



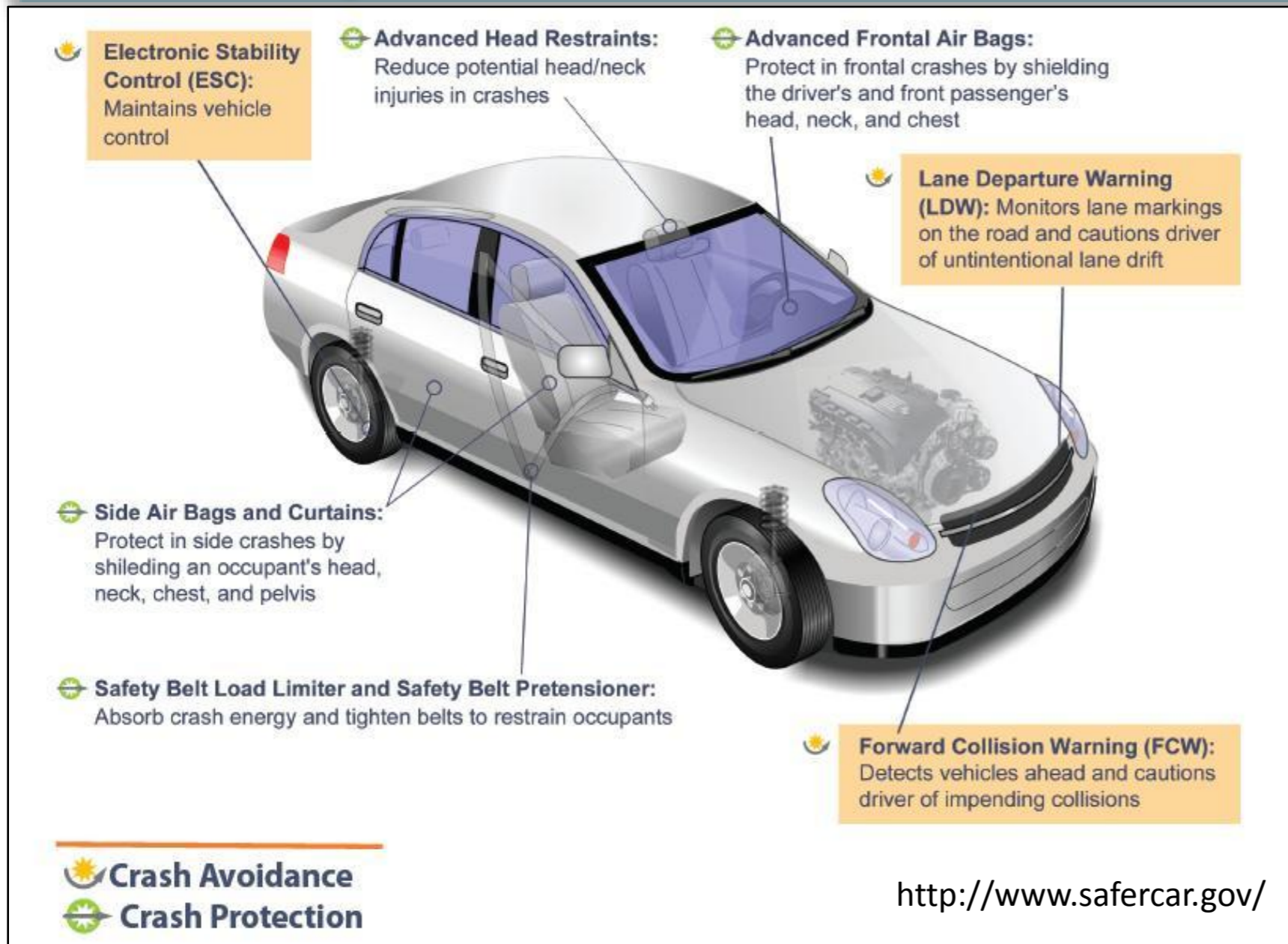
Toyota's Safety Initiatives

Toyota Motor Corporation

March 20, 2013

Countermeasures taken into vehicles

1. Manufactures have continued developing and innovating various safety technologies.
2. NHTSA, IIHS and Consumer Reports have been introducing tests to encourage installing technologies into vehicles.



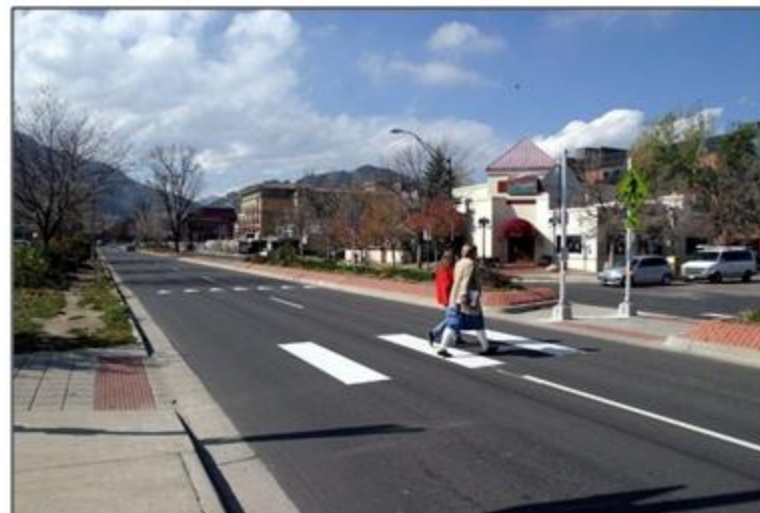
<http://www.iihs.org/>



Countermeasures taken onto traffic environment

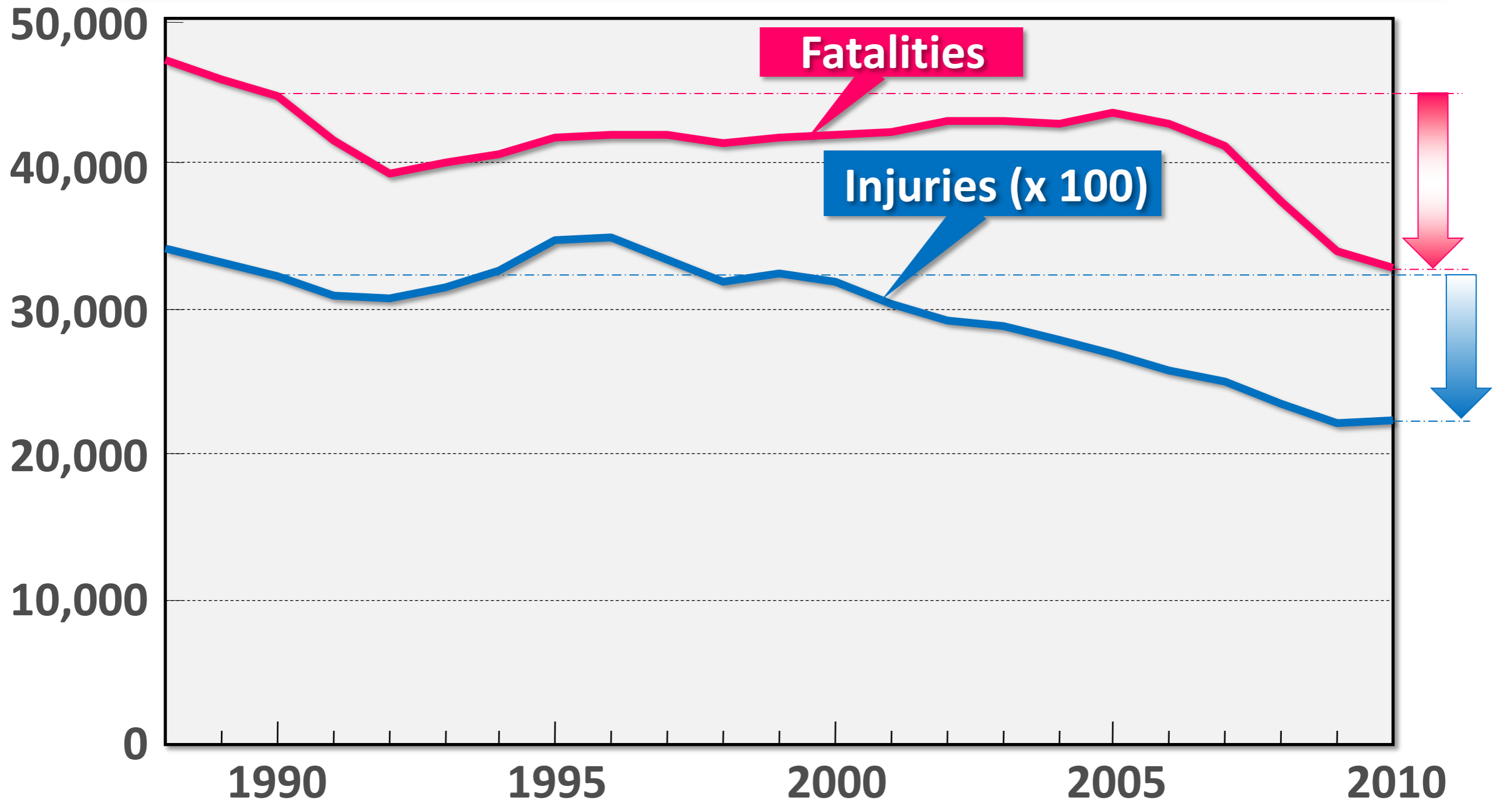
3. FHWA and state governments' efforts on improving traffic environment.

<http://safety.fhwa.dot.gov/provencountermeasures/index.htm>



Traffic Accident Trends in US

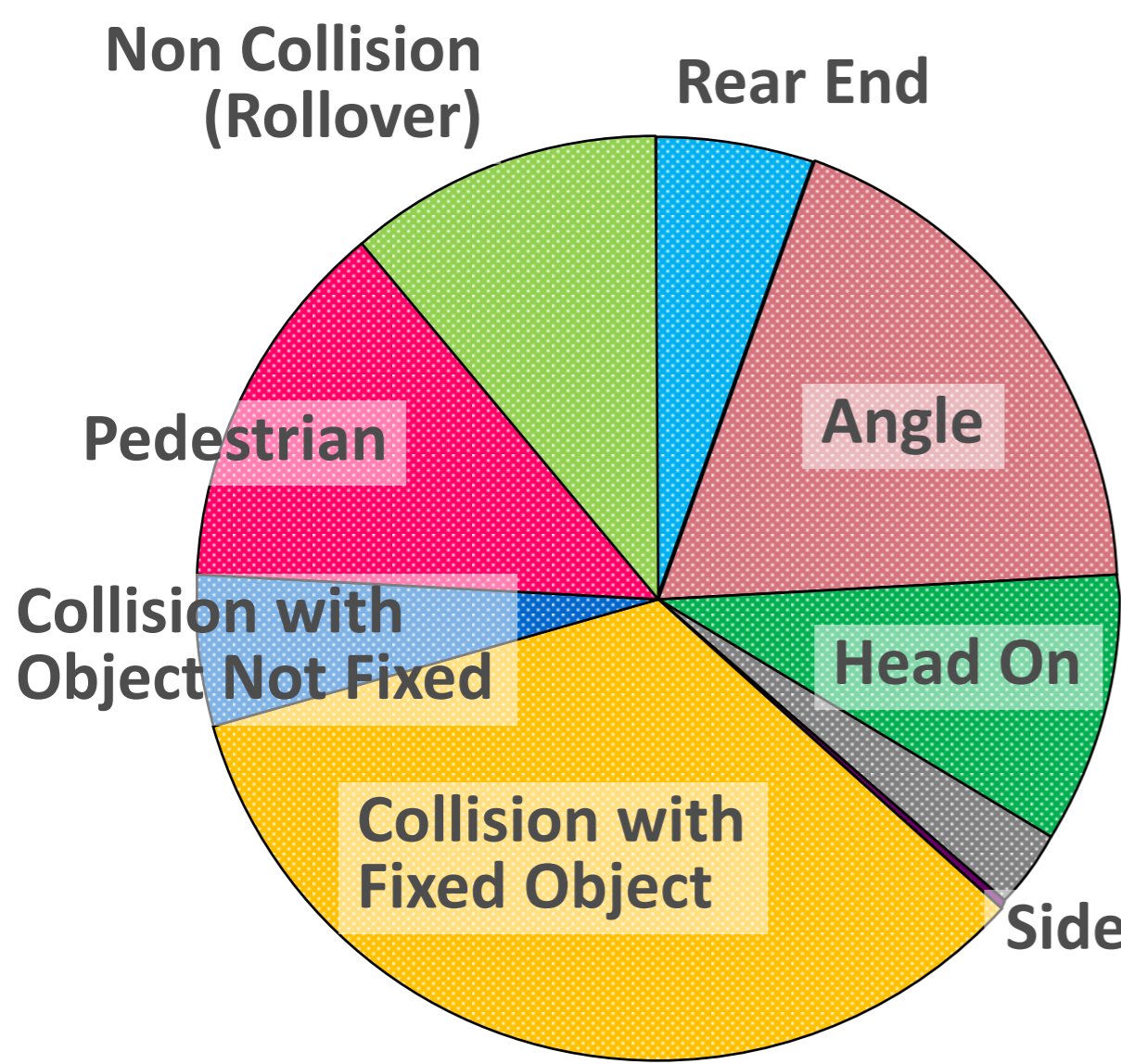
Fatality rate and injury rate have been decreased by about one-third in the over last two decades.



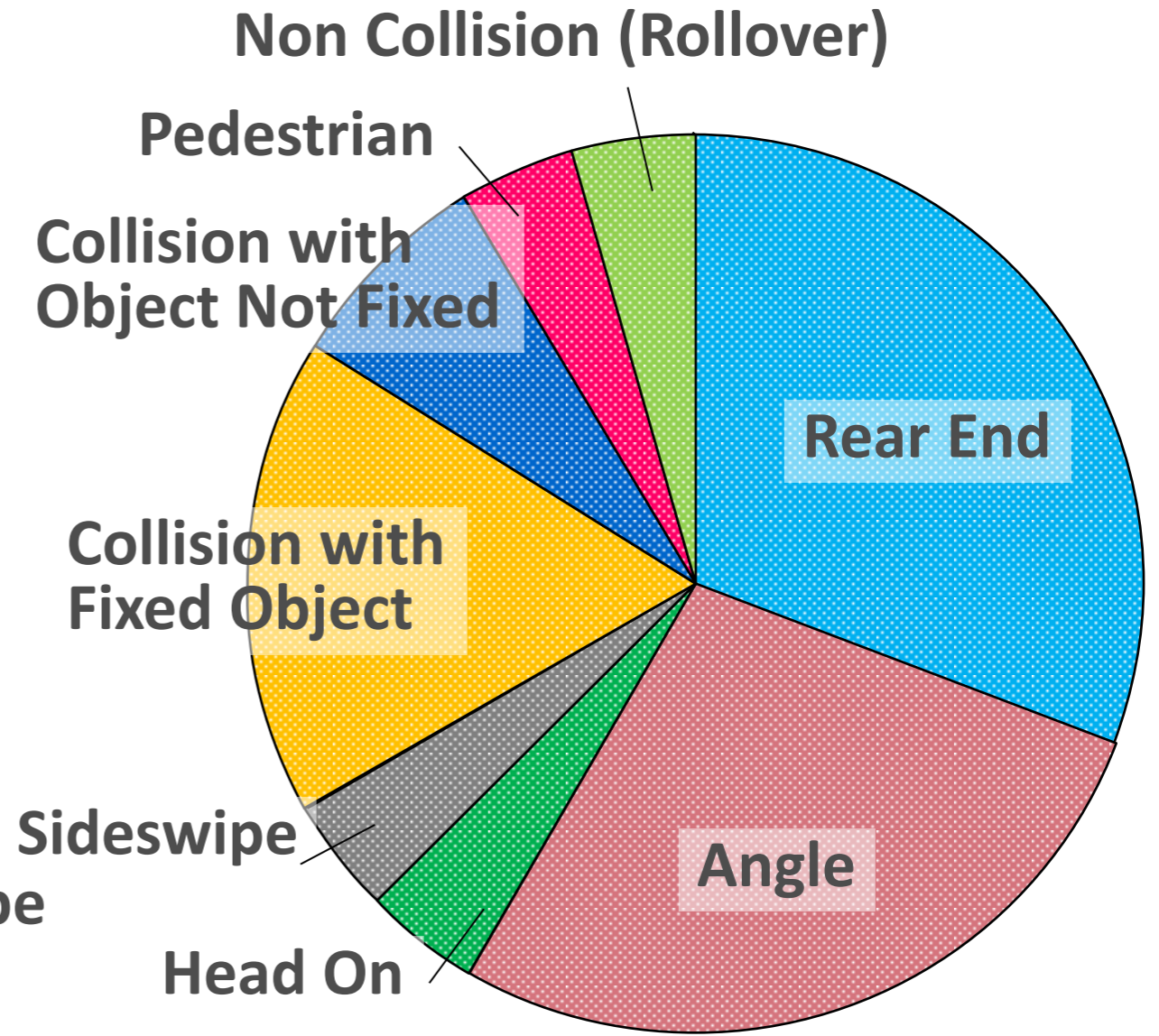
Traffic Safety Facts 2010

Crashes by Manner of Collision, etc. (2010)

To further reduce both fatalities and injuries, many more countermeasures are required to avoid crashes.



Fatal Crashes (30,196)



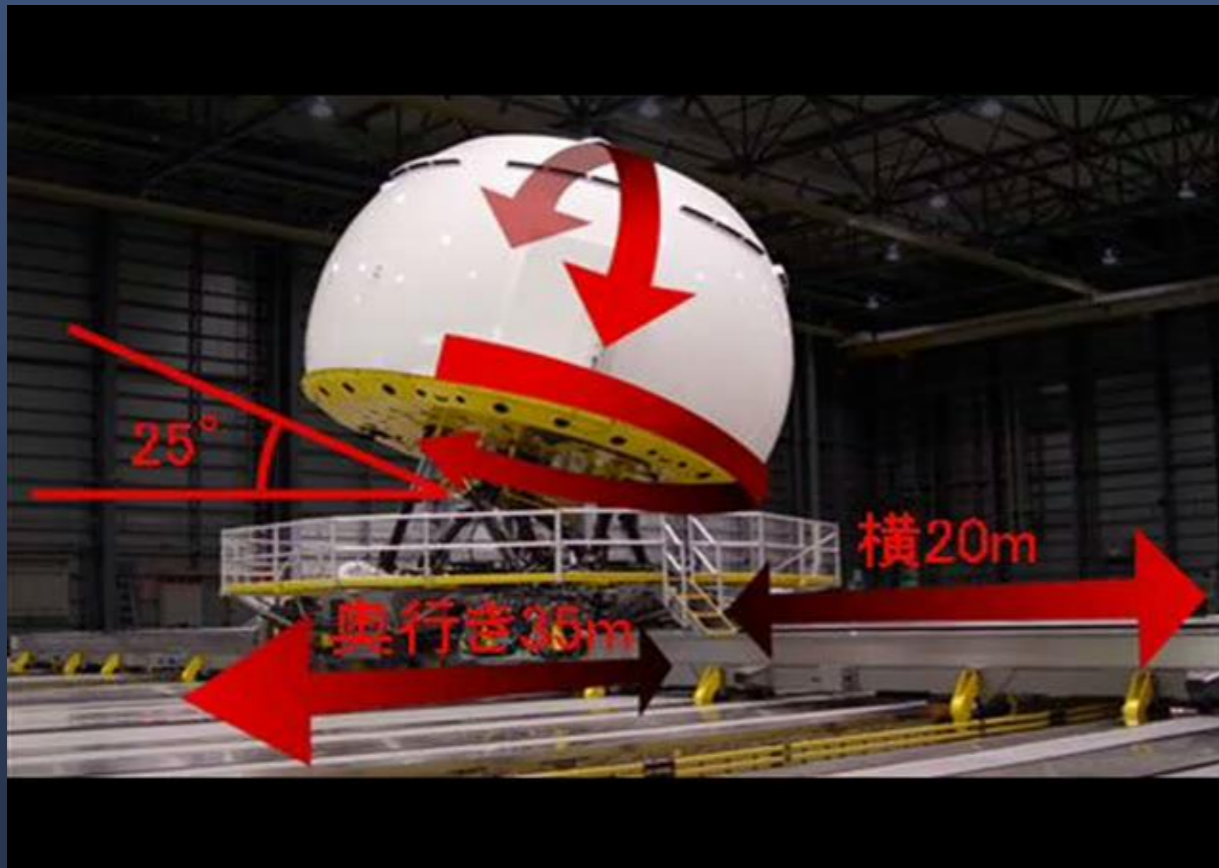
Injury Crashes (1,542,000)

Traffic Safety Facts 2010

Driving Simulator

The aim of the Driving Simulator is to investigate driver behavior that could result in crashes.

World-leading range of movement



High-definition computer graphics with a driver's view of 360 degrees

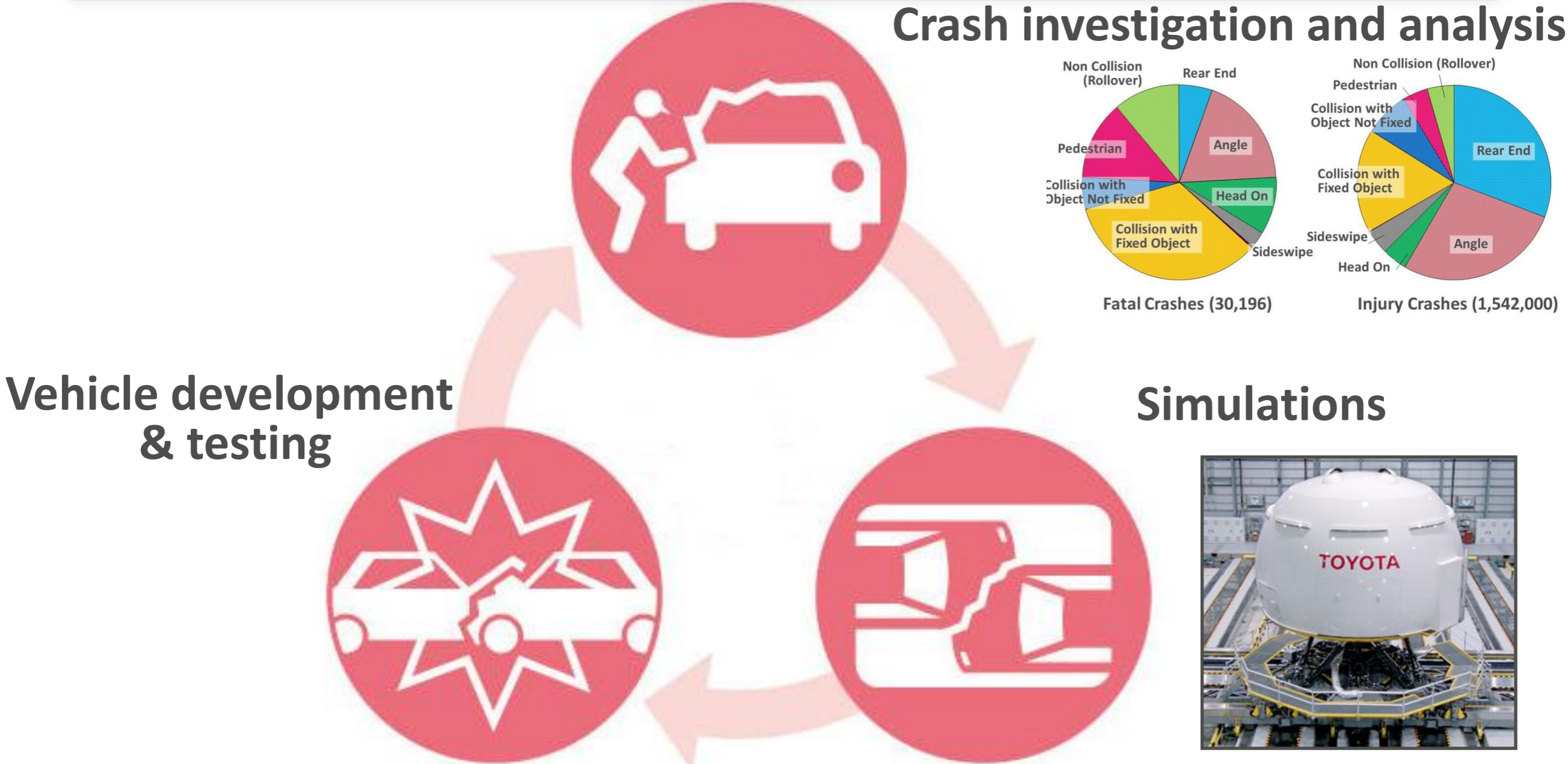


* 20m = about 65 feet
35m = about 114 feet



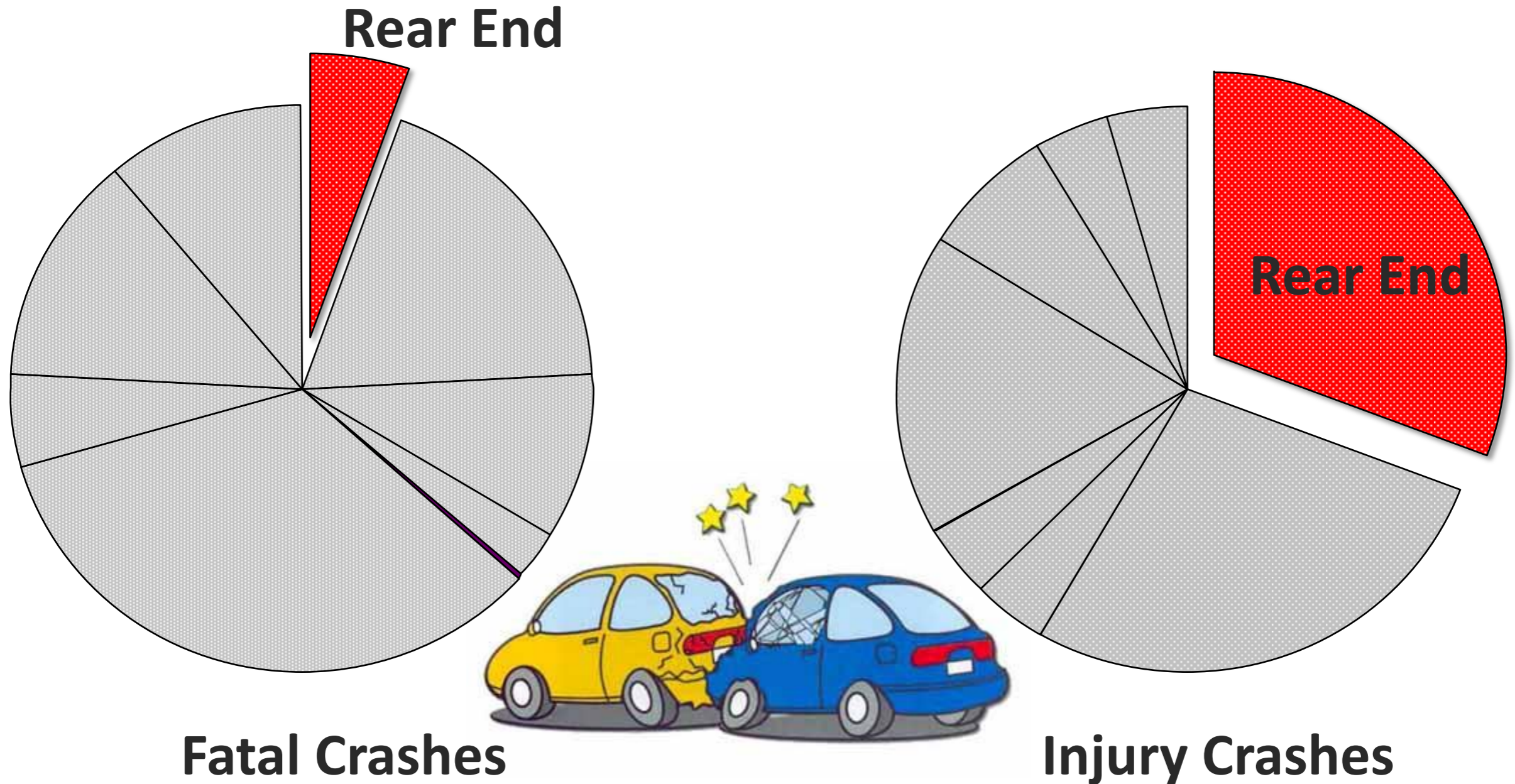
Pursuit of Real-world Safety

Learning from actual accidents, simulating how crashes happen, developing countermeasures, and examining their performance in future actual crashes.



Rear End Collisions

Rear end collisions are a major cause of vehicle injuries.



Traffic Safety Facts 2010

Pre-Collision System (PCS)

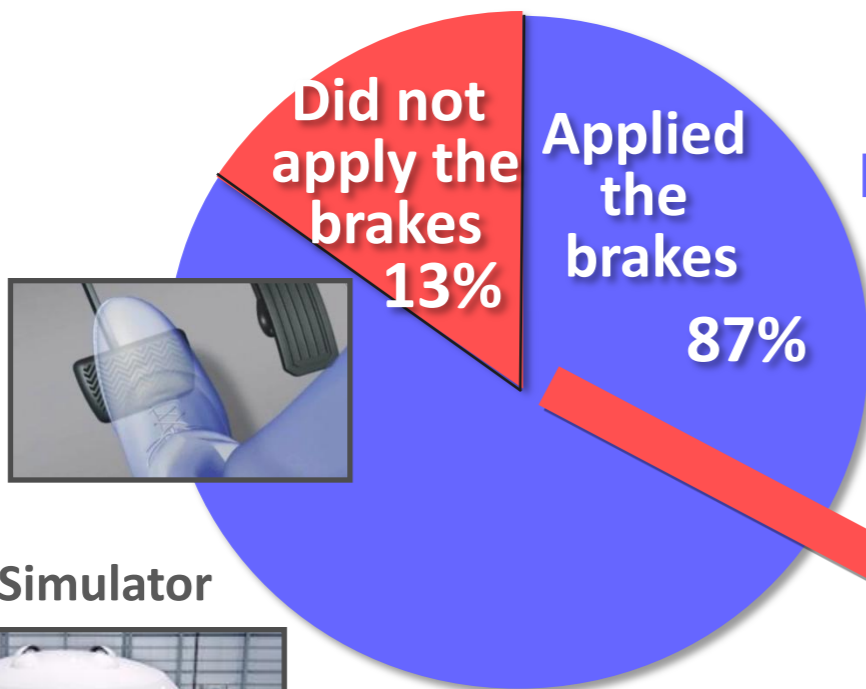
To avoid or mitigate rear-end crashes, PCS is designed to sound an alarm to warn a driver, to enhance driver's braking effort, and when the system detects that a crash is unavoidable, to apply brakes automatically.



Enhancement of PCS

- For drivers who apply the brakes, New PCS could help decelerate by as much as 40 mph on average.
- For drivers who do not brake, PCS could decelerate by as much as 20 mph.

PCS warning test results



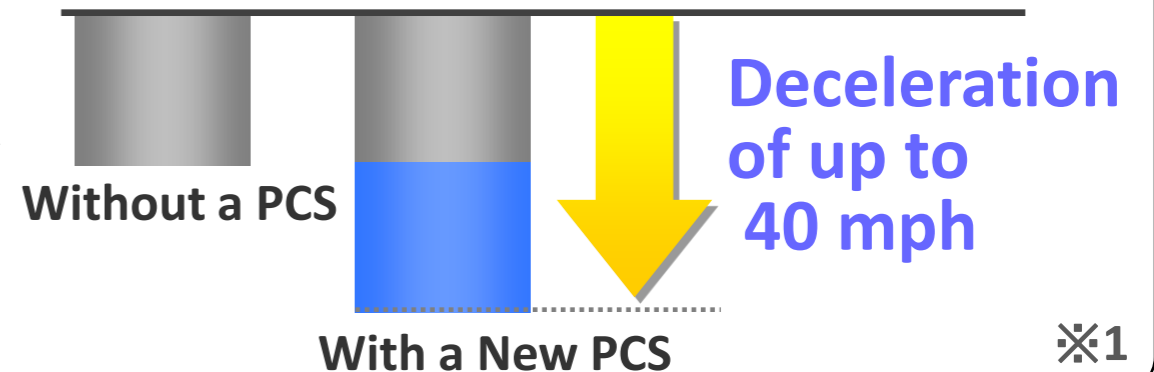
Driving Simulator



Test group:
113 males and females
from 20s to 60s

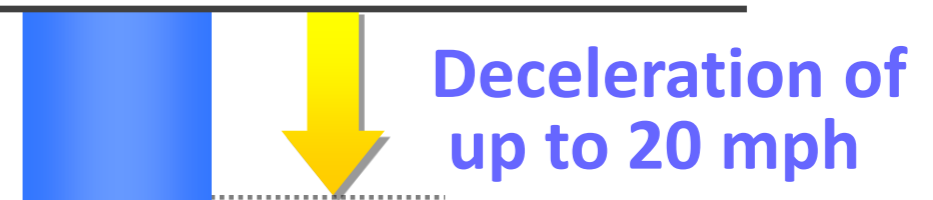
Effect of enhanced driver's effort

Relative velocity with preceding vehicles



Effect of automatic braking

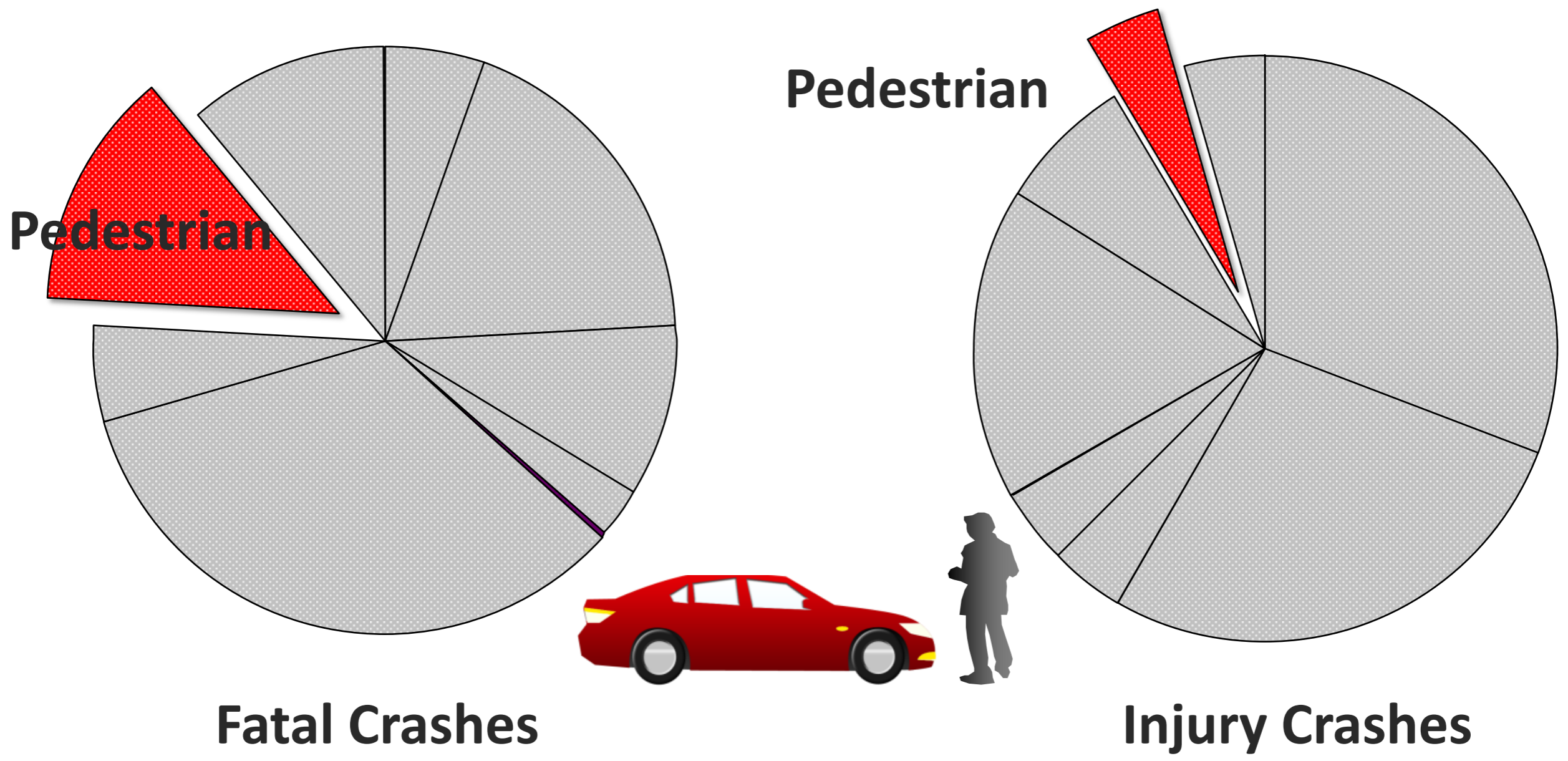
Relative velocity with preceding vehicles



¹ Preceding vehicle at 20 km/h, subject vehicle at 80 km/h
² Preceding vehicle at 20 km/h, subject vehicle at 50 km/h
Note: Results dependent on weather and road conditions

Pedestrian Accidents

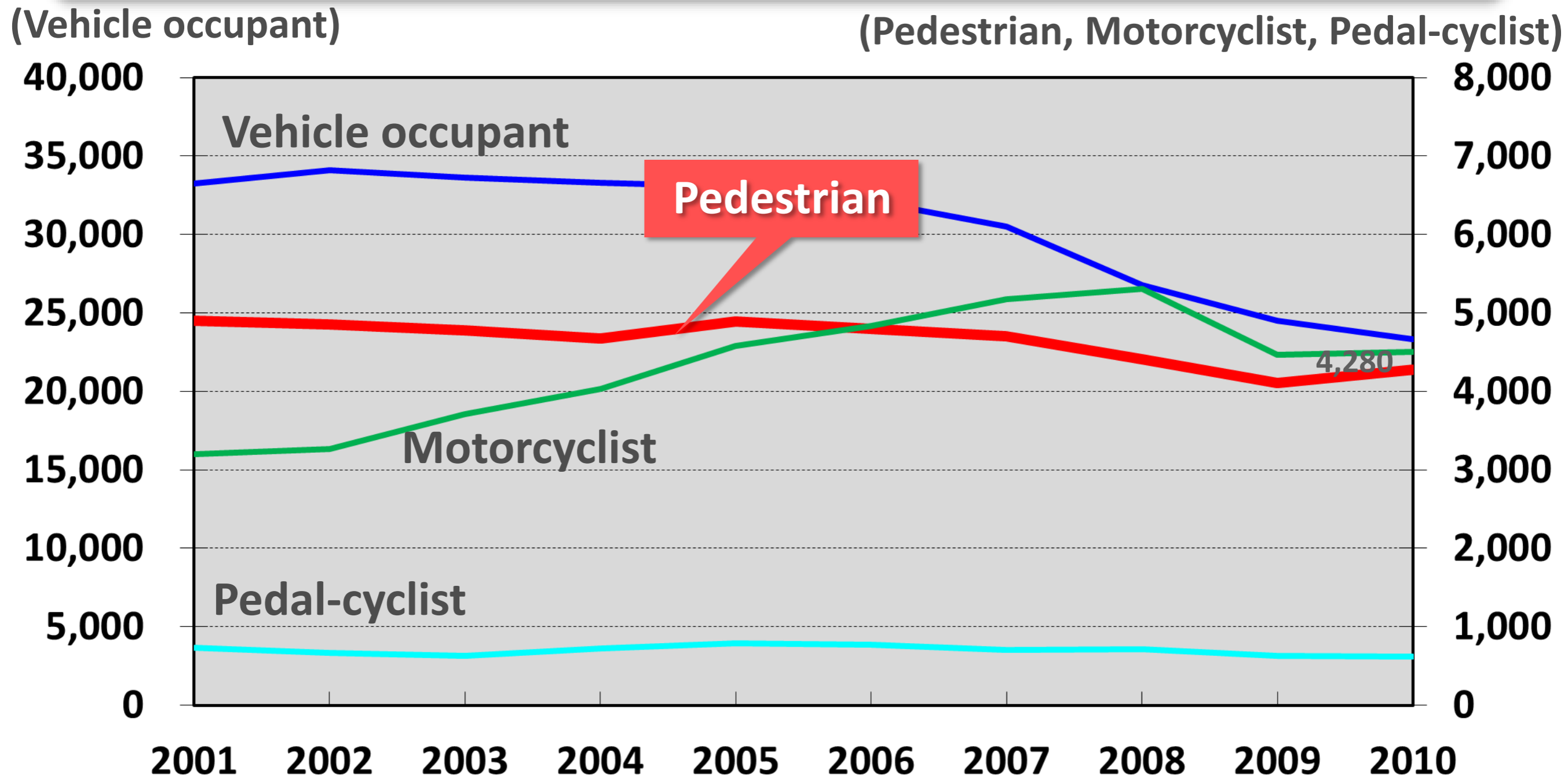
Pedestrian accident do not show high percentage of pedestrian fatalities and injuries in crashes, but



Traffic Safety Facts 2010

Traffic Accident Trends in US by Person Type

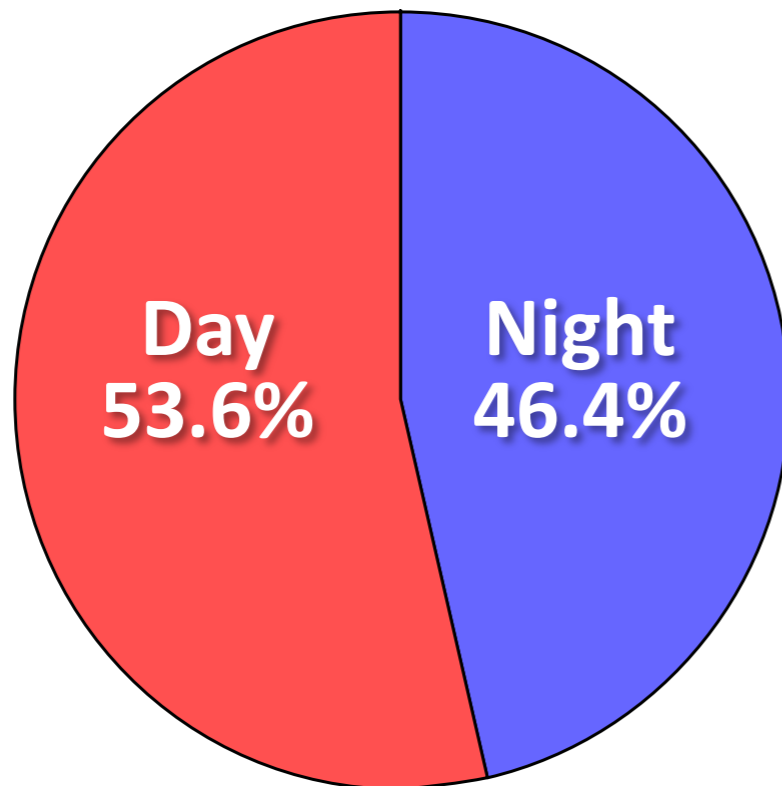
Pedestrian fatalities have not been apparently decreasing in the past decade.



Traffic Safety Facts 2010

Automatic High Beam (AHB)

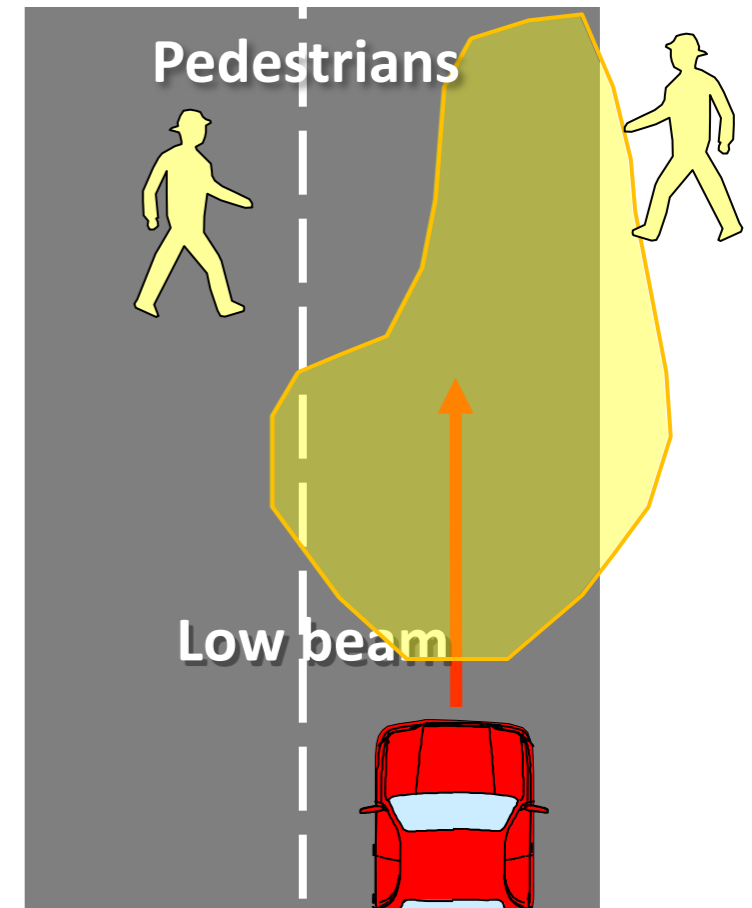
Pedestrian fatalities
by day and night



NASS-PCDS(1994-1998)

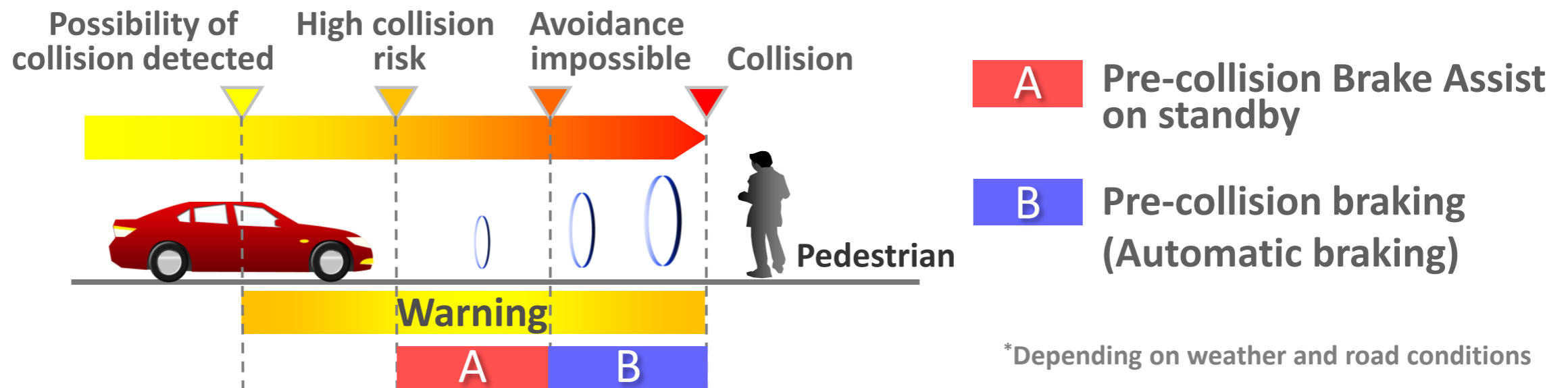
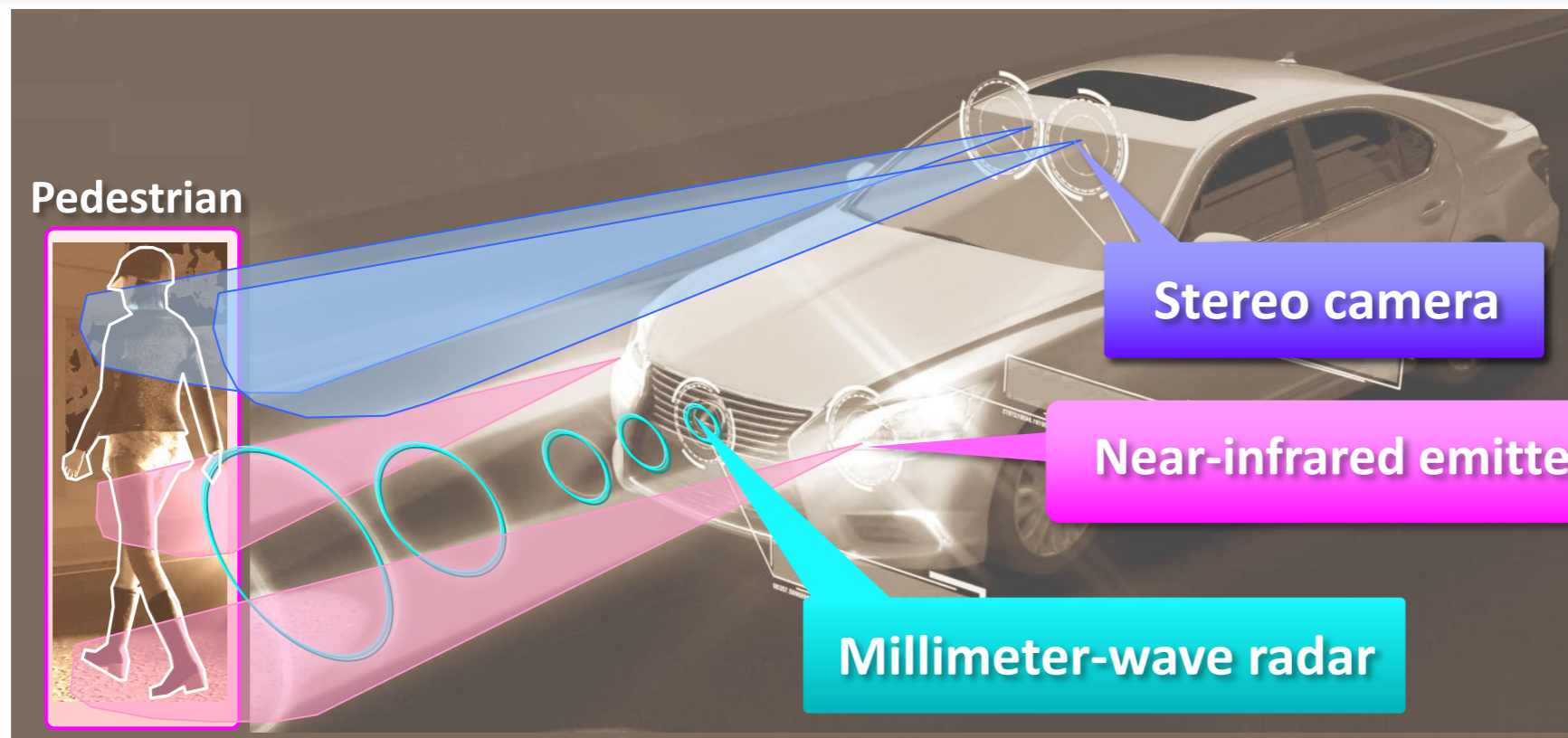
A High-beam is activated at all times so that pedestrians could be noticed earlier.

Toyota is planning to extend AHB roll out to include compact vehicles.



Pre-Collision System (PCS) for preventing pedestrian accidents

The PCS with pedestrian detection rolled out in 2013MY Lexus LS. It is designed to avoid the collisions at speeds up to 25 mph.



Pre-Collision System (PCS) for preventing pedestrian accidents

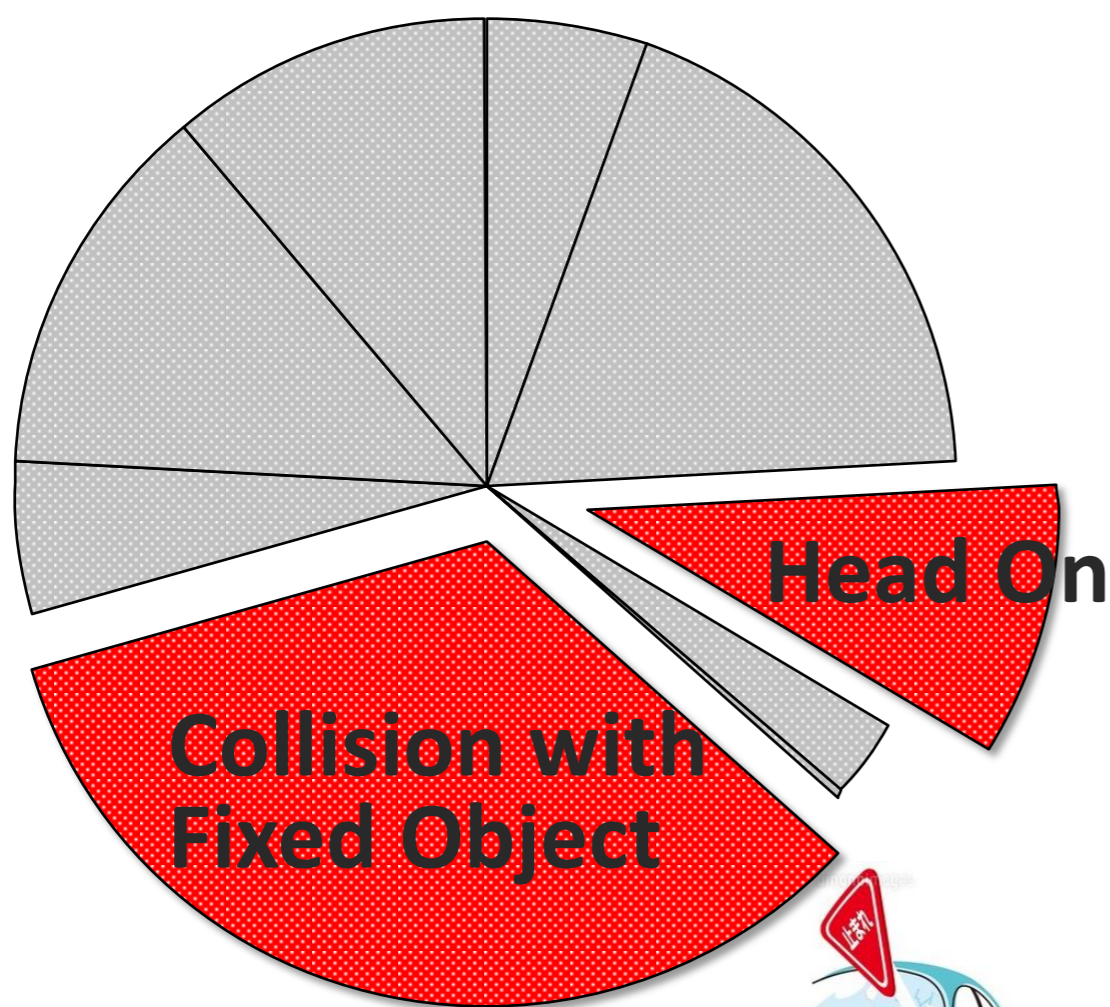


* 40km/h = about 25mph

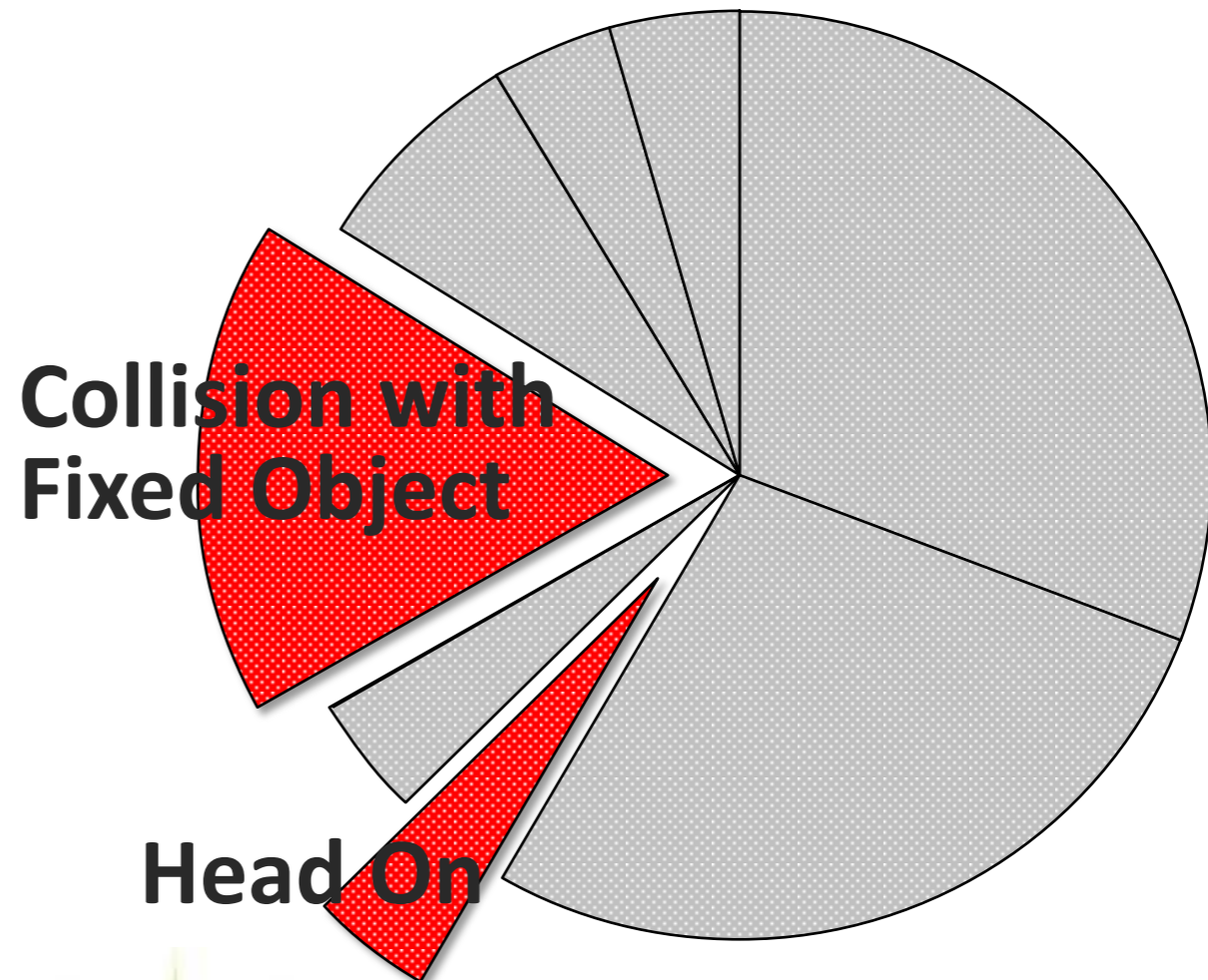


Lane departure crashes

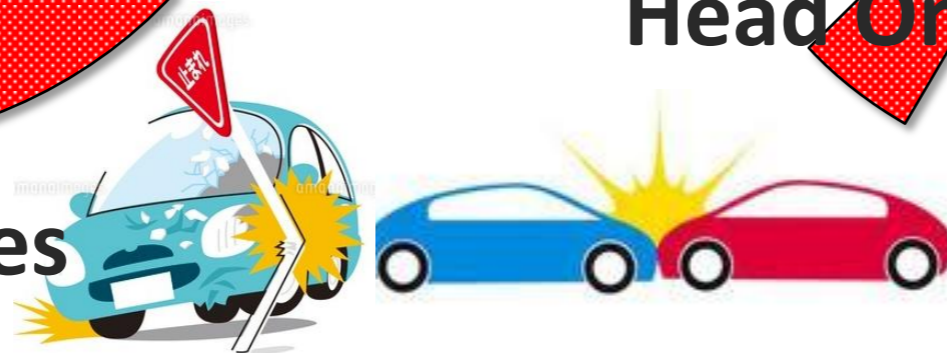
Head on collisions and collision with fixed objects account for a major portion of both fatal crashes and injury crashes.



Fatal Crashes



Injury Crashes



Vehicle Stability Control (VSC)

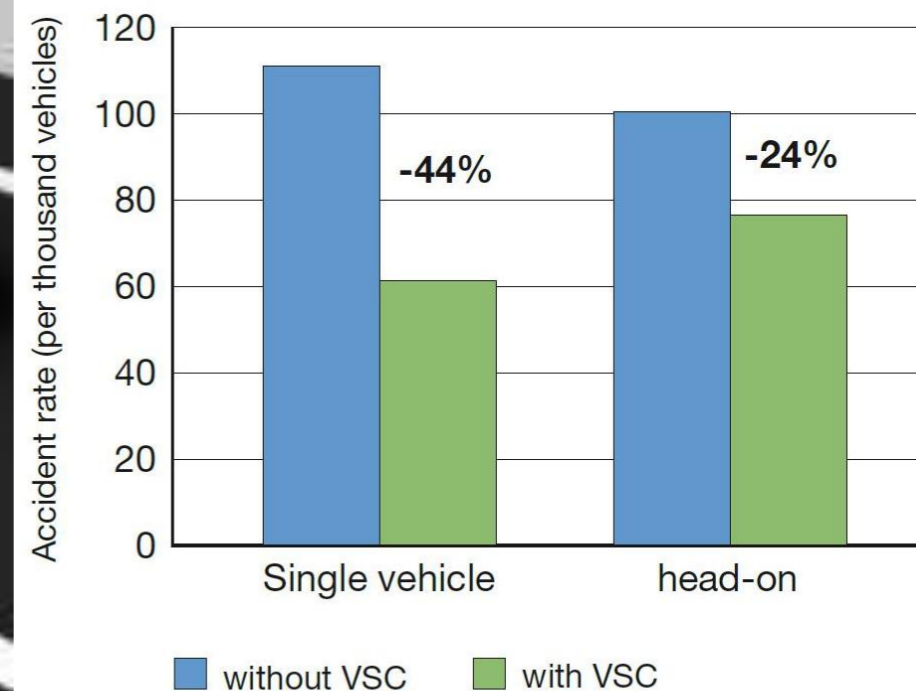
VSC helps the driver maintain control of the vehicle when lateral skidding occurs after sudden steering changes and when driving on slippery surfaces.

Without a VSC



Without a VSC

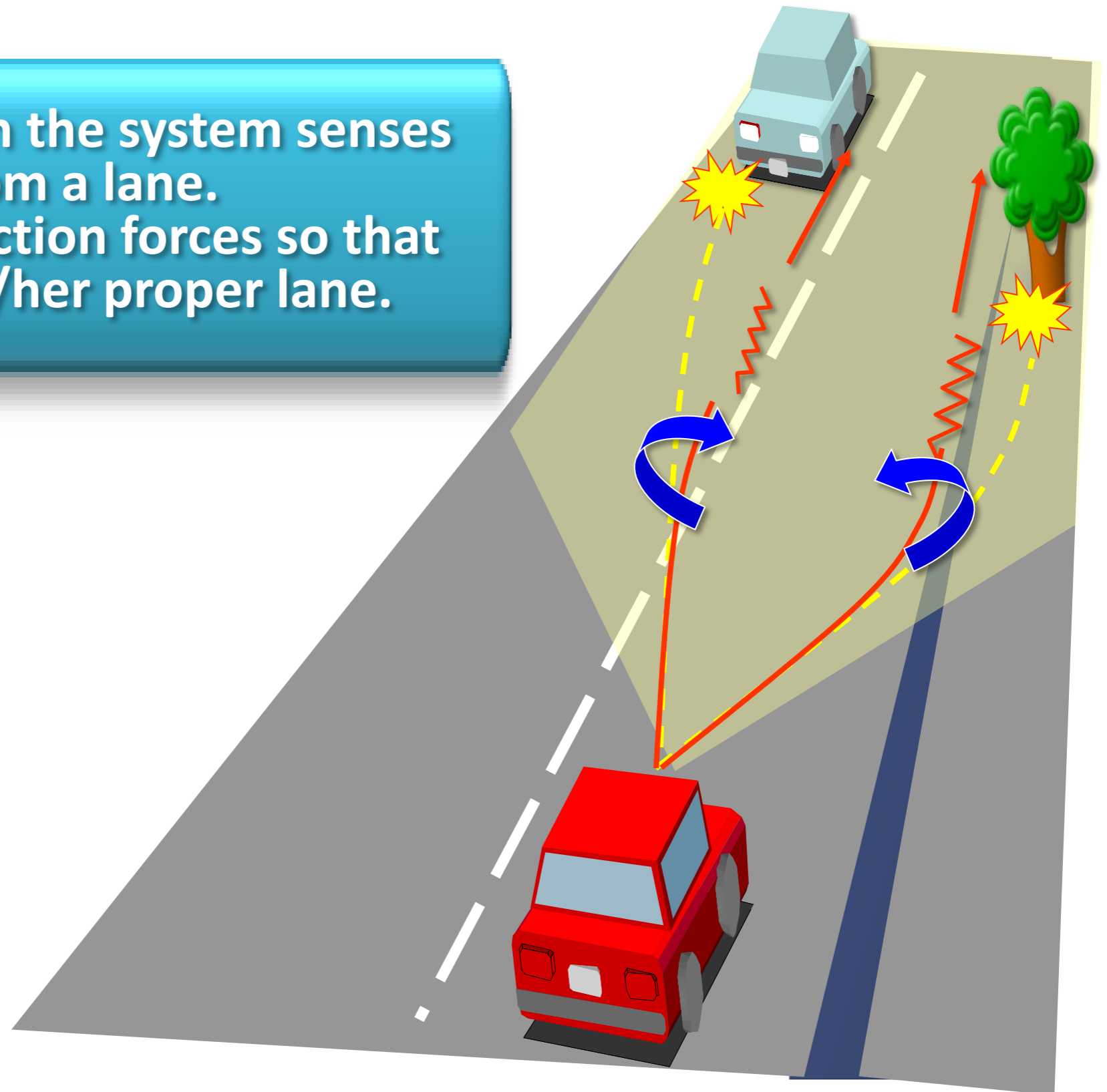
With a VSC



source: 2005 ITARDA

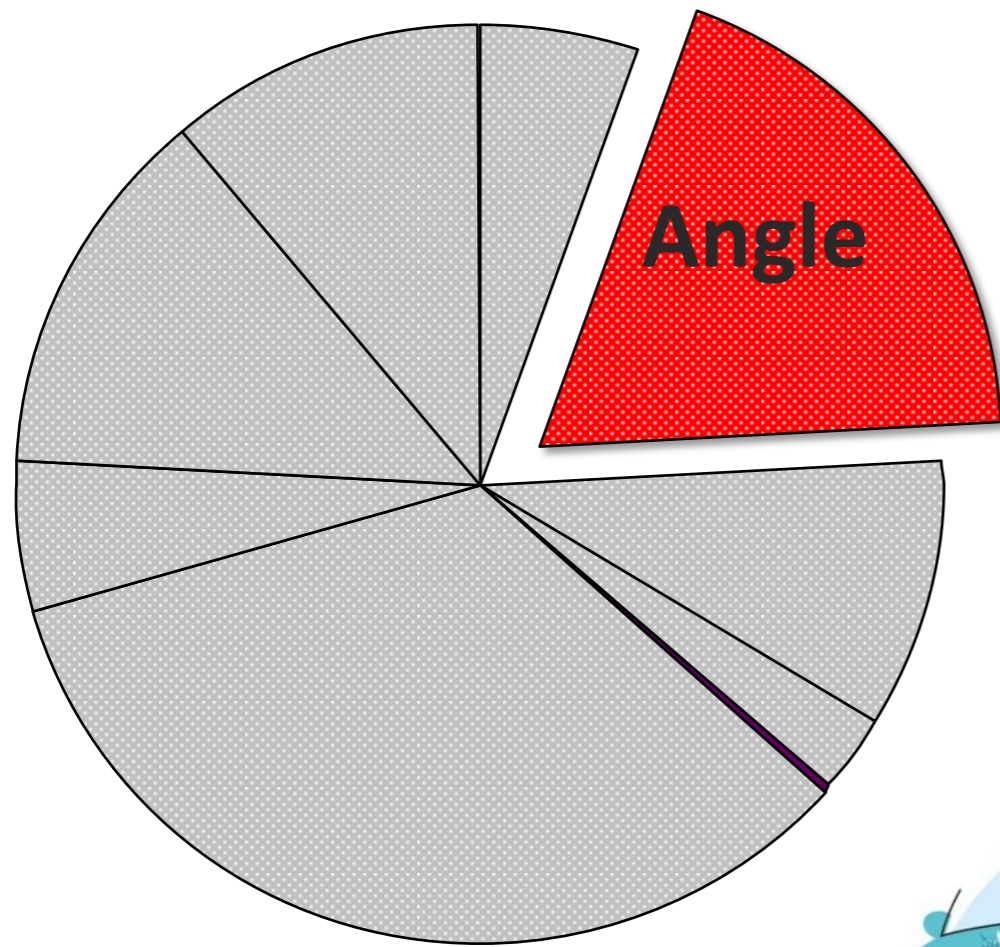
Lane Keeping Assist (LKA)

LKA warns a driver when the system senses the risk of departing from a lane. It also adds steering reaction forces so that the driver maintains his/her proper lane.

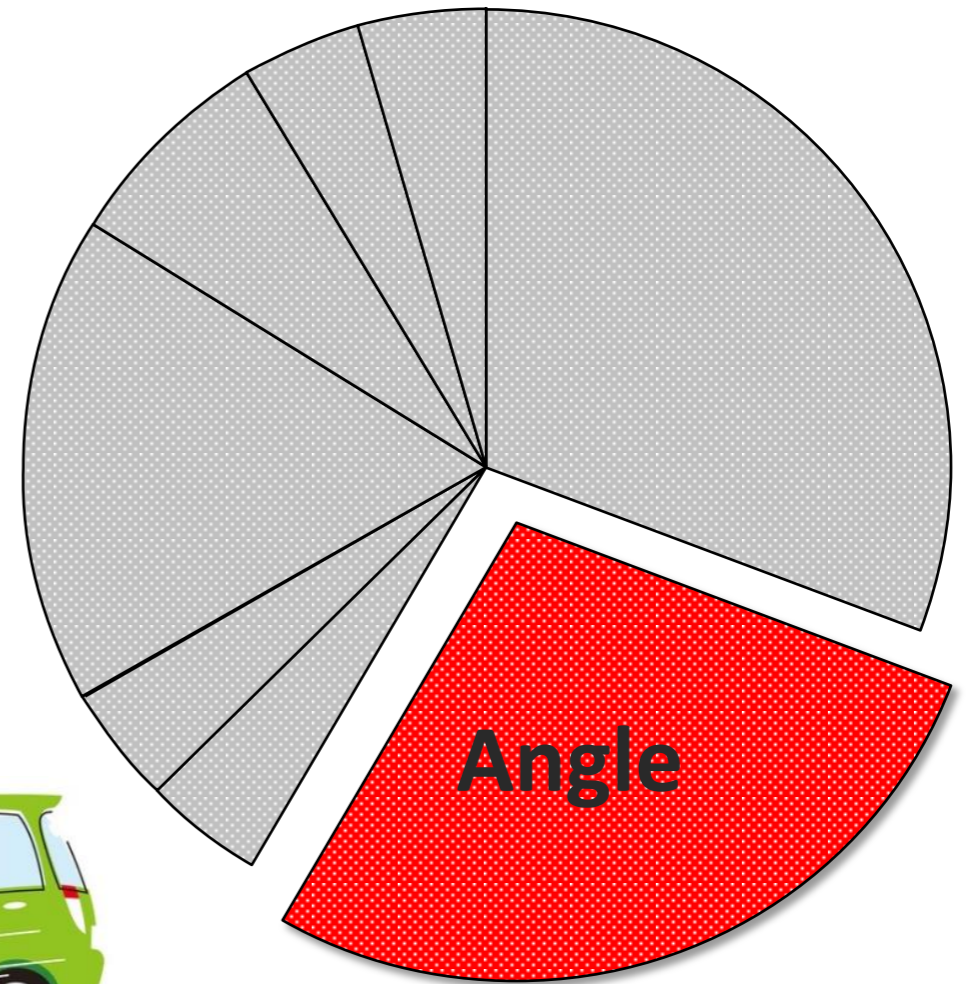


Intersection crashes

Angle collisions represent a major portion of both fatal crashes and injury crashes.



Fatal Crashes



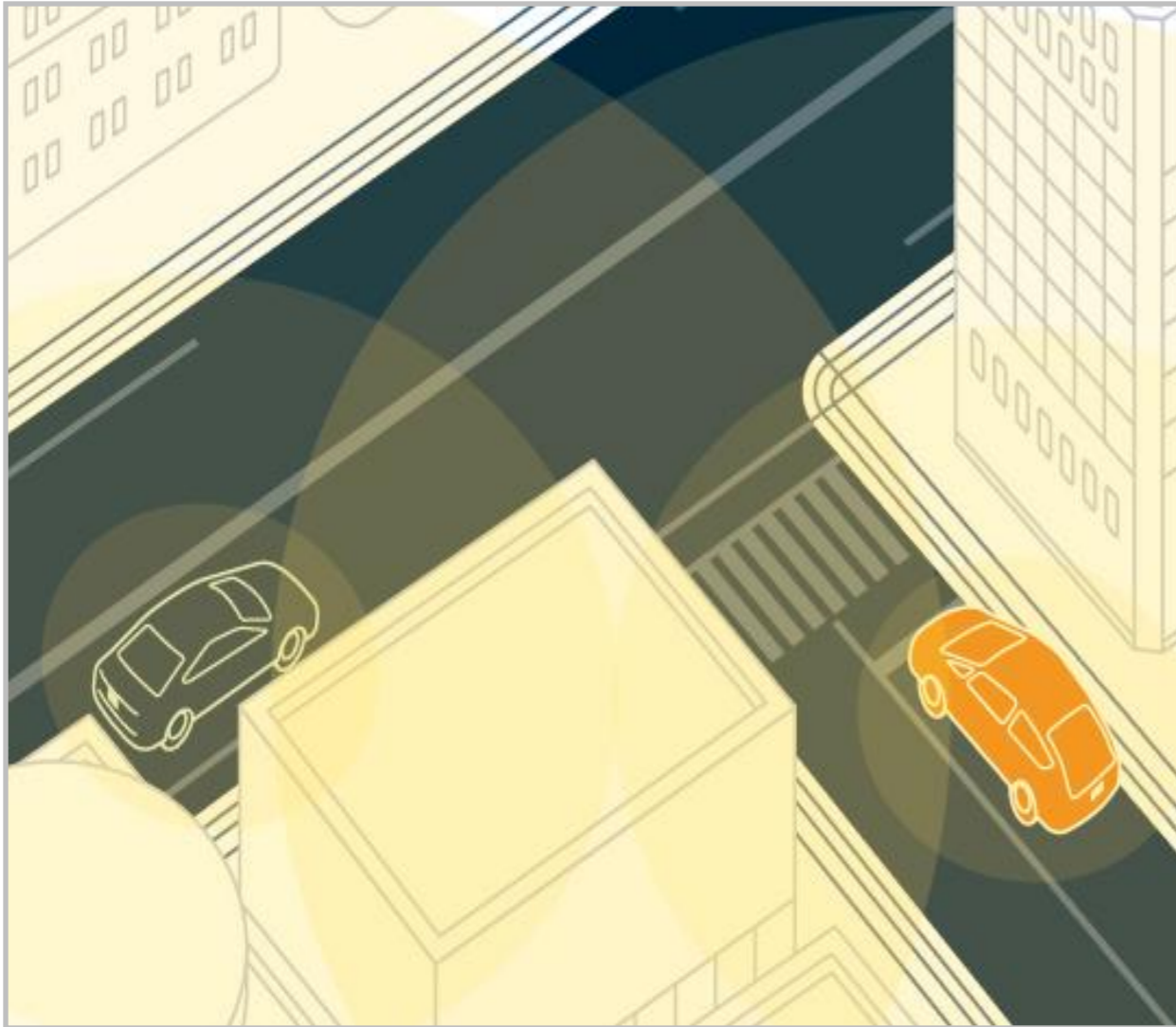
Injury Crashes

Traffic Safety Facts 2010

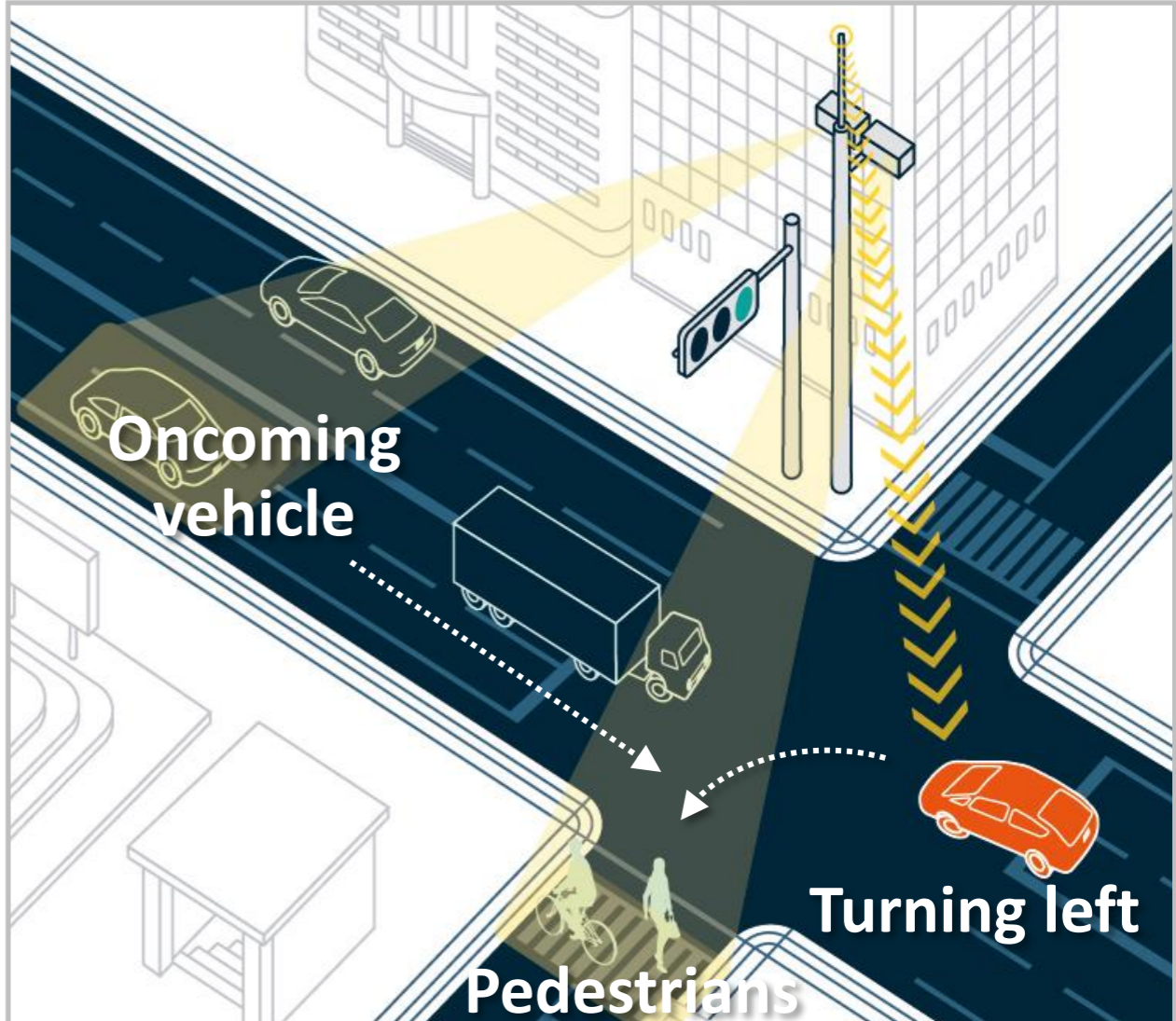
Vehicle-to-Infrastructure and Vehicle-to-Vehicle Cooperative Safety System

Toyota is trying to promote the development and the realization of both systems in parallel with government activity.

Crossing collision
Notification of approaching vehicle in hidden area

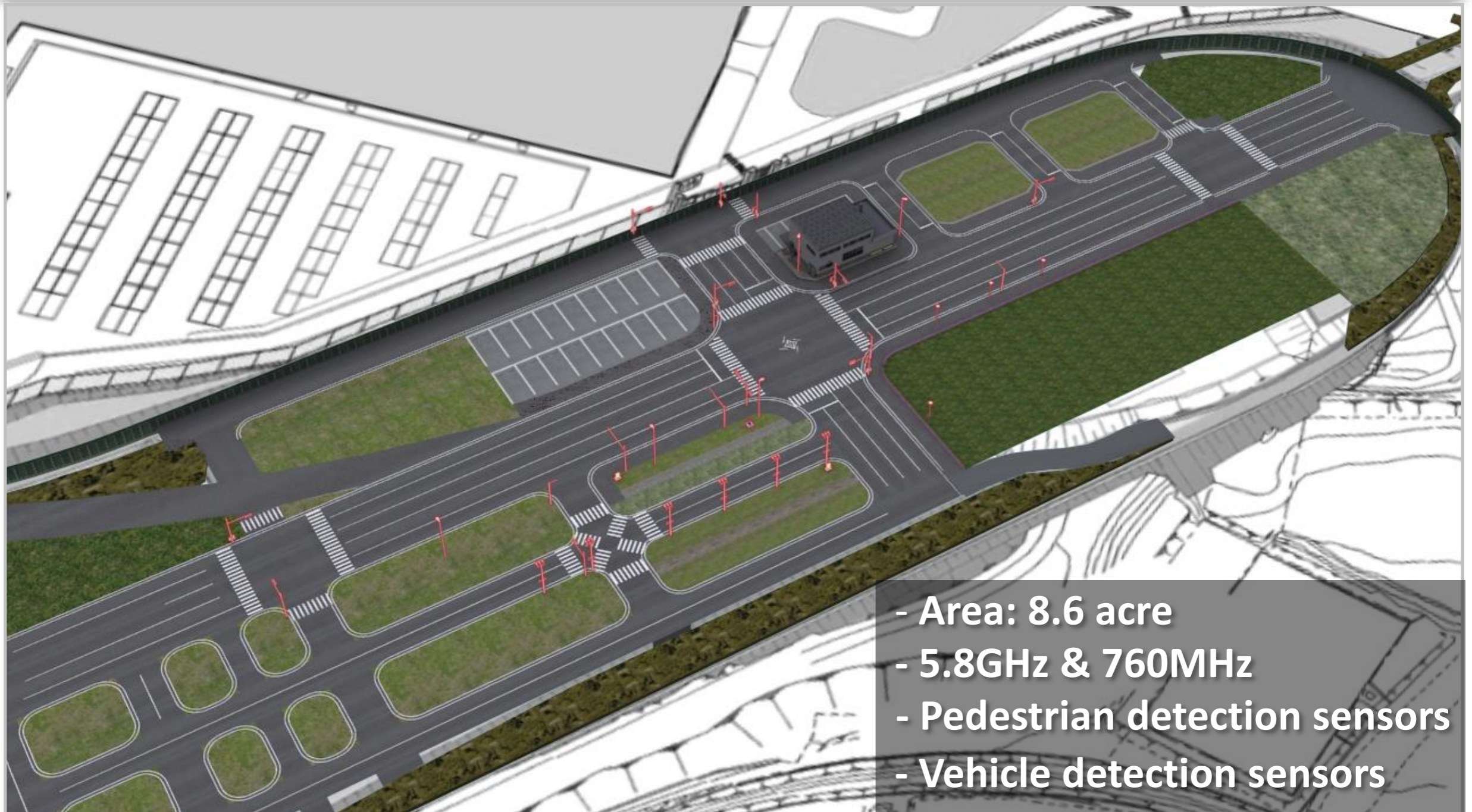


Left-turn accident
Notification of oncoming traffic and pedestrian presence on crosswalk



The Intelligent Transport System (ITS) Proving Ground

The aim of the ITS proving ground is to establish early countermeasures to prevent intersection crashes.



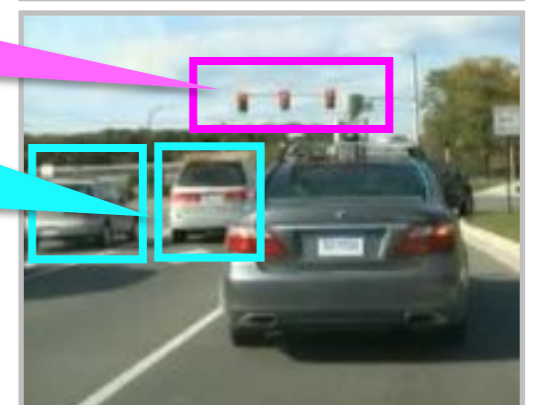
Future: Automated Vehicle Technology

Automated driving technology will be integrated into the driving support systems in the next generation.

Automated driving development



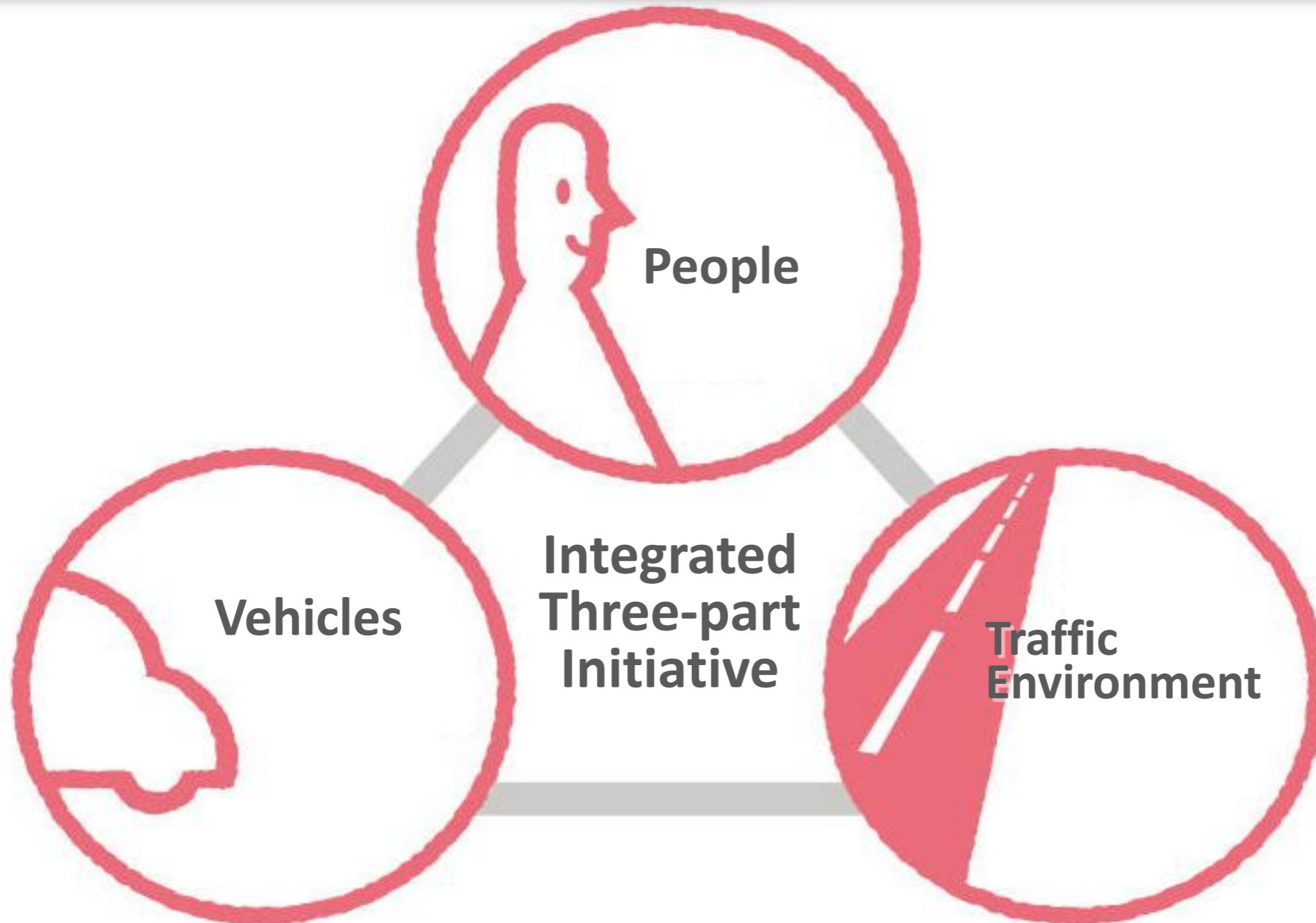
Traffic signal recognition



Vehicle recognition

Integrated Three-part Initiative

Integrated Three-part Initiative is the most effective approach to create traffic safety society.





RESPECT FOR THE PLANET

EXCEED EXPECTATIONS

LEAD THE WAY

future of mobility

Commitment to quality

REWARDED WITH A SMILE

SAFEST & most responsible ways of moving PEOPLE

CHALLENGING GOALS

there is always a better way

Engaging TALENT & Passion of PEOPLE

CONSTANT INNOVATION

ENRICHING LIVES

VALUES

PRECEPTS

TOYOTA WAY

PRINCIPLES

PHILOSOPHY

Thank you