Zero is our goal. A Safe System is how we get there.
This train-the-trainer presentation was developed with FHWA perspective for FHWA staff to provide an overview of the Safe System Approach.

Others are welcome to use it in whole or in part as appropriate to their purposes.

Thank you.
Imagine our country as a place where nobody has to die from vehicle crashes.

Source: Fehr & Peers
Presentation Overview

1. Introduction
2. Safe System Principles
3. Safe System Elements
4. Case Studies
5. Conclusion & Resources
Introduction

Assessment of our current situation and introduction to the Safe System approach
Traffic fatalities are a public health crisis affecting all road users.

1.25M
Lives lost globally each year from traffic crashes
Source: World Resources Institute

36,835
Lives lost on US roads in 2018
Source: NHTSA

6,283
Pedestrians killed in US traffic crashes in 2018
Source: NHTSA
THOUSANDS OF LIVES ARE LOST EACH YEAR

Total US Traffic Fatalities 2009-2018

Source: NHTSA
PEDESTRIAN DEATHS ARE INCREASING

Total US Pedestrian Fatalities 2009-2018

Source: NHTSA
How does the United States reach zero deaths?

Source: Fehr & Peers
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
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

- Safe Road Users
- Safe Vehicles
- Post-Crash Care
- Safe Speeds
- Safe Roads

DEATH/SEVERE INJURY IS UNACCEPTABLE
REDUNDANCY IS CRUCIAL
SAFETY IS PROACTIVE
RESPONSIBILITY IS SHARED
HUMANS MAKE MISTAKES
HUMANS ARE VULNERABLE

Source: FHWA
THE 6 SAFE SYSTEM PRINCIPLES

- DEATH/SERIOUS INJURY IS UNACCEPTABLE
- HUMANS MAKE MISTAKES
- Safe Roads
- Safe Vehicles
- Safe Speeds
- Post-Crash Care
- Responsibility is Shared
- Safety is Proactive
- Redundancy is Crucial

Source: FHWA
THE 5 SAFE SYSTEM ELEMENTS

- Safe Road Users
- Safe Vehicles
- Post-Crash Care
- Safe Speeds
- Safe Roads

Source: FHWA
Safe System Principles

Overview of the 6 principles of the Safe System approach
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
DEATH/SERIOUS INJURY IS UNACCEPTABLE

Source: Vision Zero Network
HUMANS MAKE MISTAKES

Source: Fehr & Peers
HUMANS ARE VULNERABLE

Crash Kinetic Energy

Serious Injury

Fatality

100%

0%

Fatality Risk

Source: FHWA
RESPONSIBILITY IS SHARED

System managers
   Planners, designers, builders, operators, maintenance workers

Vehicle manufacturers

Law enforcement personnel

Post-crash personnel

System users
SAFETY IS PROACTIVE

Identify risks

Mitigate risks
REDUNDANCY IS CRUCIAL

Safe road users
Safe vehicles
Safe speeds
Safe roads
Post-crash care
Overview of the 5 elements of the Safe System approach

1. Introduction
2. Safe System Principles
3. Safe System Elements
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THE 5 SAFE SYSTEM ELEMENTS

- Safe road users
- Safe vehicles
- Safe speeds
- Safe roads
- Post-crash care
SAFE ROAD USERS

Walk  Bike  Drive  Transit  Other

Source for all images: Fehr & Peers
SAFE ROAD USERS – CONTINUED

- Not distracted or impaired
- Follow rules
- Act within the limits of the road design
SAFE VEHICLES

Active safety

Measures to reduce the chance of a crash occurring

• Lane departure warning
• Autonomous emergency braking

Passive safety

Protective systems for when crashes do occur

• Seatbelts and airbags
• Crash-absorbing vehicle crumple zones
SAFE VEHICLES - CONTINUED

Other road user safety

- Bicyclist and pedestrian detection
- Vehicle size and design

New technology

Leveraging connected and automated vehicle (CAV) technology to improve safety
SAFE SPEEDS

Speed is at the heart of a forgiving road transport system. It transcends all aspects of safety: without speed there can be no movement, but with speed comes kinetic energy and with kinetic energy and human error come crashes, injuries, and even deaths.”

Organisation for Economic Co-operation and Development
SAFE SPEEDS: REDUCING PEDESTRIAN FATALITIES

Hit by a vehicle traveling at

23 MPH  
10% risk of death

Hit by a vehicle traveling at

42 MPH  
50% risk of death

Hit by a vehicle traveling at

58 MPH  
90% risk of death

Source: FHWA
SAFE SPEEDS: FATALITY RISKS

Impact Speed (MPH)

Fatality Risk

0%
100%

Auto Hits Pedestrian
Auto Hits Fixed Object
Auto Side Impacts Auto
Auto Hits Auto Head-On

Source: FHWA
SAFE SPEED: TREATMENTS THAT MINIMIZE INJURIES

Speed through typical intersection

Source: Fehr & Peers

Speed through Safe System intersection

Source: City of Carmel, IN
Safe roads are designed and operated to:

1. Prevent crashes
2. Keep impacts on the human body at tolerable levels
SAFE ROADS: AVOIDING CRASHES

Avoiding crashes involves:

- Separating users in space
- Separating users in time
- Increasing attentiveness and awareness

Source for all images: Fehr & Peers
SAFE ROADS: CRASH KINETIC ENERGY

Managing crash kinetic energy involves:

- Managing speed
  Source: Fehr & Peers

- Manipulating mass
  Source: Fehr & Peers

- Manipulating crash angles
  Source: City of Carmel, IN
Safe roads include all aspects of the roadway system:
Vital post-crash actions include:

- First responders
- Medical care
- Crash investigation
- Traffic incident management
- Justice
The “Swiss Cheese Model” of redundancy creates layers of protection. Death and serious injuries only happen when all layers fail.

- Post-crash care
- Safe roads
- Safe speeds
- Safe vehicles
- Safe road users

Source: FHWA
Implementing the Safe System approach is our shared responsibility, and we all have a role.
Zero is our goal.
A Safe System is how we get there.

Questions?