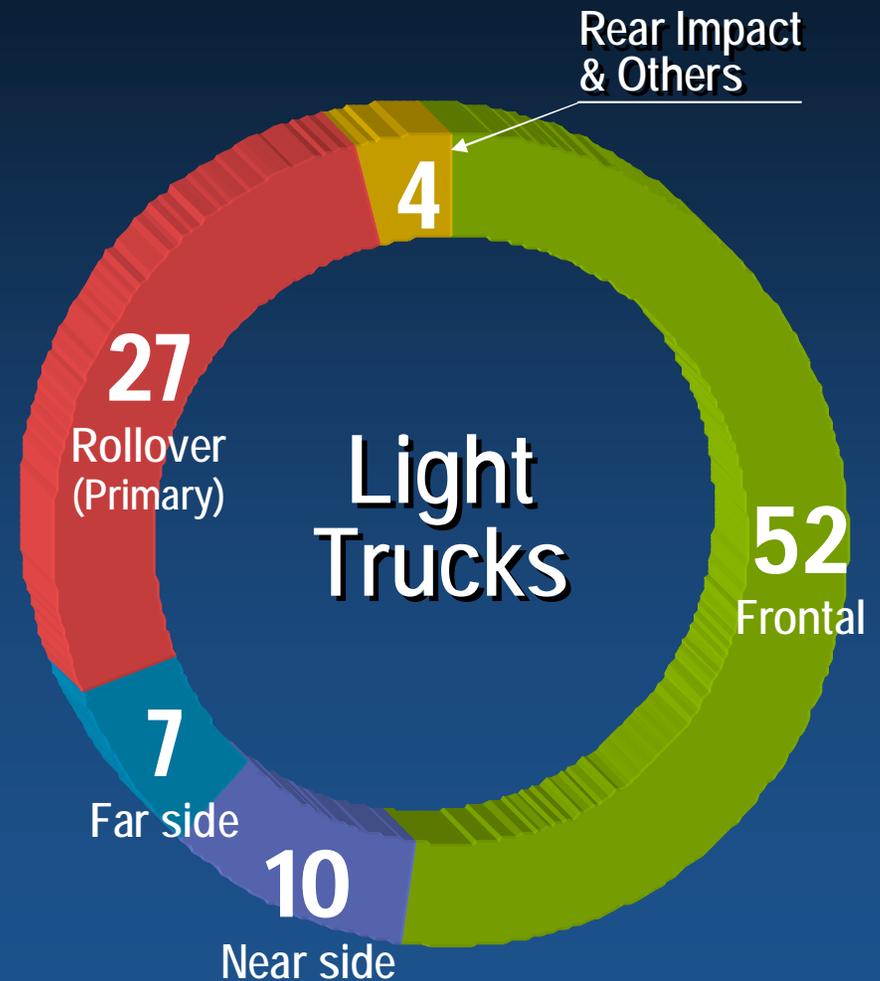
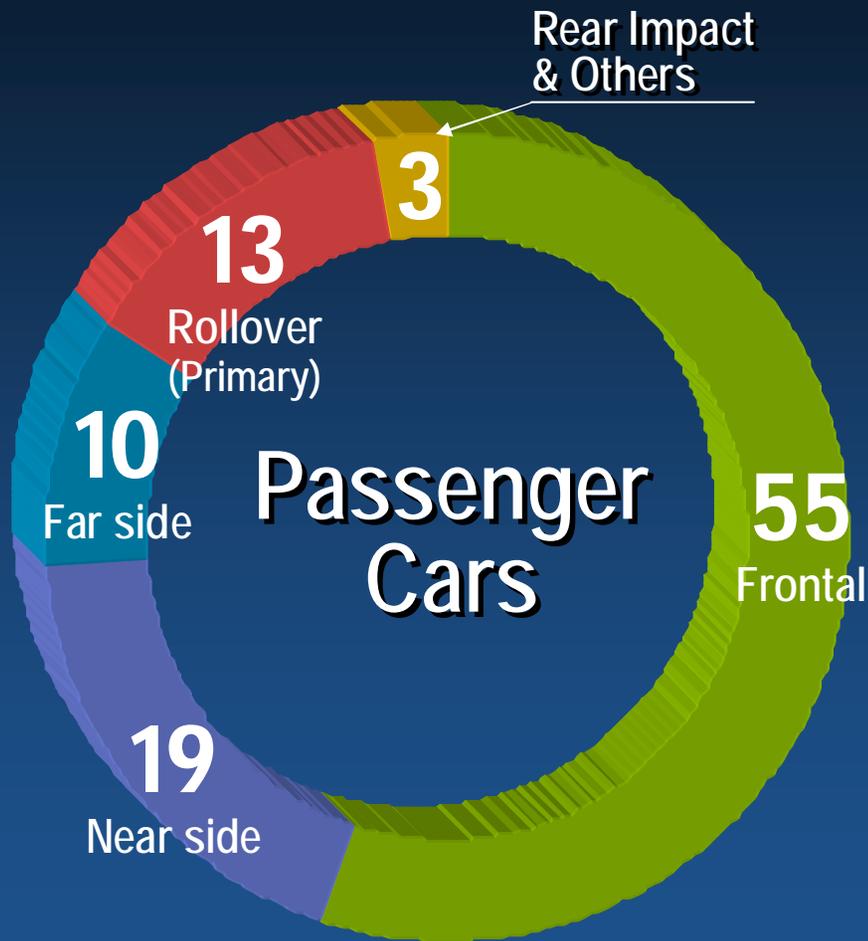


Passenger Vehicle Occupants Fatalities by Age and Restraint Use-2003

Total Fatalities \approx 32,000



Crash Mode Distribution of Unrestrained Fatalities (Percent)

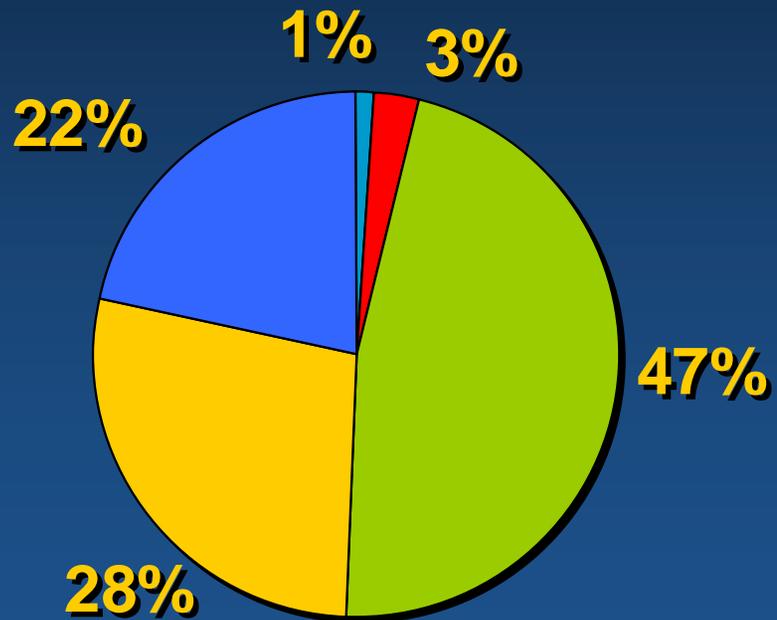


Source: NHTSA Technical Report DOT HS 809 198, December 2000

Vehicles and Fatalities by Collision Type 2003

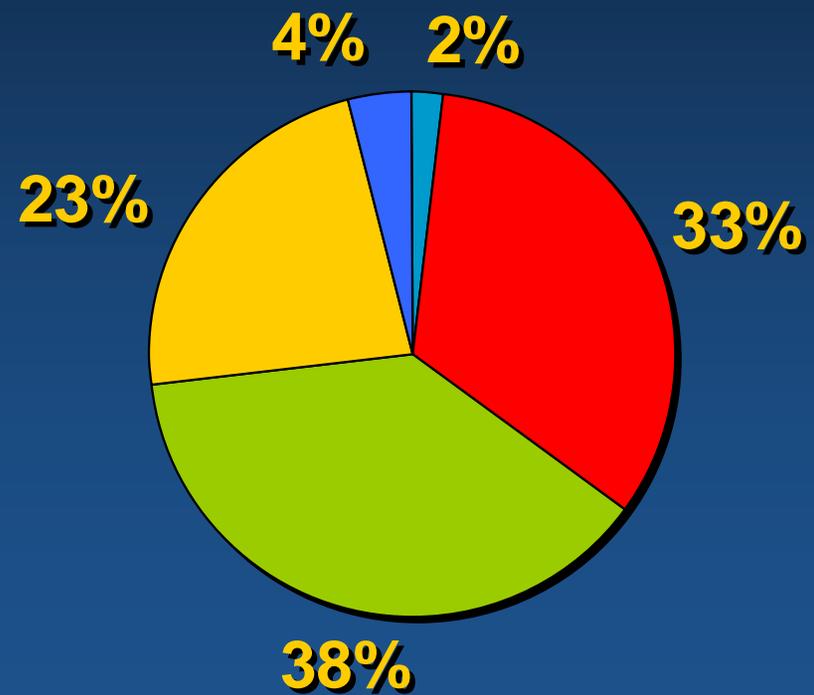
Passenger Vehicles in Crashes

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



NHTSA Performance



FIVE PRIORITIES	2001 – 2004
Belt Use	73% - 80%
Impaired Driving	0.62 – 0.59** / 17,400 – 17,013** NADS/VRTC Research
Data	FAST FARS, EDR Rule
Rollover	Rollover Rating, ESC effectiveness, Ejection Mitigation, Roof Crush, Belt Performance Research.
Compatibility	Alliance Working Group Proposal, Research on Average Height of Force, Side Impact Rule.

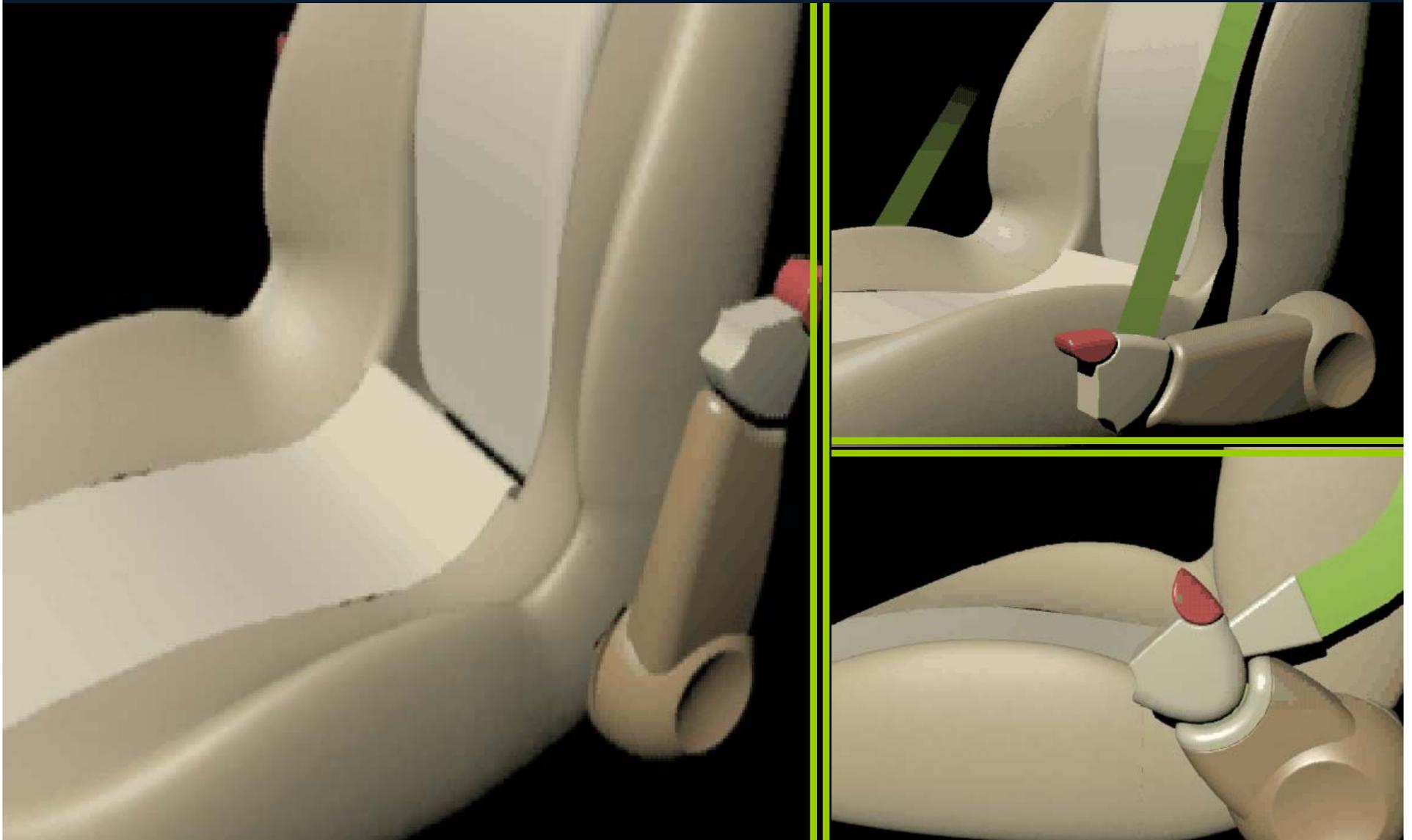
** 2003 Data

2008 Goal is Challenging



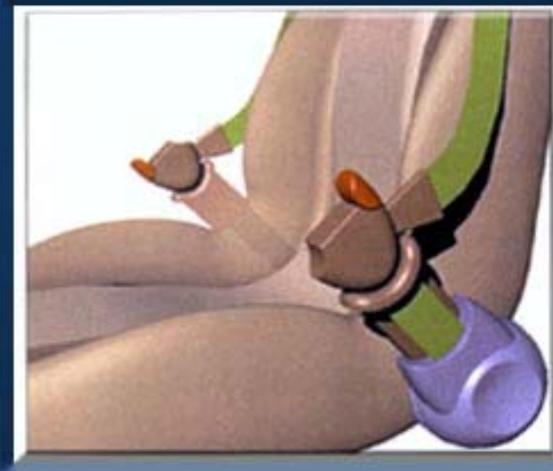
Advanced Car seating Restraint Systems

www.nhtsa.dot.gov
nhtsa
people saving people

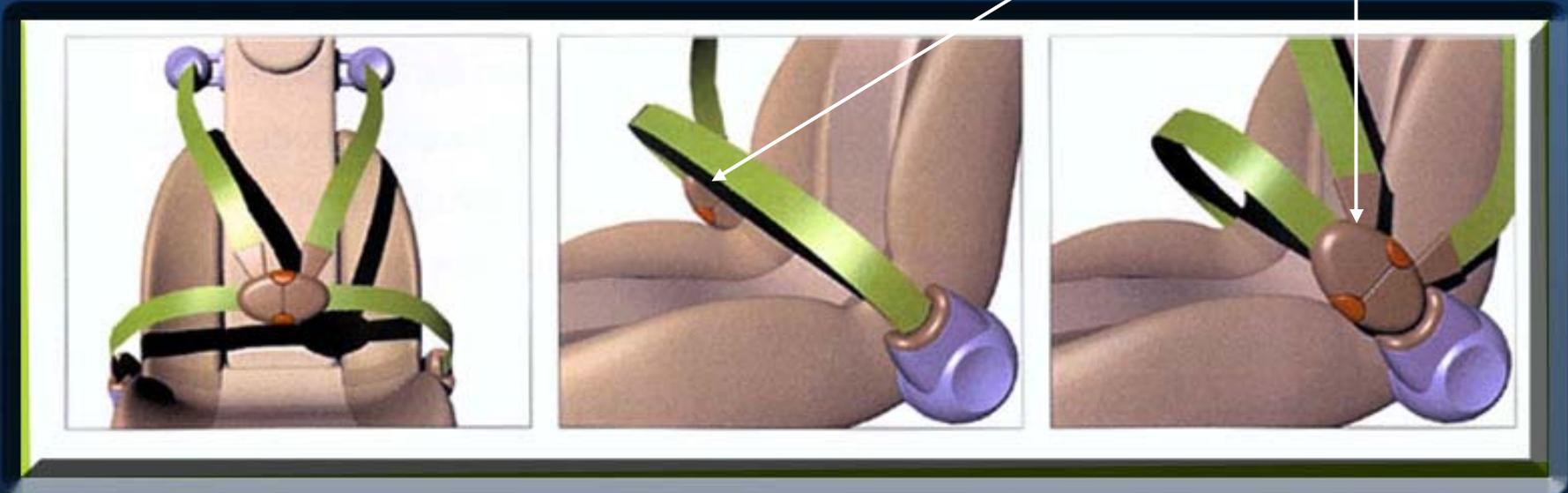


Advanced Car seating Restraint Systems

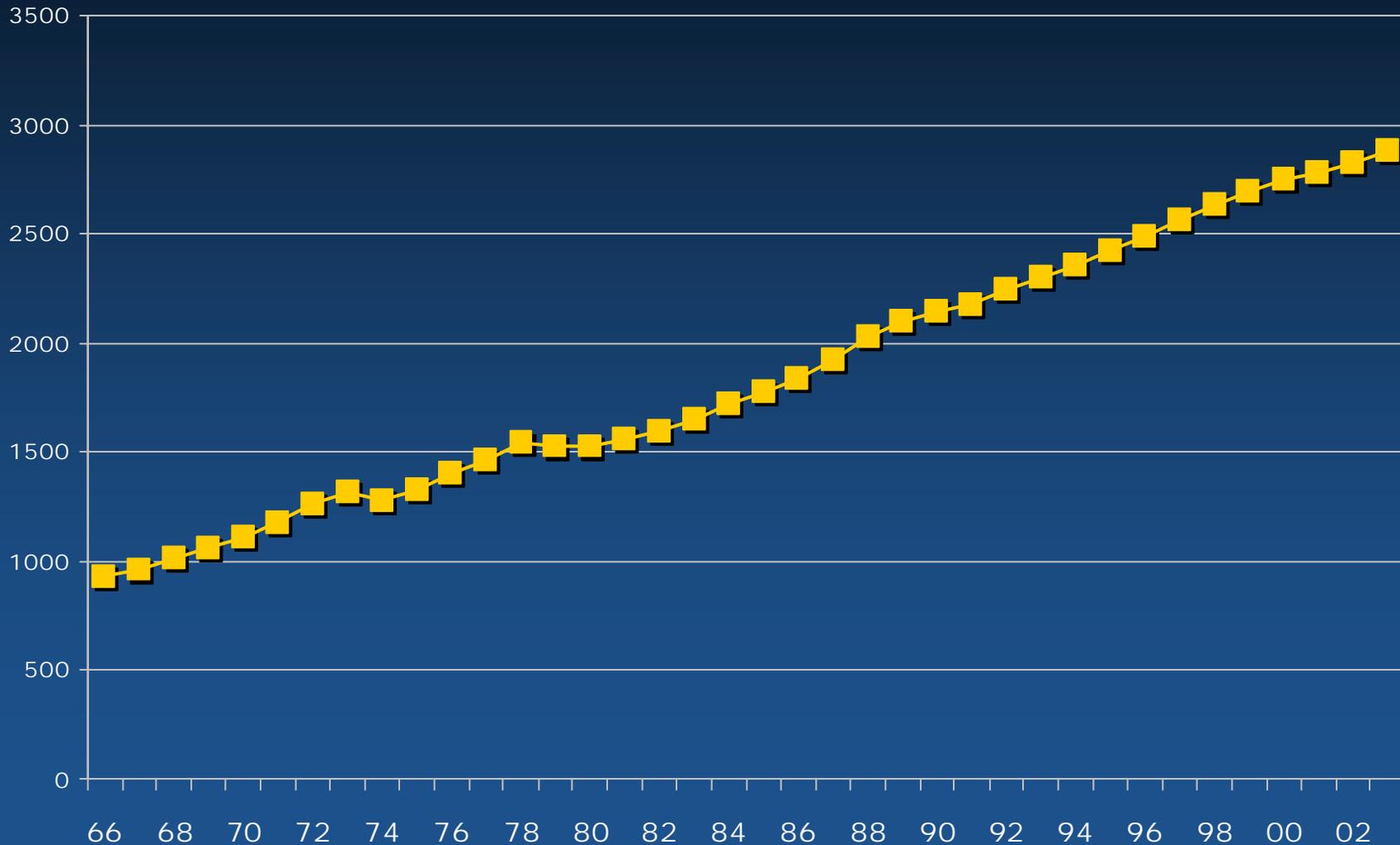
Lower buckle pusher with adjustable back/head support mounted upper d-ring



Variable 3-point right or left or 4-point harness



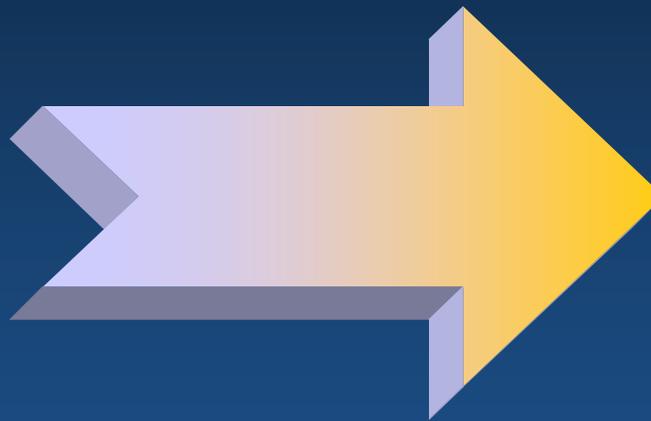
Vehicle Miles Traveled, 1966–03 (in Billions)



Evolution of Vehicle Safety

The Past

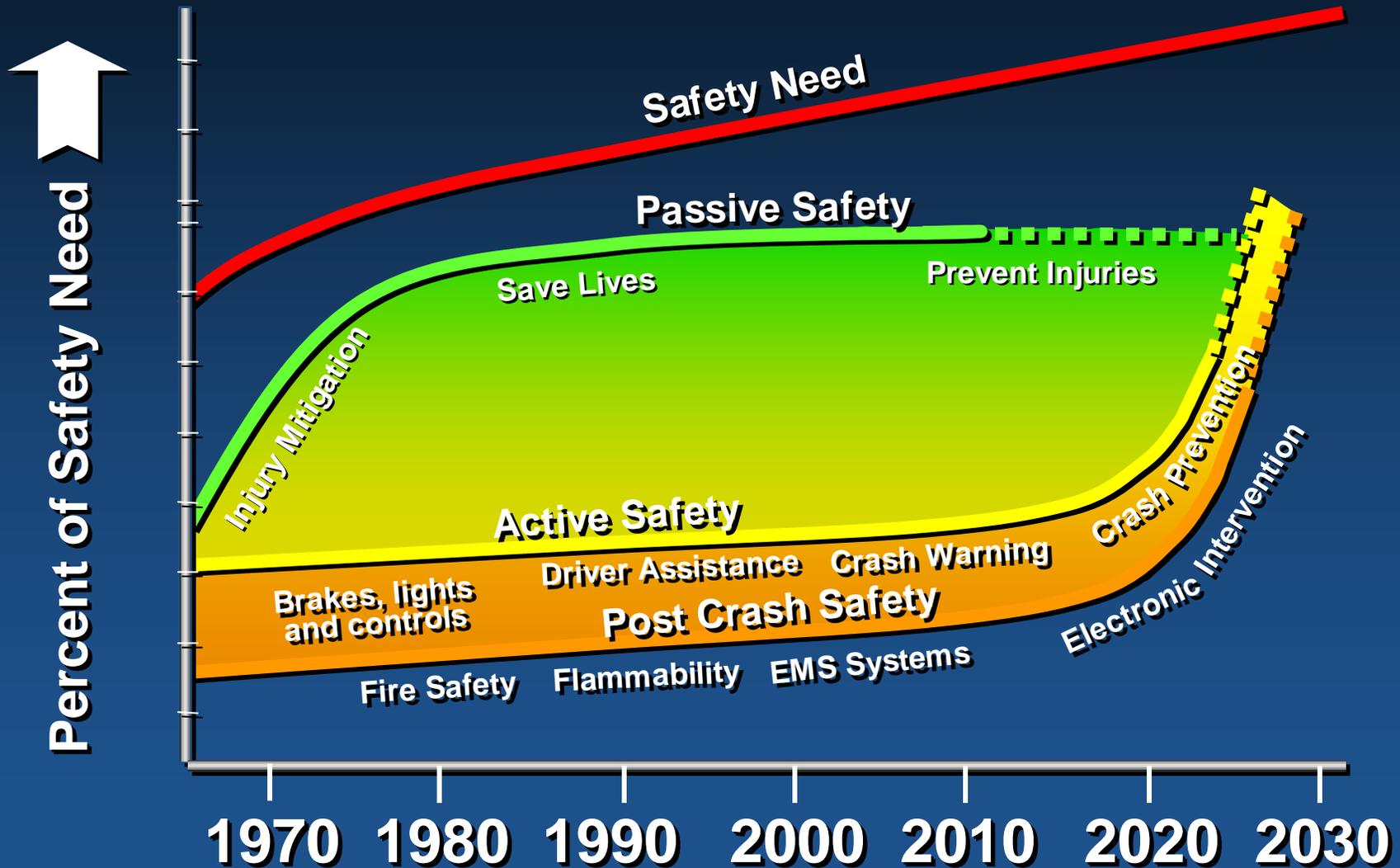
Crash
Worthiness



The Future

**Crash
Avoidance**

The Safety Need



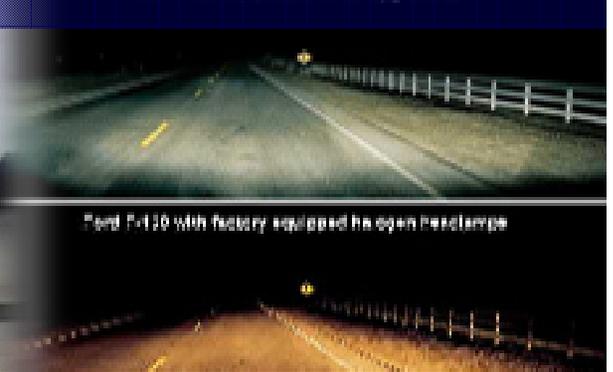
Solving Problems

Human

Vehicle

Environment

Pre-Event



Event



Post-Event



Crash Time Line

Prevention



Protection



0

100 m.sec.

1 hr



**Severity
Reduction**



**Post
Crash**

Total Safety



Why Advanced Technologies?

- **Technologies often bring new opportunities**
- **Potential for total safety benefits**
- **Save lives, prevent injuries and reduce the economic costs**

Currently Available Systems

- Extensions of the anti-lock brake (ABS) family of products: Traction control, Electronic yaw-stability control, braking assistance and rollover control.
- Adaptive cruise control
- Night vision systems
- Automatic crash notification systems
- Backing crash warning systems
- Extensions of basic airbag restraint systems, such as occupant mass and seat position sensors and multi-stage airbag inflators
- Lane-position assistance systems
- Voice-activated navigation systems
- Event data recorders

The Challenge

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

Matrix

Crash Prevention **TECHNOLOGIES**

HAZARD	Night Vision System	Adaptive Cruise Control	Electronic Stability Control	Brake Assist	Traction Control	Roll Stability Advisor	Roll Stability Control	Curve Over Speed	Drowsy Driver Alert	Other Specify	Other Specify	Other Specify
Run-off-road Crashes												
Intersections Crashes												
Frontal Crashes (C to C longitudinal)												
Non-motorist												
Rollover												
Elderly Driver												
Young Driver												
Inexperienced Driver												
Impaired Driving, Drugs, Alcohol												
Impaired Driving, Distraction												
Speeding												
Inclement Weather												
Reduced Visibility, Darkness (pedestrian)												
Impaired Driving, Drowsiness												
Reduced Visibility, Fog												
Animal in Road (nighttime)												

Please fill out the attached table of hazards versus technologies by placing a **high (H)**, **medium (M)**, **low (L)**, or **not applicable (-)** in each cell in indicate your judgment of the potential for each of the technologies to impact each of the hazards, given further development.

- **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

Delivery of Auto Safety

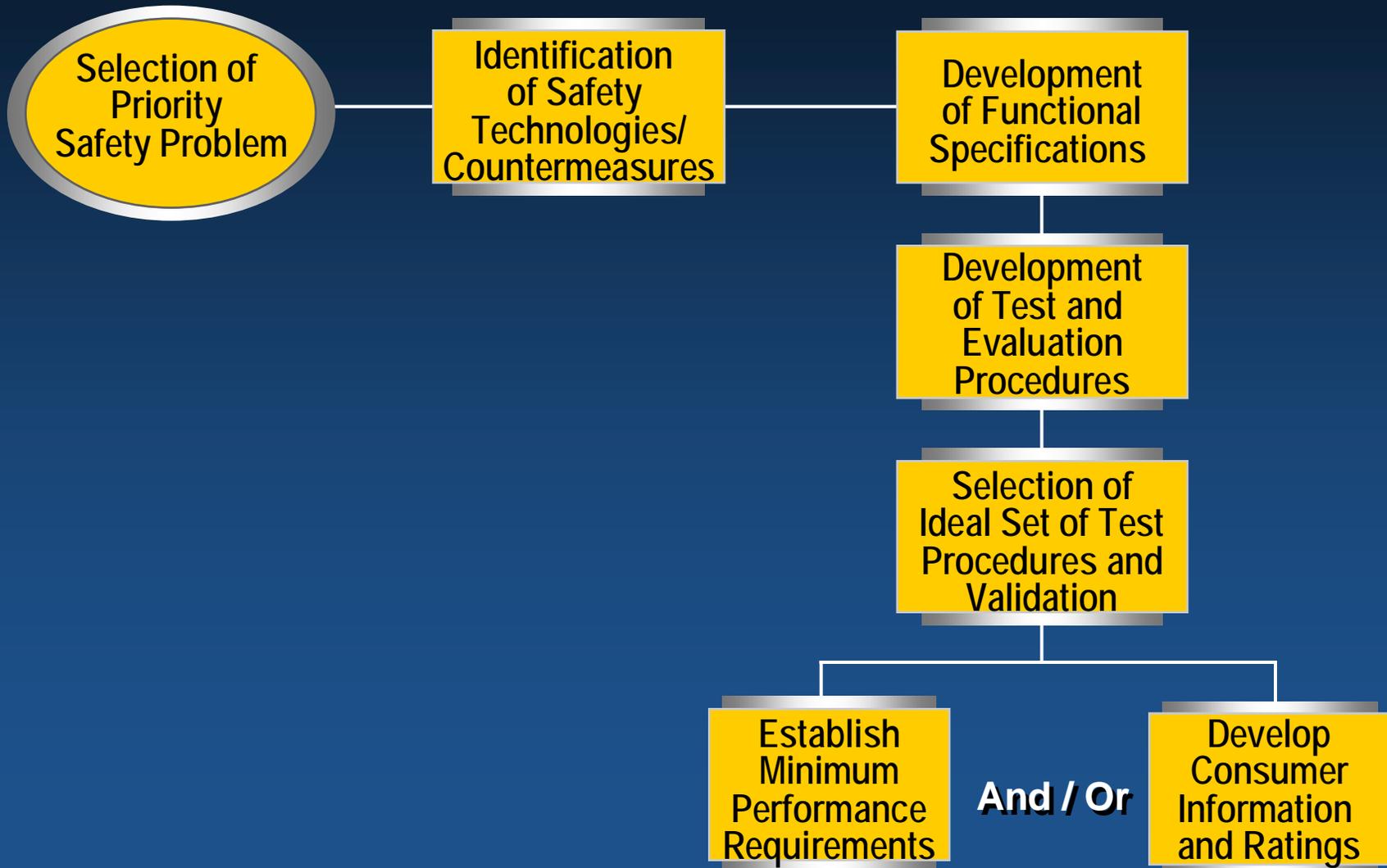
TRADITIONAL APPROACH

- Define problem
- Develop safety countermeasures
- Evaluate benefits
- Regulation

NEW APPROACH

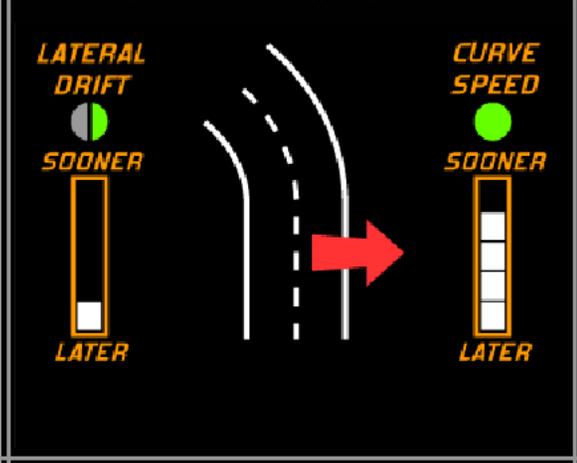
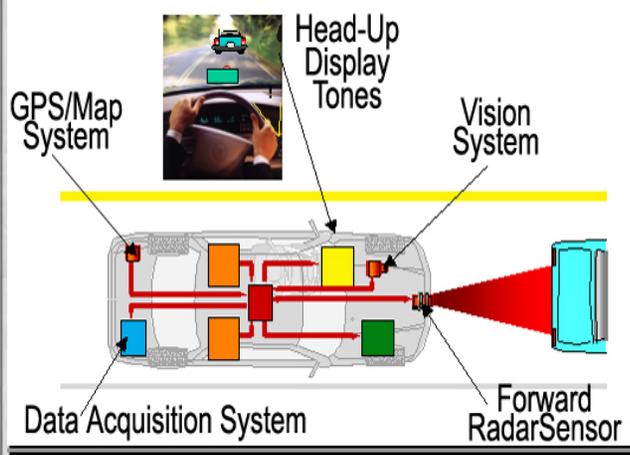
- Identify Technologies
- Estimate Benefits
- Collaborative Research
- Deployment
- Monitor Benefits

Strategies For Deployment of Advanced Safety Technologies



U.S. IVI Program

IVI PROGRAMS



ADVANCED SAFETY RESEARCH

New ITS Safety Initiatives (5 – 6 Year Program Plan)



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

Integrated Vehicle-Based Safety Systems (IVBSS)

- **Program motivation**
 - More than 3 million rear-end, road departure, and lane change crashes (60% of total crashes)
- **Facilitate introduction and commercialization of effective integrated safety systems**

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 cooperative collision avoidance systems**

Vehicle Infrastructure Integration (VII)

- Creating an “enabling communication infrastructure”
- Emphasis safety applications

Leveraging Prior Work

- Performance Specifications
- Objective Test Procedures
- Field Operational Tests
- Enabling and Enhancing Technologies
- Independent Evaluation

Conclusions

- **Safety Needs Novel Approaches**
 - Collaborative research
 - Innovative regulatory approaches
 - Consumer information and education
 - Closer cooperation between Government and Industry

How to accelerate deployment?

- Estimate Safety Benefits and show Feasibility
- Use Market Forces
- Develop Performance Specifications and Objective Tests.