AI Aspirations & Transportation

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Our Roadway Safety Crisis

NHTSA estimates 40,990 lives were lost in traffic fatalities in 2023

Equivalent to a midsized aircraft, with a capacity of 110 passengers, crashing everyday for a year.

USDOT's Response: Adoption of the Safe Systems Approach

How can AI and HD Mapping help implement the Safe Systems Approach?

A Scenario

A bustling urban street during the morning rush

A child, not using the cross walk, steps from between two parked cars, into traffic

A driver, distracted by their phone, is approaching the child

In the modern context this scenario could easily lead to a devastating outcome.

In the future, the Safe Systems Approach coupled with Navigation AI and HD Maps could create a different outcome

Autonomous Navigation

HD Map precisely locates the car and surrounding infrastructure

Sensors precisely locate surrounding vehicles and other vulnerable road users

AI interprets the danger, reacts within milliseconds, applies brakes, and avoids collisions by safely moving the car into open space

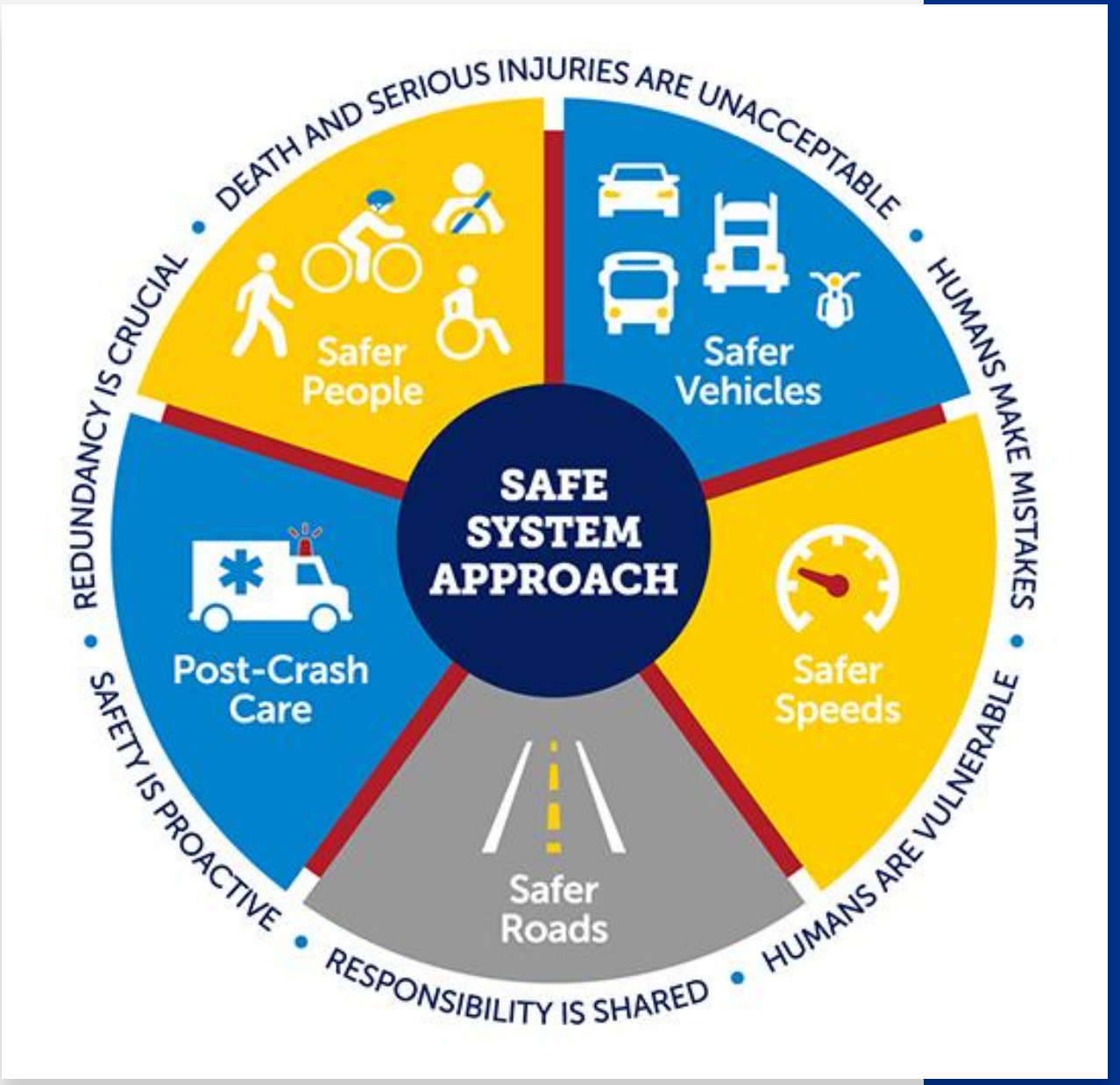
V2X connectivity – The car broadcasts its intent to adjacent vehicles and relevant infrastructure

The transportation system adjusts automatically –

Traffic reacts and slows, infrastructure optimizes flow and recovery

Safe System Approach

- A comprehensive, proactive framework aimed at reducing fatalities and serious injuries on roadways by creating a more forgiving and resilient transportation system.
- Differs from traditional road safety efforts by recognizing that human errors are inevitable and therefore designing the system to accommodate these errors in a way that prevents severe outcomes.
- Rather than focusing solely on reducing the likelihood of crashes, the Safe System approach emphasizes minimizing the consequences of crashes when they do occur.



Principles

- Death & Serious Injuries are Unacceptable
- Humans Make Mistakes
- Humans Are Vulnerable
- Responsibility is Shared
- Safety is Proactive
- Redundancy is Crucial

Objectives

Safer People

Safer Roads

Safer Vehicles

Safer Speeds

Post Crash Care

HD Maps Support the SSA

Enhancing Vehicle Automation and Connectivity

Supporting Vulnerable Road Users

Improving Road Design and Infrastructure Safety

Facilitating Predictive Safety Models

Traffic Management and Incident Response

Post-Crash Analysis and Prevention

Integration with Smart City Infrastructure

Enhancing Vehicle Automation & Connectivity

Autonomous Vehicles (AVs)

- HD maps, with detailed and precise road information enable autonomous vehicles (AVs) to navigate more safely and accurately.
- AVs rely on HD maps for positioning, path planning, and decision-making, reducing human error—a major cause of traffic incidents.

Vehicle-to-Infrastructure Communication (V2I):

- HD maps can support connected vehicles, enabling them to communicate with infrastructure (e.g., traffic lights, road signs) in real-time, improving situational awareness and responsiveness to dynamic road conditions.

Supporting Vulnerable Road Users

HD maps can identify areas where vulnerable road users (pedestrians, cyclists, etc.) are at higher risk, enabling AVs and human drivers to take precautionary measures.

Precise geospatial data about crosswalks, bike lanes, and school zones allow vehicles to anticipate potential risks and adjust speeds or driving behavior.

Improving Road Design and Infrastructure Safety

The Safe System approach emphasizes designing roads that **forgive human errors**.

HD maps provide detailed, real-time information that can be used to assess road safety features.

Transportation agencies can use this data to plan improvements, such as **adjusting road geometry, improving signage, or identifying high-risk areas** for crashes.

Facilitating Predictive Safety Models

With accurate, continuously updated HD maps, transportation agencies can build **predictive safety models**.

These models help anticipate high-risk areas based on factors like traffic density, road conditions, and weather patterns.

Integrating HD maps with real-time traffic and sensor data allows for **proactive measures** such as rerouting traffic or adjusting speed limits.

Traffic Management and Incident Response

HD maps contribute to **real-time traffic management systems**, helping authorities monitor and manage traffic flow more effectively.

For example, HD maps integrated with traffic sensors and cameras can provide up-to-date information on road conditions, traffic incidents, and congestion, improving emergency response times and enabling quicker decision-making.

Post-Crash Analysis and Prevention

Detailed map data can aid in **analyzing crashes** and identifying root causes by examining road features, vehicle movements, and traffic patterns in precise detail.

The data collected can then be used to **prevent future crashes** by making infrastructure improvements, updating traffic control measures, or revising speed limits in critical zones.

Integration with Smart City Infrastructure

HD maps, when combined with **smart city technologies**, can optimize traffic signals, enhance public transportation routes, and enable **dynamic lane management**.

This improves overall urban mobility and reduces traffic conflicts, promoting the Safe System approach's goal of safer roadways for all users.

Zero Deaths!

Getting to zero is a shared responsibility

We minimize fatal and serious injuries through a combination of better design, technology, and behavioral changes.

HD Maps can improve design, technology, and behavior