Safe System Approach Overview

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Source: FHWA

Names of the 95 people killed in traffic crashes in the greater Portland region in 2019. Source: ODOT

Every three days someone is killed in a traffic crash in our region.

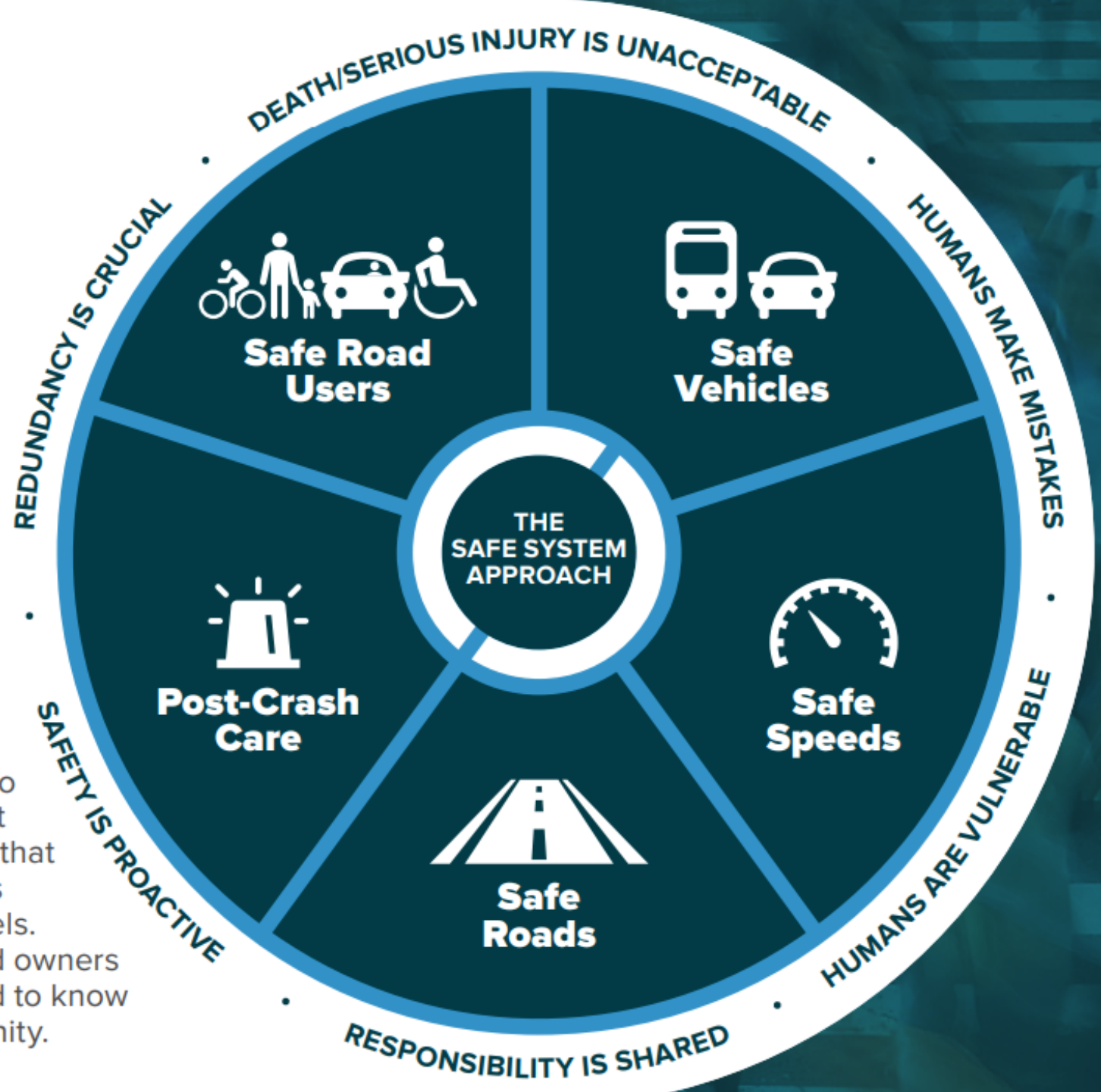
Every day someone is seriously injured.

THE SAFE SYSTEM

APPROACH

Zero is our goal. A Safe System is how we will get there.

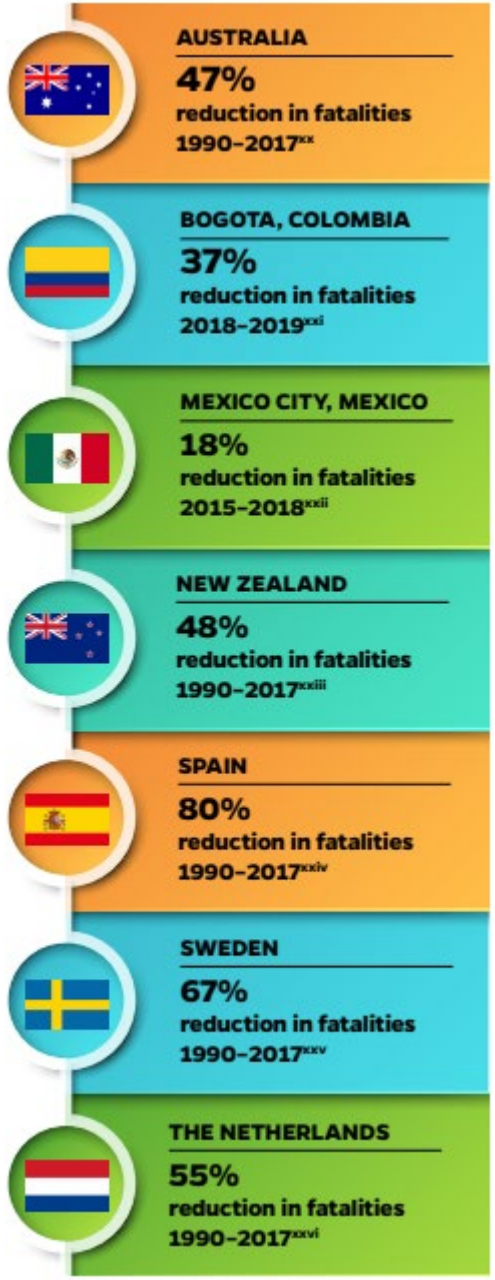
Imagine a world where nobody has to die from vehicle crashes. The Safe System approach aims to eliminate fatal & serious injuries for all road users. It does so through a holistic view of the road system that first anticipates human mistakes and second keeps impact energy on the human body at tolerable levels. Safety is an ethical imperative of the designers and owners of the transportation system. Here's what you need to know to bring the Safe System approach to your community.



The Safe System Approach in not a New Concept

Countries that have adopted a Safe System approach have both the lowest rates of fatalities per 100,000 inhabitants and the fastest rate of change in fatality levels.

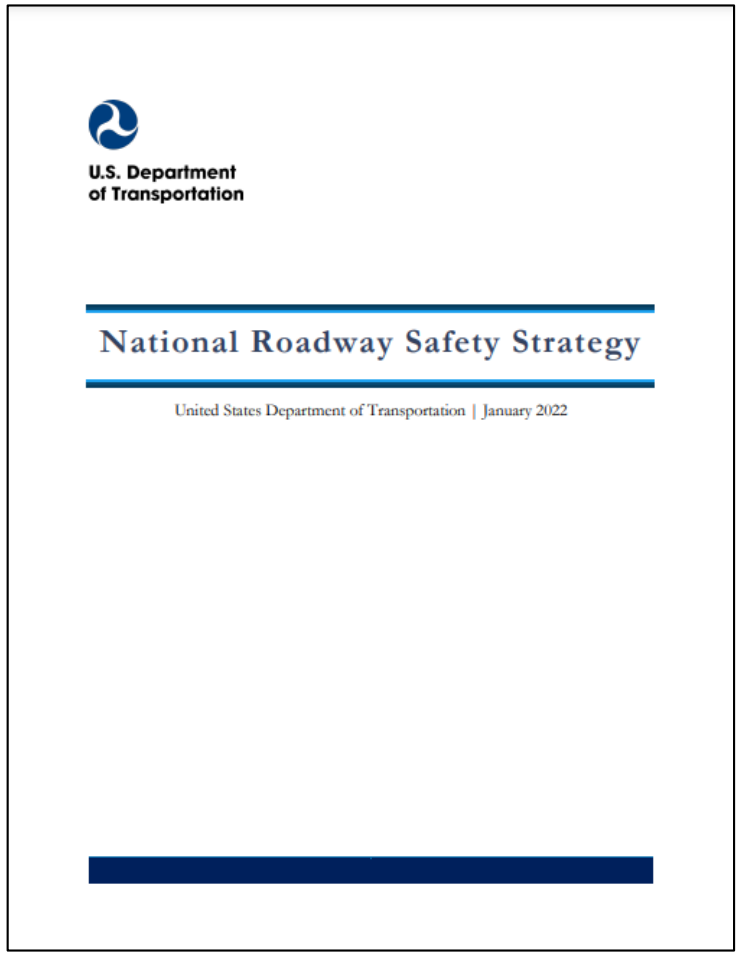
Examples of countries and cities that have adopted the Safe System approach



Percentage change in the number of road deaths, 2010-18

Road Safety Annual Report 2020 OECD/ITF 2020

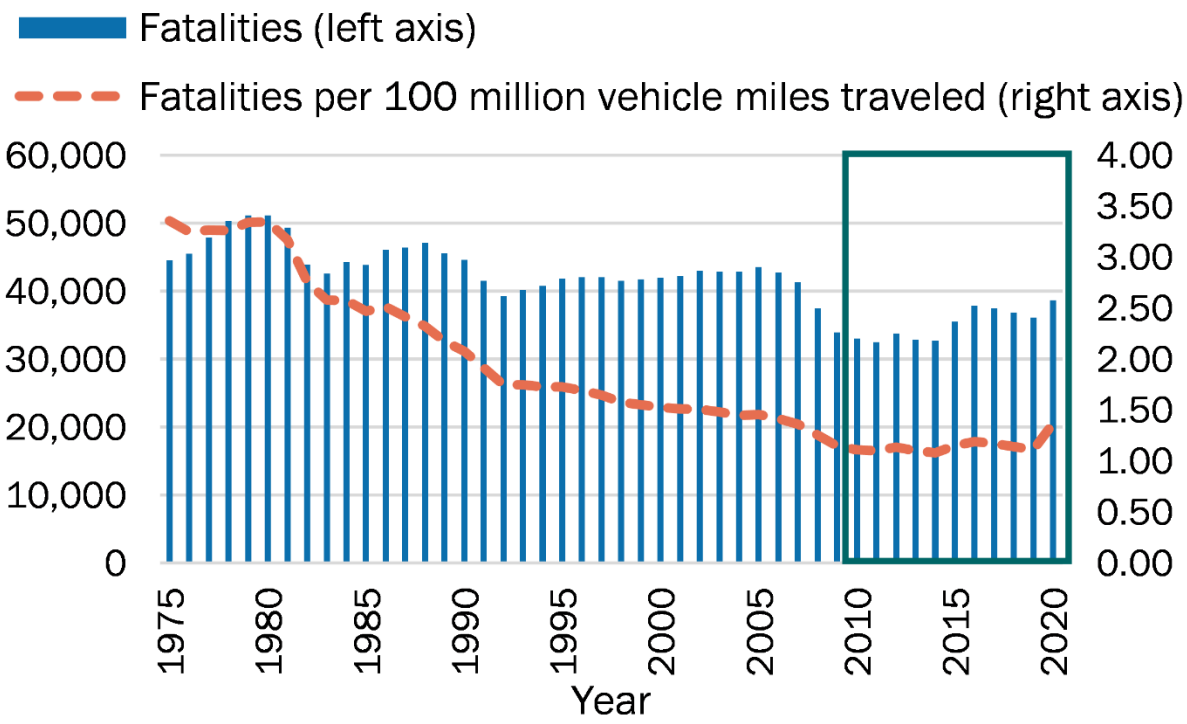
U.S. DOT adopts a Safe System approach as the guiding paradigm to address roadway safety – why is this important?

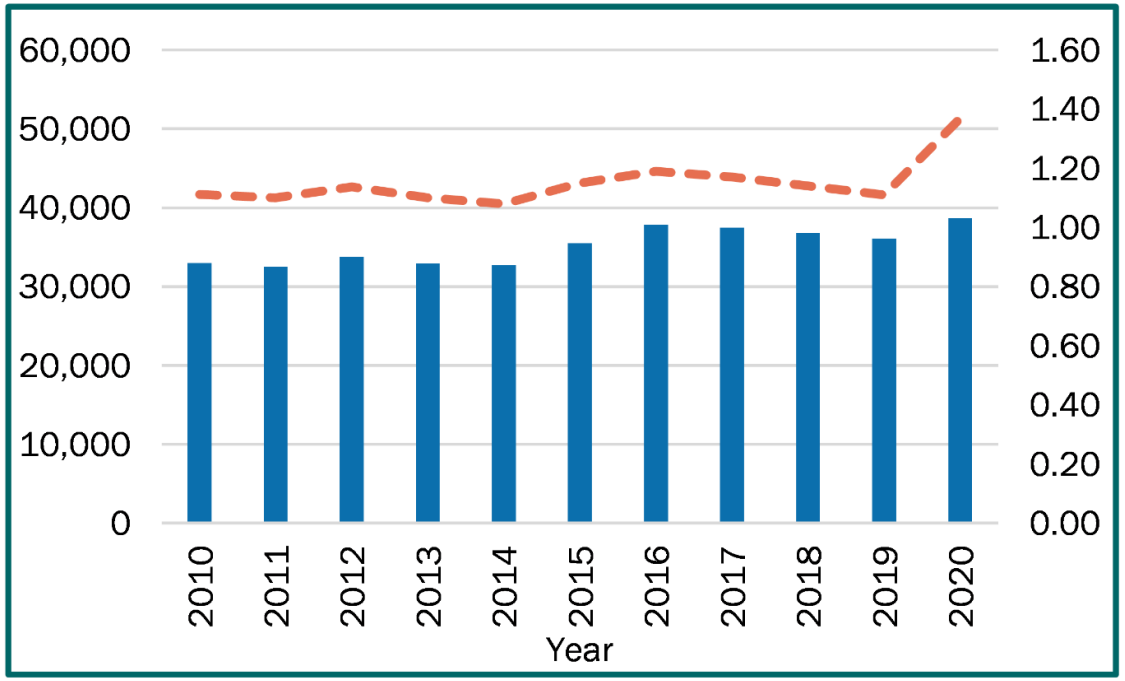


Source: FHWA

We have a national roadway safety problem

Roadway fatalities and the fatality rate was on the decline for 30 years…





…but progress has stalled over the last decade…

Traffic fatalities are a preventable public health crisis affecting all roadway users

39,824

Lives lost on US roads in 2020

Source: NHTSA

460

Lives lost on Oregon roads in 2020

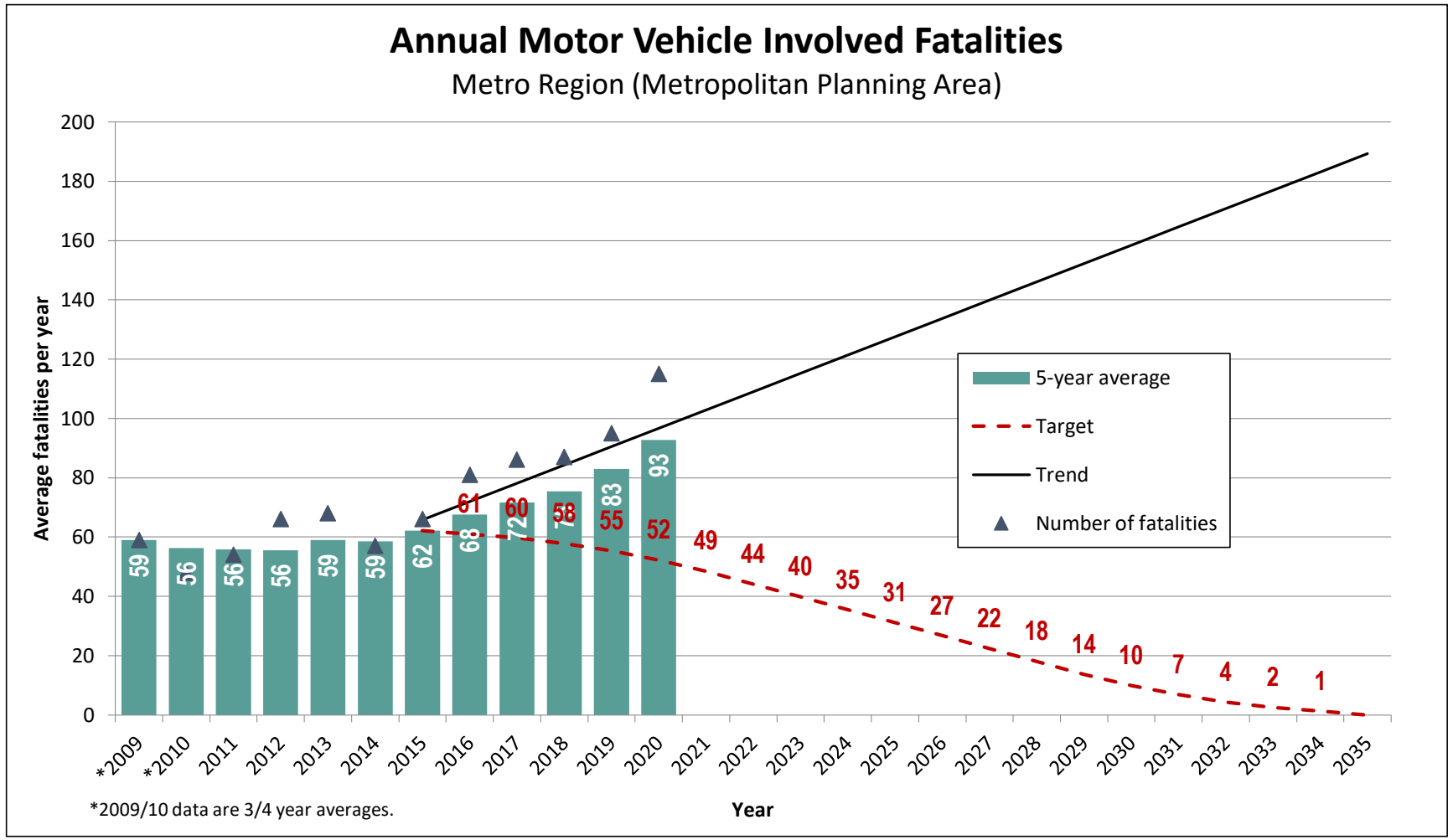
Source: ODOT

115

Lives lost greater Portland roads in 2020 – a 20% increase over 2019

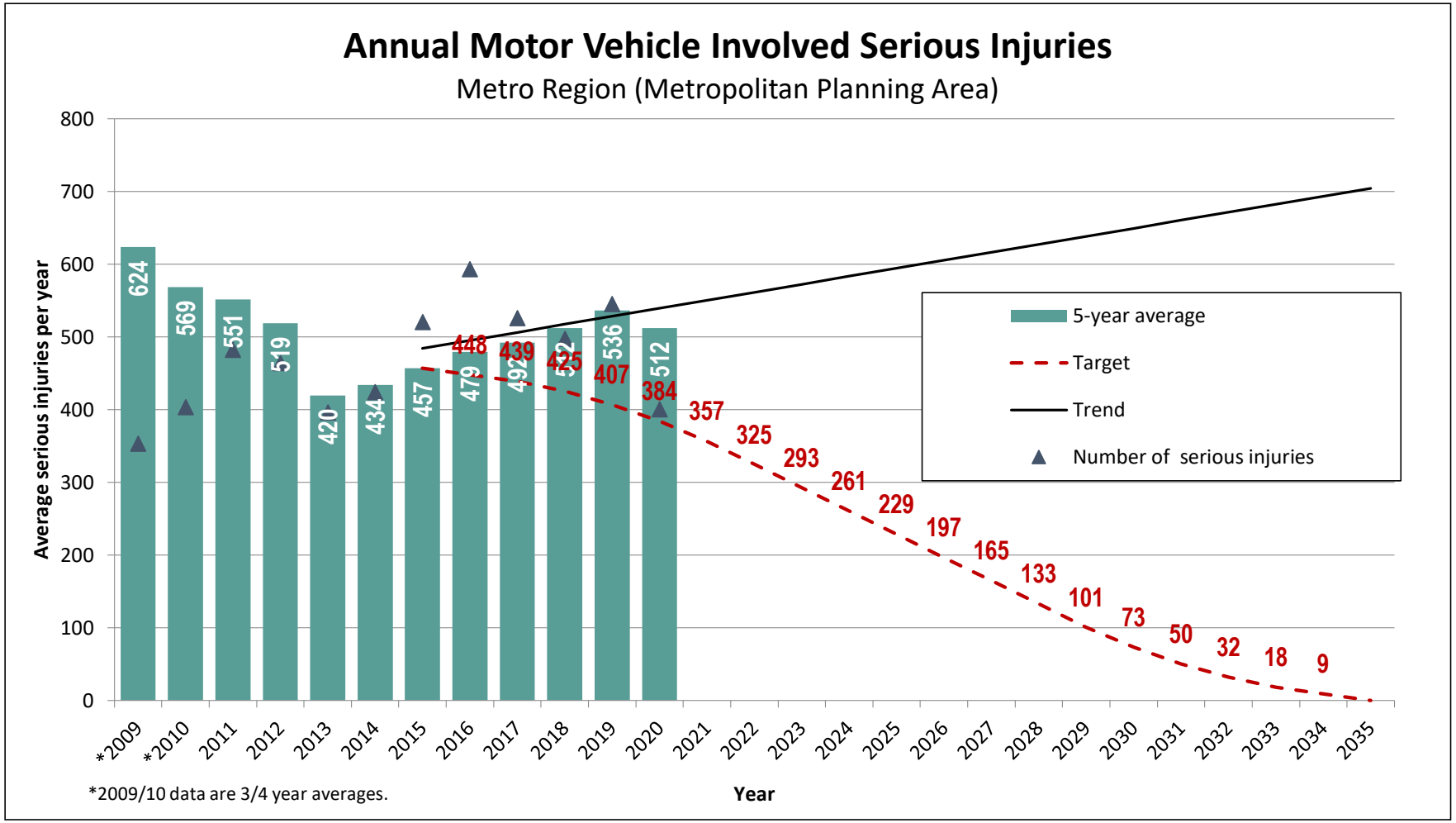
Source: ODOT, Metro

Traffic deaths in the region are trending upward



Fatality and serious injury trends for the greater Portland region
Source: Metro

Serious injuries in the region are trending upward



Fatality and serious injury trends for the greater Portland region
Source: Metro

Traffic fatalities disproportionately impact people of color

2.9X

Black residents in Oregon are nearly three times as likely to die in a traffic crash as white residents.

Source: ODOT, 2021

2X

Black residents in Multnomah County are twice as likely to die in traffic crashes as white residents.

Source: Multnomah County REACH, 2021

76%

Seventy-six percent of pedestrian deaths and serious injuries occur in equity focus areas, where 56% of the population lives.

Source: Metro, 2019 fatalities and serious injuries performance measures report

Traffic fatalities cost our region over $1 billion a year

$1.1B

Annual cost to our region from traffic deaths.

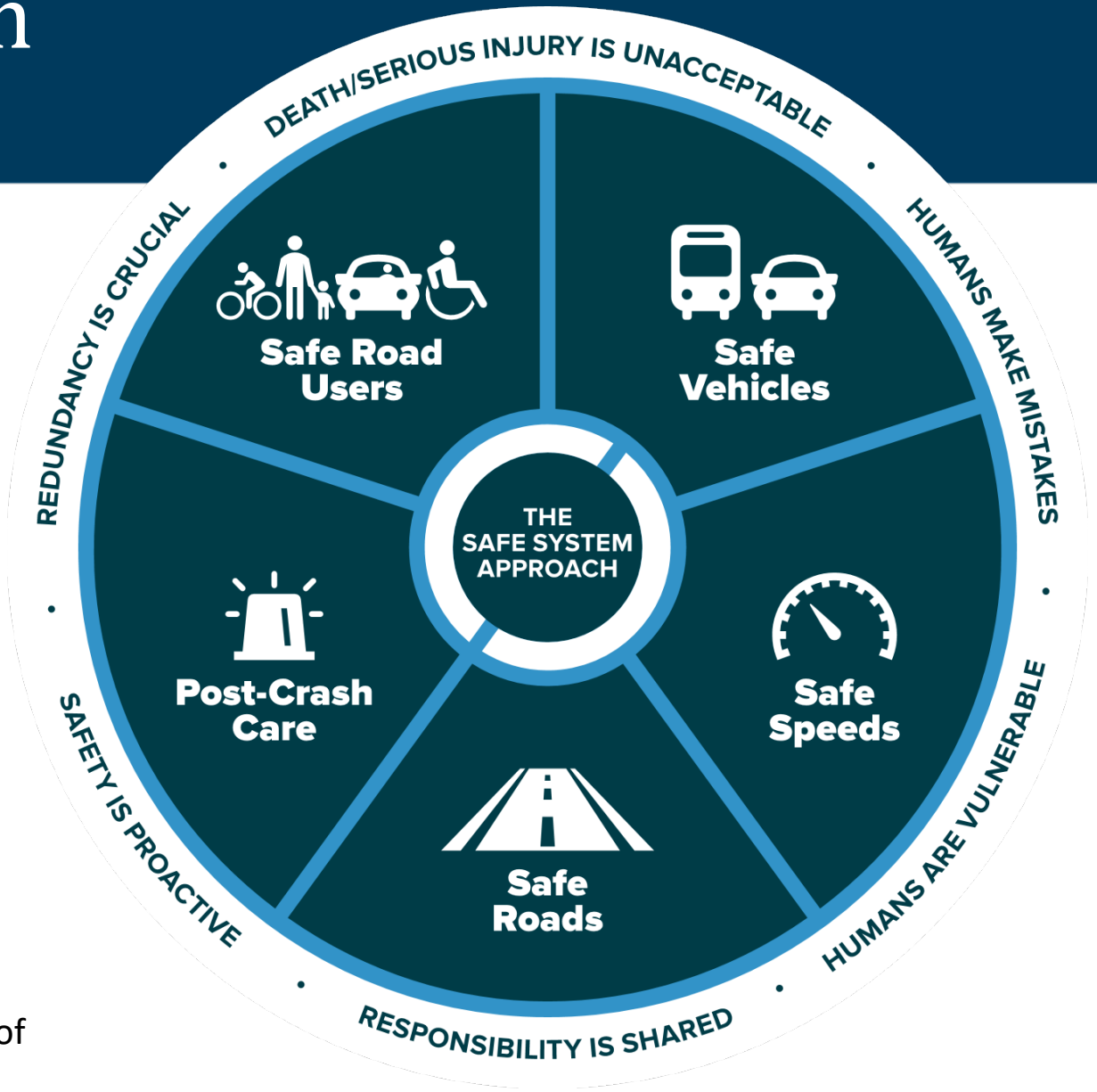
Source: Metro; Guidance on the Treatment of the Economic Value of a Statistical Life (VSL) in U.S. Department of Transportation Analyses – 2021 Update

The Safe System Approach

The Safe System has three parts:

- Approach
- Principles
- Elements

PARADIGM SHIFT



Graphic created by FHWA based on similar designs by the Institute of Transportation Engineers (ITE) and the Road to Zero Coalition.

The Safe System **approach** focuses on reducing the seriousness of crashes

PARADIGM SHIFT

Source: FHWA

“ In road injury epidemiology, kinetic energy is the pathogen ”

Robertson LS. *Injury epidemiology*. Oxford: Oxford University Press, 1992

People are killed and seriously injured on the roads when the collision forces transferred onto the human body exceed tolerable thresholds.

The Safe System **approach** is a shift in how we think about our roadway safety problem

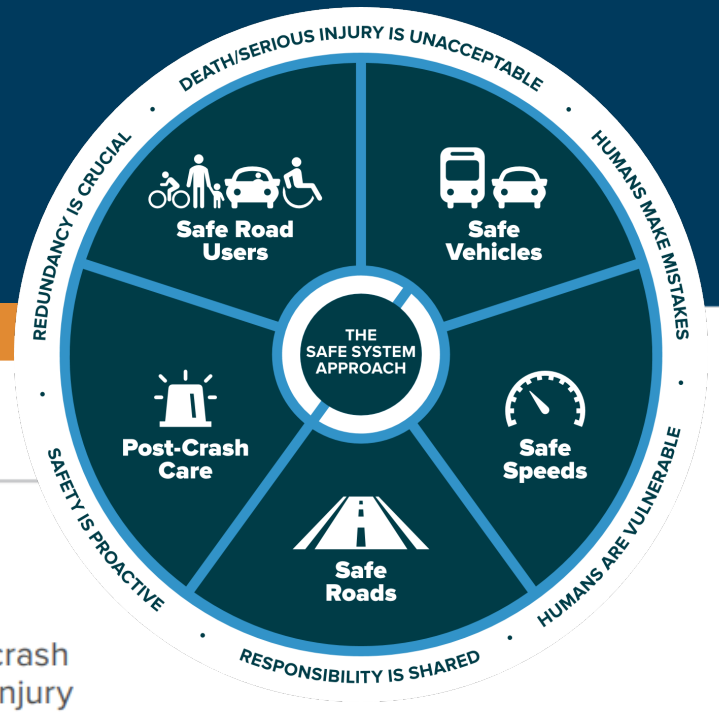
Accommodating human mistakes

Keeping impacts on the human body at tolerable levels

PARADIGM SHIFT

Source: FHWA

The 6 Safe System Principles



SAFE SYSTEM PRINCIPLES

Death/Serious Injury is Unacceptable

While no crashes are desirable, the Safe System approach prioritizes crashes that result in death and serious injuries, since no one should experience either when using the transportation system.

Humans Make Mistakes

People will inevitably make mistakes that can lead to crashes, but the transportation system can be designed and operated to accommodate human mistakes and injury tolerances and avoid death and serious injuries.

Humans Are Vulnerable

People have limits for tolerating crash forces before death and serious injury occurs; therefore, it is critical to design and operate a transportation system that is human-centric and accommodates human vulnerabilities.

Responsibility is Shared

All stakeholders (transportation system users and managers, vehicle manufacturers, etc.) must ensure that crashes don't lead to fatal or serious injuries.

Safety is Proactive

Proactive tools should be used to identify and mitigate latent risks in the transportation system, rather than waiting for crashes to occur and reacting afterwards.

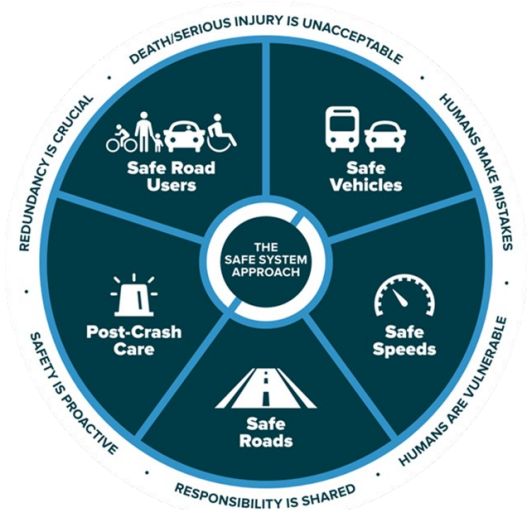
Redundancy is Crucial

Reducing risks requires that all parts of the transportation system are strengthened, so that if one part fails, the other parts still protect people.

Principle 1: Death and serious injury is unacceptable

Death/serious injury is unacceptable

What would you do? If you had the opportunity to implement a feature that would reduce the number of fatalities and serious injuries by 50%,but would double the total number of minor crashes … would you trade one fatality for 540 minor crashes?



PARADIGM SHIFT

While no crashes are desirable, the Safe System approach prioritizes crashes that result in death and serious injuries, since no one should experience either when using the transportation system.

Principle 2: Humans make mistakes

Humans make mistakes

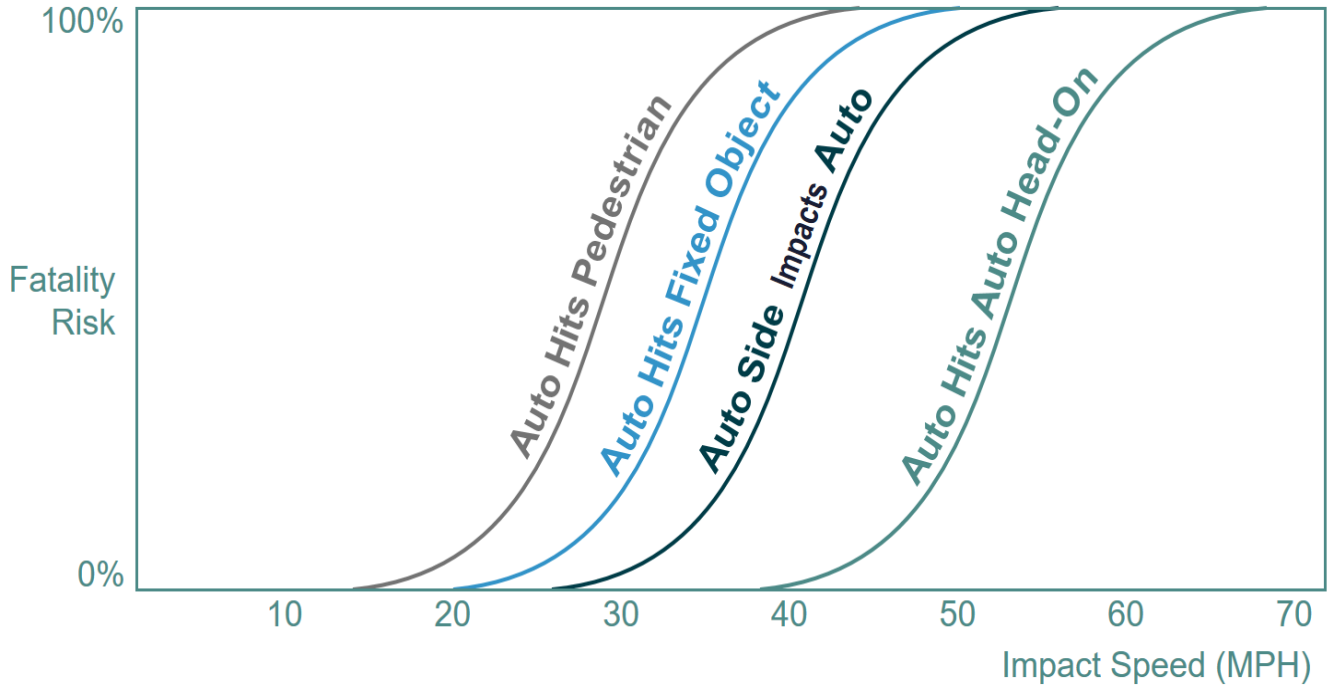
- As road users, people will inevitably make mistakes and those mistakes may lead to crashes
- In a Safe System approach, owners and operators of the system strive to make it easy for humans to not make mistakes by designing roads and vehicles to be in tune with human competences

PARADIGM SHIFT

Source: FHWA

Principle 3: Humans are vulnerable

Humans are vulnerable



Source: FHWA

Designing safer roads is an exercise of managing kinetic energy

PARADIGM SHIFT

People have limits for tolerating crash forces before death and serious injury occurs; therefore, it is critical to design and operate a transportation system that is human-centric and accommodates human vulnerabilities.

Principle 4: Responsibility is shared

Responsibility is shared

Source: FHWA

PARADIGM SHIFT

All stakeholders (transportation system users and managers, vehicle manufacturers, etc.) must ensure that crashes don't lead to fatal or serious injuries.

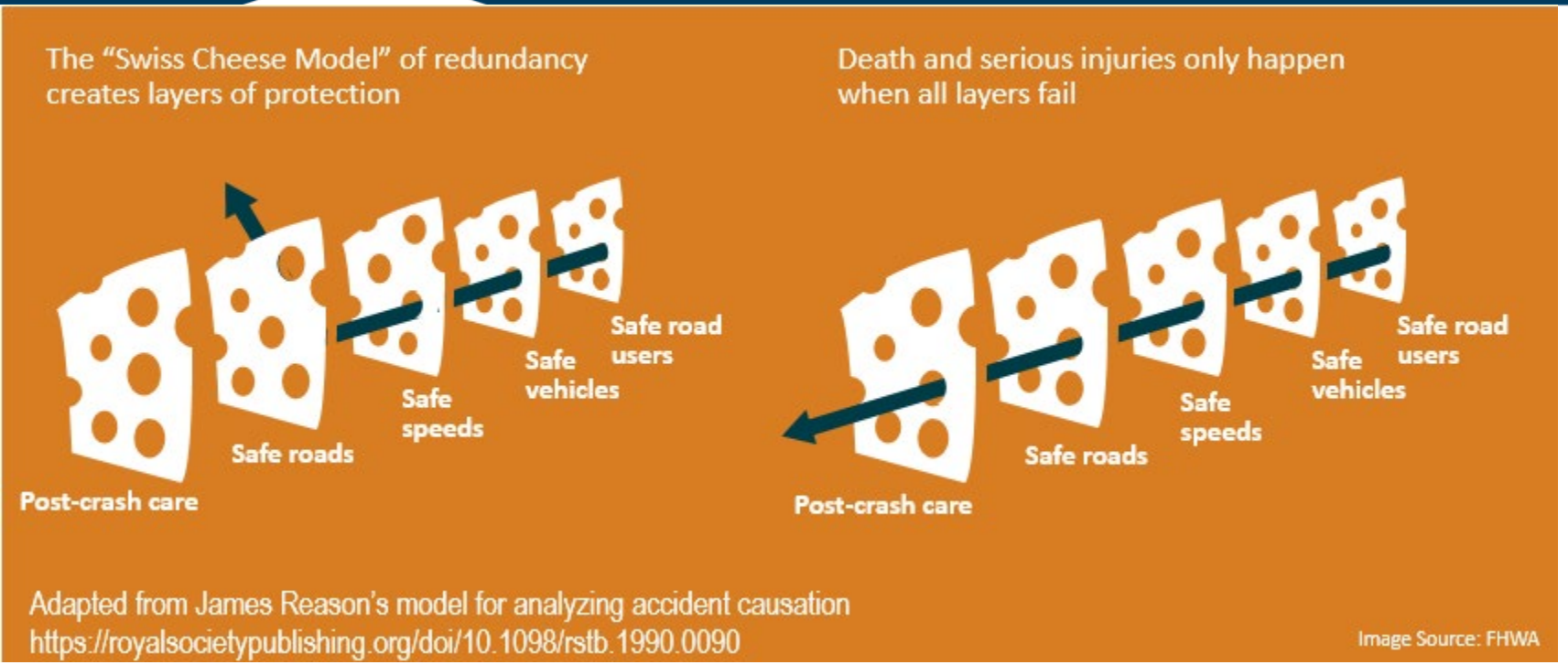
Principle 5: Safety is proactive

PARADIGM SHIFT

Use proactive approach, data and tools to identify and mitigate **latent risks** in the transportation system, rather than waiting for crashes to occur and reacting afterwards.

Principle 6: Redundancy is crucial

Redundancy is crucial



Source: FHWA

PARADIGM SHIFT

Reducing risks requires that all parts of the transportation system are strengthened, so that if one part fails, the other parts still protect people.

The Safe System Elements

SAFE SYSTEM ELEMENTS

Making a commitment to zero deaths means addressing every aspect of crash risks through the five elements of a Safe System, shown below. These layers of protection and shared responsibility promote a holistic approach to safety across the entire transportation system. The key focus of the Safe System approach is to reduce death and serious injuries through design that accommodates human mistakes and injury tolerances.

Safe Road Users

The Safe System approach addresses the safety of all road users, including those who walk, bike, drive, ride transit, and travel by other modes.

Safe Vehicles

Vehicles are designed and regulated to minimize the occurrence and severity of collisions using safety measures that incorporate the latest technology.

Safe Speeds

Humans are unlikely to survive high-speed crashes. Reducing speeds can accommodate human injury tolerances in three ways: reducing impact forces, providing additional time for drivers to stop, and improving visibility.

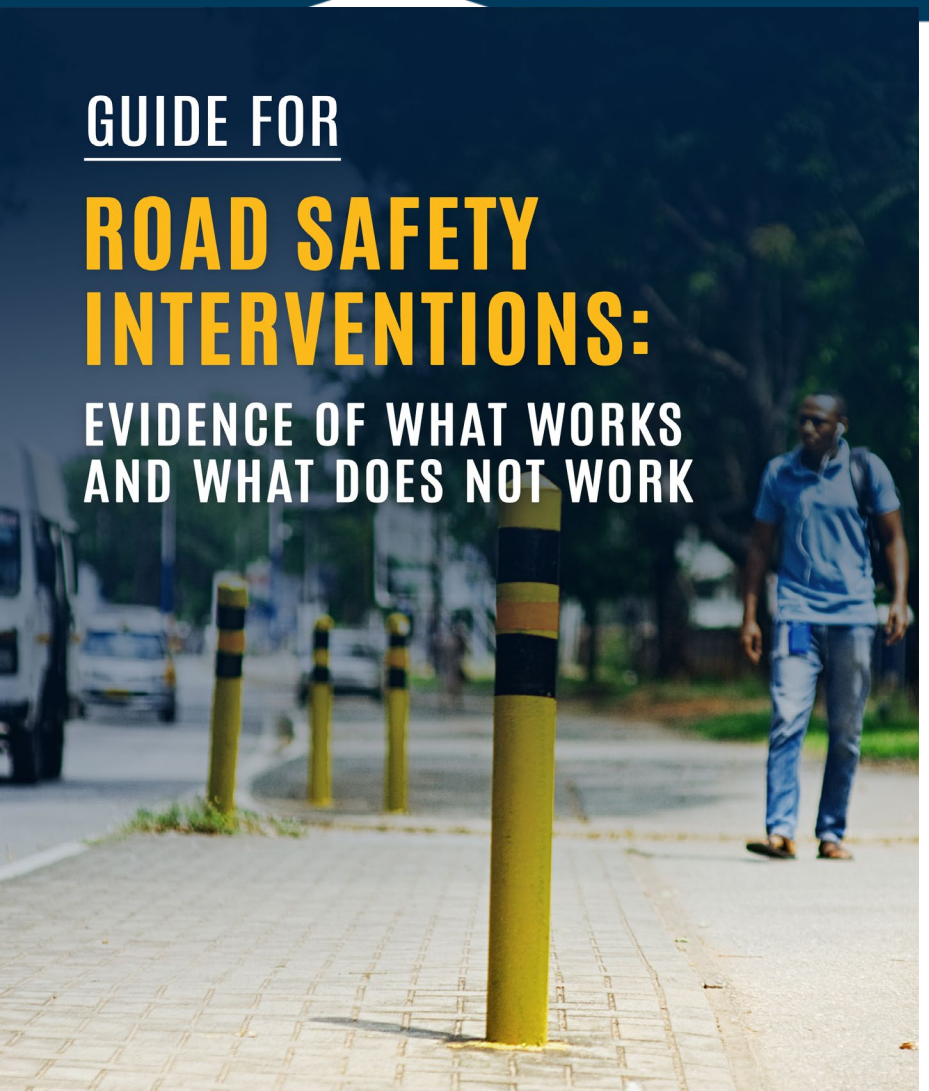
Safe Roads

Designing to accommodate human mistakes and injury tolerances can greatly reduce the severity of crashes that do occur. Examples include physically separating people traveling at different speeds, providing dedicated times for different users to move through a space, and alerting users to hazards and other road users.

Post-Crash Care

When a person is injured in a collision, they rely on emergency first responders to quickly locate them, stabilize their injury, and transport them to medical facilities. Post-crash care also includes forensic analysis at the crash site, traffic incident management, and other activities.

Element 1: Safe Road Users



Safe Road Users

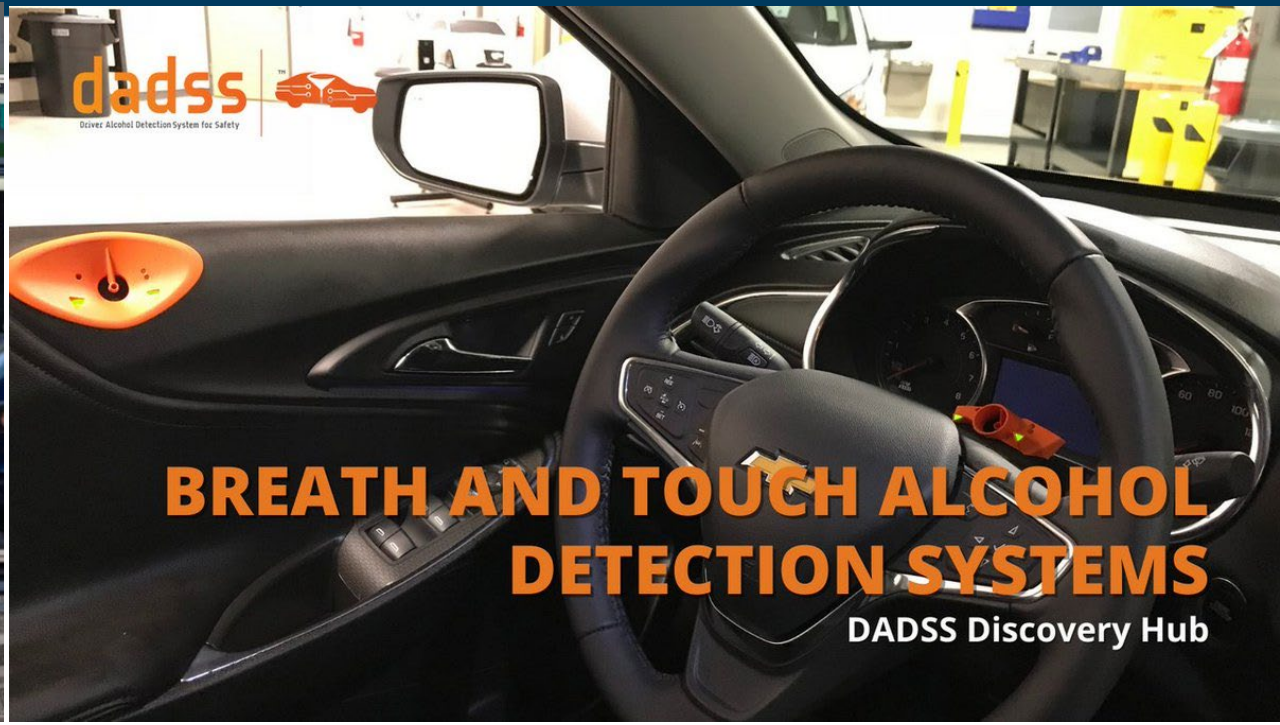
Source: FHWA

PARADIGM SHIFT

The Safe System approach addresses the safety of all road users, including those who walk, bike, drive, ride transit, and travel by other modes.

Element 2: Safe Vehicles

Safe Vehicles



PARADIGM SHIFT

Vehicles are designed and regulated to minimize the occurrence and severity of crashes using safety measures that incorporate the latest technology.

Element 3: Safe Speeds

Safe Speeds

Source: FHWA

Humans are unlikely to survive high-speed crashes. Reducing speeds can accommodate human injury tolerances in three ways: reducing impact forces, providing additional time for drivers to stop, and improving visibility.

Element 4: Safe Roads

Safe Roads

Separating users in space

Separating users in time

Increasing attentiveness and awareness

Source: Fehr & Peers

Manage speed

Source: City of Carmel, IN

Manage impact angles

Source: Fehr & Peers

Manage impact energy distribution

Source: FHWA

PARADIGM SHIFT

Designing to accommodate human mistakes and injury tolerances can greatly reduce the severity of crashes that do occur.

Element 5: Post-Crash Care

Post-Crash Care

38,680

PEOPLE DIED IN TRAFFIC CRASHES IN THE U.S. IN 2020[2]

20% OF TRAUMA DEATHS

are preventable with optimal emergency and trauma care[1]

2 OUT OF 5

WERE ALIVE WHEN FIRST RESPONDERS ARRIVED, BUT LATER DIED[2]

MORE THAN ONE THIRD OF SERIOUSLY INJURED CRASH VICTIMS ARE NOT TAKEN DIRECTLY TO A LEVEL I OR II TRAUMA CENTER[3]

THERE IS A **25%** INCREASE IN THE ODDS OF SURVIVAL

for severely injured patients if treated in a hospital that is a level I trauma center[4]

Source: FHWA

PARADIGM SHIFT

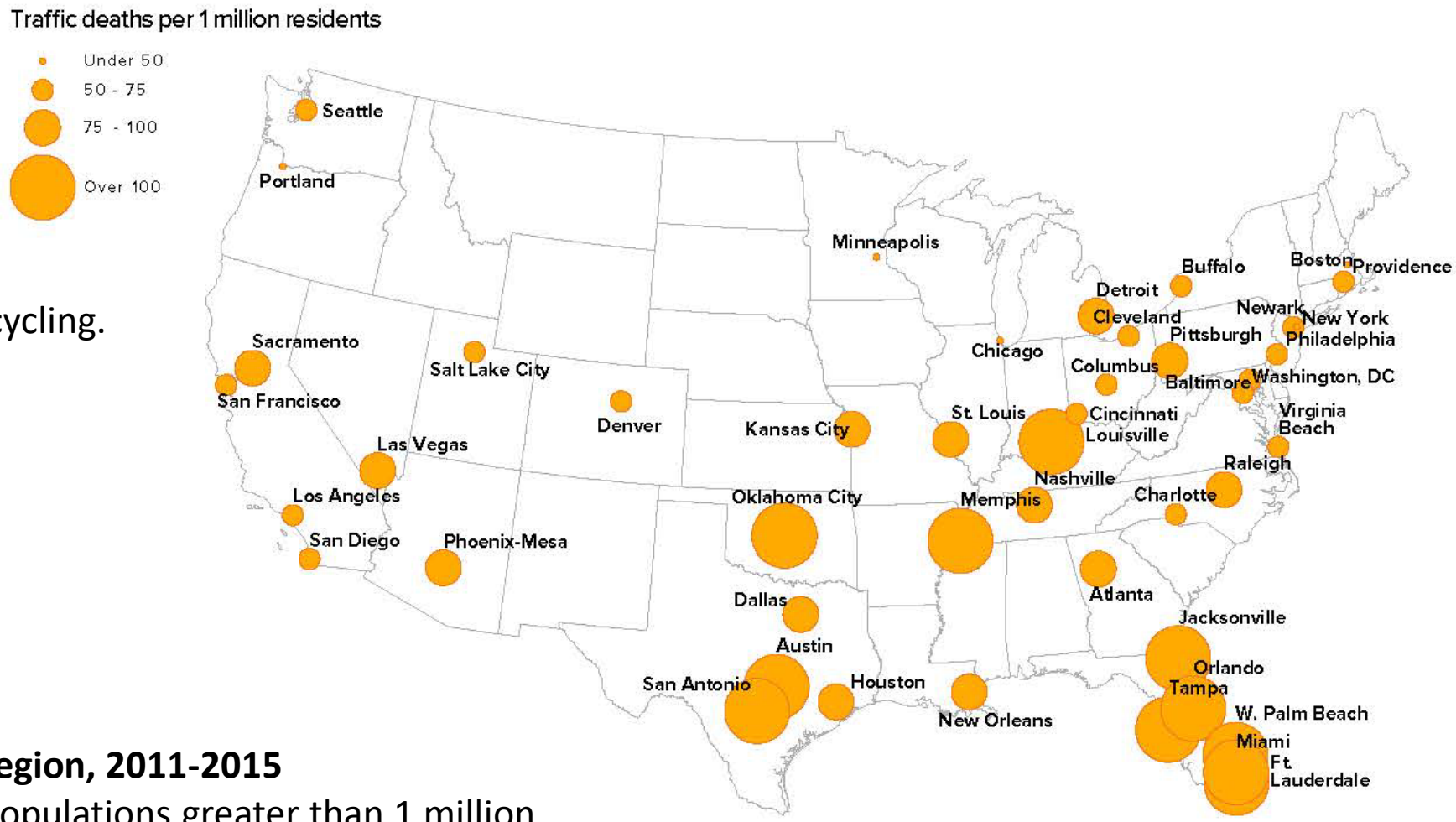
Access to emergency and trauma care is critical to the survivability of crashes.

The Safe System approach is a shift in how we think about roadway safety

Traditional	PARADIGM SHIFT →	Safe System
Prevent crashes	→	Prevent deaths and serious injuries
Improve human behavior	→	Design for human mistakes/limitations
Control speeding	→	Reduce system kinetic energy
Individuals are responsible	→	Share responsibility
React based on crash history	→	Proactively identify and address risks

Moving forward: Do more of what is working

Land use.
Shorter trips.
More transit, walking, bicycling.
Less VMT/capita.



Traffic deaths by urban region, 2011-2015
U.S. urban regions with populations greater than 1 million

Moving forward: Prioritize safety over speed, prioritize the safe system approach

Source: FHWA

Safe speeds. Speed management strategies and technologies are estimated to save 4,000 lives each year nationally.
Safe vehicles. Incorporating Advanced Driver Assistance Systems, technologies which exist today, into all vehicles, is estimated to save up to 10,000 lives a year nationally.
Safe road users. Incorporating Alcohol Detection Systems, technologies which exist today, into all vehicles, is estimated to save up to 9,000 lives annually.[11]
Safe roads. Roadway design improvements that are safety-outcomes based are estimated to save 3,000 lives a year nationally.
Safe EMS. Improved emergency response to crashes is estimated to save 2,500 lives a year.
Safe system for all. Shifting to more transit, walking, and bicycling trips is estimated to save 3,000 lives a year nationally.

Sources: National Safety Council, Rand Report; Insurance Institute for Highway Safety - Highway Loss Data Institute; AAA Report; APTA Report.

Accommodating human mistakes

Keeping impacts on the human body at tolerable levels

Thank you!

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www.oregonmetro.gov/regional-transportation-safety-plan