

ITEM 9 – Information

September 21, 2022

U.S. DOT Safe System Approach for Roadway Safety

Background:

As part of the TPB's focus on safety, the board will be briefed on the U.S. DOT Safe System approach as the guiding paradigm to address roadway safety. The Safe System approach has been embraced by the transportation community as an effective way to address and mitigate the risks inherent in our enormous and complex transportation system. It works by building and reinforcing multiple layers of protection to both prevent crashes from happening in the first place and minimize the harm caused to those involved when crashes do occur. It is a holistic and comprehensive approach that provides a guiding framework to make places safer for people. This is a shift from a conventional safety approach because it focuses on both human mistakes and human vulnerability, and designs a system with many redundancies in place to protect everyone. The U.S. DOT's National Roadway Safety Strategy and the Department's ongoing safety programs are working towards a future with zero roadway fatalities and serious injuries.



U.S. Department of Transportation
Federal Highway Administration



An Introduction to the Safe System Approach

Transportation Planning Board Meeting
September 21, 2022, Item 9
12:00pm to 2:00pm ET



SAFE SYSTEM APPROACH

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

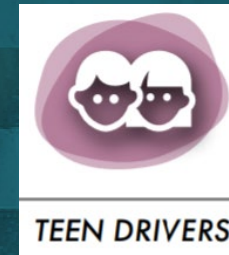
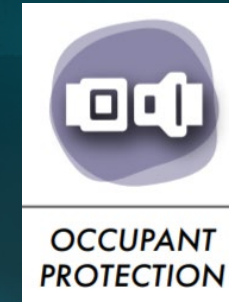
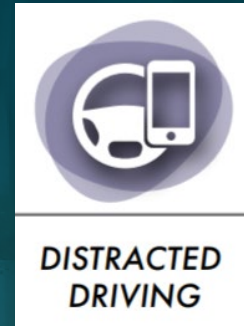


U.S. Department of Transportation
Federal Highway Administration



Safe Roads for a Safer Future
Investment in roadway safety saves lives

Why are people killed and seriously injured on our roads?



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

PARADIGM SHIFT



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

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

A NEW DIRECTION

The Safe System approach aims to eliminate fatal and serious injuries for all road users by:



**Accommodating
human mistakes**



**Keeping impacts on the human
body at tolerable levels**

WHAT IS THE SAFE SYSTEM APPROACH?



Image: FHWA

SUCCESSFUL SAFE SYSTEM ADOPTERS



Sweden

Vision Zero

60-70%

Reduction in fatalities
1994-2015

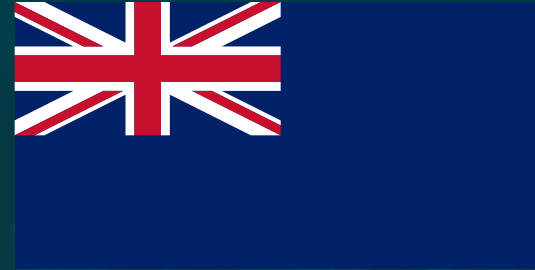


Netherlands

Sustainable Safety

50-60%

Reduction in fatalities
1994-2015



Australia

Safe System

50-60%

Reduction in fatalities
1994-2015



New Zealand

Safer Journeys

50-60%

Reduction in fatalities
1994-2015

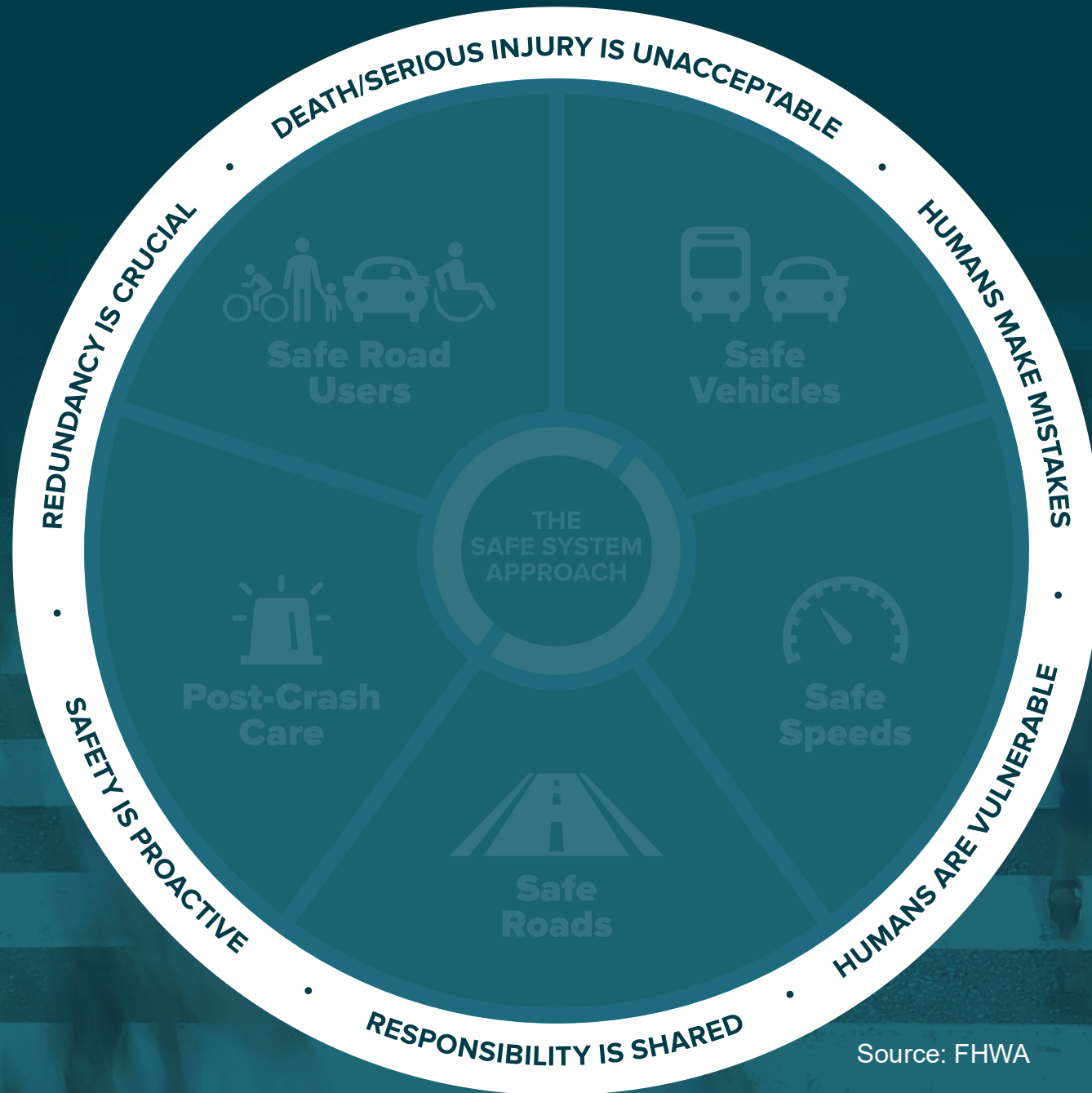
Source: World Resources Institute

THE SAFE SYSTEM APPROACH



Source: FHWA

THE 6 SAFE SYSTEM PRINCIPLES



Source: FHWA

THE 5 SAFE SYSTEM ELEMENTS



Source: FHWA

THE 6 SAFE SYSTEM PRINCIPLES



**Death/serious injury
is unacceptable**



**Humans make
mistakes**



**Humans are
vulnerable**



**Responsibility is
shared**



Safety is proactive



**Redundancy
is crucial**

THE 5 SAFE SYSTEM ELEMENTS



Safe road users



Safe vehicles



Safe speeds



Safe roads



Post-crash care

PARADIGM SHIFT



Humans make mistakes

People as road users will inevitably make mistakes that can lead to crashes

In a Safe System approach, the system owners and operators should strive to make it easy for humans to not make mistakes by designing roads and vehicles to be in tune with human competences.



Source: FHWA

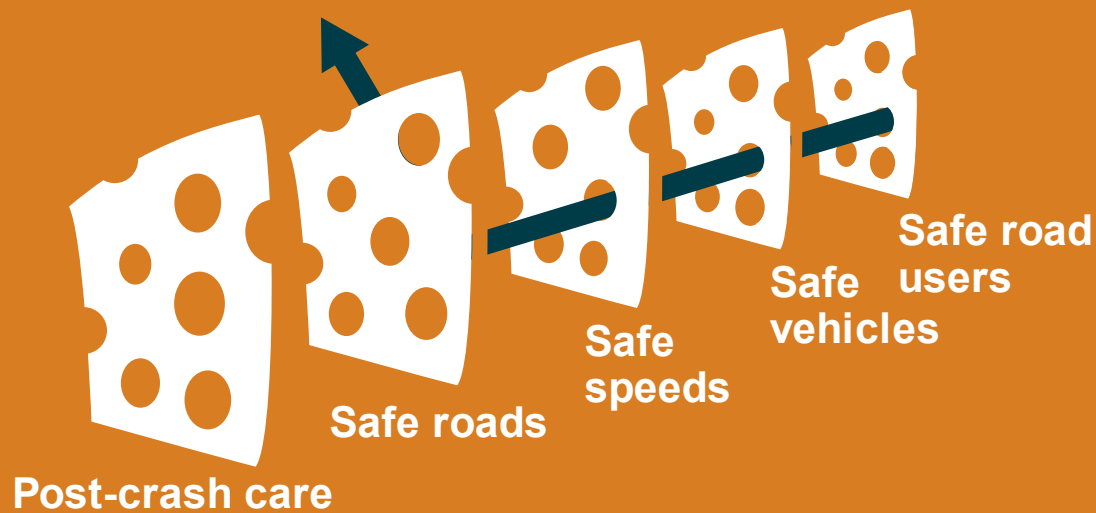
SAFE SYSTEM ELEMENTS CREATE REDUNDANCY



Redundancy
is crucial

The “Swiss Cheese Model” of redundancy creates layers of protection

Death and serious injuries only happen when all layers fail



Adapted from James Reason’s model for analyzing accident causation
<https://royalsocietypublishing.org/doi/10.1098/rstb.1990.0090>

Image Source: FHWA

WHERE ARE YOU ON THE SAFE SYSTEM JOURNEY?

Traditional approach

Prevent crashes →

Improve human behavior →

Control speeding →

Individuals are responsible →

React based on crash history →

Safe System approach

Prevent death and serious injuries

Design for human mistakes/limitations

Reduce system kinetic energy

Share responsibility

Proactively identify and address risks

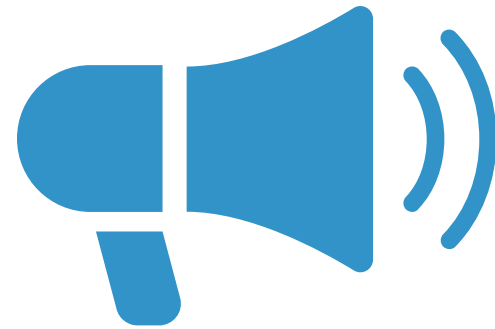
Safe System Approach – What's Next?

“There is no single pathway for the adoption, establishment and implementation of a Safe System. Moving to a Safe System is a learning-by-doing process best described as a journey which presents opportunities, hazards and challenges along the way. The experiences of the pioneering countries show that each follows its own journey, shaped by the cultural, temporal, and local context, but guided by the underlying principles.”



Source: Zero Road Deaths and Serious Injuries: Leading a Paradigm Shift to a Safe System; OECD (2016)

<http://www.oecd.org/publications/zero-road-deaths-and-serious-injuries-9789282108055-en.htm>



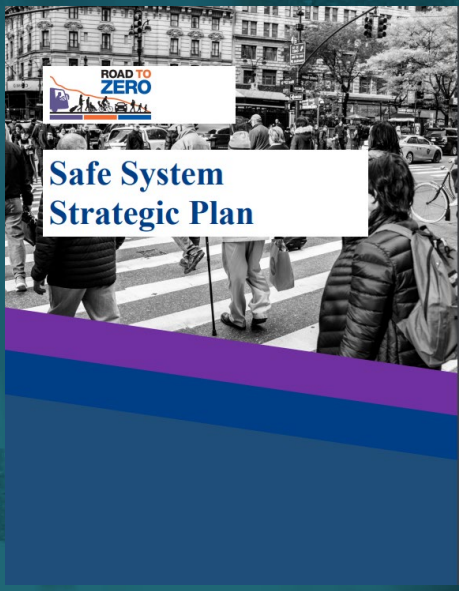
Safe System Materials

Find more resources at: safety.fhwa.dot.gov/zerodeaths

For More Information

FHWA Resources: https://safety.fhwa.dot.gov/zerodeaths/zero_deaths_vision.cfm

ITE Resources: <https://www.ite.org/technical-resources/topics/safe-systems/>



THE SAFE SYSTEM APPROACH

DEATH/SERIOUS INJURY IS UNACCEPTABLE

REDUNDANCY IS CRUCIAL

SAFETY IS PROACTIVE

RESPONSIBILITY IS SHARED

Safe Users

Safe Vehicles

Safe Roads

Safe Speeds

Post-Crash Care

THE SAFE SYSTEM APPROACH

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 and 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.

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.

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A SAFE SYSTEM-BASED FRAMEWORK AND ANALYTICAL METHODOLOGY FOR ASSESSING INTERSECTIONS

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Safe Roads for a Safer Future
Investment in roadway safety saves lives.
<https://safety.fhwa.dot.gov>

THE SAFE SYSTEM APPROACH

INTEGRATING THE
Safe System Approach

WITH THE
Highway Safety Improvement Program

AN INFORMATIONAL REPORT

U.S. Department of Transportation
Federal Highway Administration

Safe Roads for a Safer Future
Investment in roadway safety saves lives.

PRIMER ON SAFE SYSTEM FOR PEDESTRIANS AND BICYCLISTS

U.S. Department of Transportation
Federal Highway Administration
FHWA-SA-21-065

Safe Roads for a Safer Future
Investment in roadway safety saves lives.
<http://safety.fhwa.dot.gov>



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Federal Highway Administration



Thank you!



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