Recent Trends
Traffic Fatalities in the United States

- 0.8%

NHTSA, 2017 Fatal Motor Vehicle Crashes Overview
https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812603
Vulnerable Road Users Make Up Increasing Share of Fatalities

NHTSA, 2017 Fatal Motor Vehicle Crashes Overview
https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812603
More Fatalities Occurring Outside of Vehicles

Proportion of Fatalities Inside/Outside Vehicle, 1975–2017

- **Inside Vehicle**: Occupants of cars, light trucks, large trucks, buses, and other vehicles
- **Outside Vehicle**: Motorcyclists, pedestrians, bicyclists, and other nonoccupants

NHTSA, 2017 Fatal Motor Vehicle Crashes Overview
https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812603
Safe Systems
Principles of a Safe Systems Approach

PEOPLE MAKE MISTAKES
People Make Mistakes

- Most of our decisions are intuitive; we react to our environments and are influenced by more than logic and reason

**DELIBERATIVE**
- Conscious system
- Consideration of all available information
- Decision made using rational thought, logic, and reasoning

**INTUITIVE**
- Implicit and unconscious
- Decisions made instantaneously
- “Gut instinct”

**Examples:**
- Reacting to animal running into road
- Turning left across oncoming traffic

**Examples:**
- Route planning
- Purchasing a vehicle
People Make Mistakes

- Most of our decisions are intuitive; we react to our environments and are influenced by more than logic and reason.
People Make Mistakes

Image: PBIC Image Library, Dan Burden
Principles of a Safe Systems Approach

People make mistakes.

Human beings are vulnerable.
Human Beings are Vulnerable

Image: PBIC Image Library, Dan Burden
Human Beings are Vulnerable

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Human Beings are Vulnerable

MEET GRAHAM
THE ONLY PERSON DESIGNED TO SURVIVE ON OUR ROADS

As much as we like to think we're invincible, we're not. But what if we were to change? What if our bodies were built to survive a low impact crash? What might we look like? The result of these questions is Graham, a reminder of just how vulnerable our bodies really are.

“On side-impact, the problem is the knee is only built to bend in one direction. It will almost always break first.”

- DR. DAVID LOGAN

“Graham’s knees have movement in all directions. His joints are fortified with extra tendons to give added flexibility.”

- PATRICIA PICCININI
Principles of a Safe Systems Approach

1. People make mistakes
2. Human beings are vulnerable
3. Road safety involves numerous systems and each must be strengthened

Adapted From: SWOV, Sustainable Safety: Principles, Misconceptions and Relations with Other Visions
https://pdfs.semanticscholar.org/ba07/bb313ce482c11d4646cf5e6ad4bdcf200384.pdf
Safe Systems Approach

Figure taken from Safer Roads, Safer Queensland (2015-2021)
# Haddon Matrix

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>HUMAN</th>
<th>VEHICLE/EQUIPMENT</th>
<th>PHYSICAL ENVIRONMENT</th>
<th>SOCIO-ECONOMIC</th>
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<td>POST-CRASH</td>
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</tbody>
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**TABLE 4-6**: Haddon Matrix for crashes in an urban area *(Source: HSIP Manual)*
Principles of a Safe Systems Approach

- People make mistakes
- Human beings are vulnerable
- Road safety involves numerous systems and each must be strengthened
- Responsibility is shared across disciplines
DEATH DUE TO SPEED

Complex safety problems require multidisciplinary solutions:

- **POLICIES** to support setting appropriate limits
- **DESIGNS** that facilitate safe and appropriate speeds
- **MESSAGES** that raise awareness of expectations
- **ENFORCEMENT** to reinforce safe speeds and behaviors
Comparing Traditional and Safe Systems Approaches

What are we focused on?

Traditional Approach
- Reducing or preventing crashes

Safe Systems Approach
- Preventing deaths and Injuries

Adapted From: ITF/OECD, Zero Road Deaths and Serious Injuries
Prioritizing Injury Outcomes Over Crash Events

- Compared with traditional intersections, roundabouts may have more frequent crashes of low severity (e.g. rear-end)

- However, these designs result in lower operating speeds and minimize conflict points to reduce risk of severe injury and death

- New models for assessing intersection safety focus on kinetic energy transfer

Safe System Intersection Design Principles
(From Jurewicz et al. 2017)

Comparing Traditional and Safe Systems Approaches

What planning approach should we take?

Traditional Approach
Reactive to incidents; incremental improvements to address the problem

Safe Systems Approach
Proactively target and treat risk to improve the system (systemic improvements)

Adapted From: ITF/OECD, Zero Road Deaths and Serious Injuries
Reactive vs Proactive Approaches
Reactive vs Proactive Approaches
Reactive vs Proactive Approaches
Comparing Traditional and Safe Systems Approaches

What is ultimately responsible?

Traditional Approach: Noncompliant road users

Safe Systems Approach: A failure in the system

Adapted From: ITF/OECD, Zero Road Deaths and Serious Injuries
Framing, Language and Responsibility

- News reports lay blame for crashes on pedestrians or bicyclists, influencing public perception (Recent study from Rutgers, Lime and Texas A&M)

- Focusing on individual behaviors leads to overemphasis on awareness and education campaigns that have limited effectiveness


Responsibility is shared across disciplines.

Road safety involves numerous systems and each must be strengthened.

Human beings are vulnerable.

People make mistakes.
If you’re interested in safe systems…

Safe Systems Summit:
Redefining Transportation Safety
April 23-24, 2019
Durham, NC

• Learn more about our shared roles in transportation safety and leave with new ideas and resources.
• Participants will map systems together, collaborate with a wide range of stakeholders, tour and discuss advanced technologies, and swap ideas in expert panel sessions.
• Keynote speakers:
  – Dr. Roderick McClure, University of New England (Australia)
  – Phil Koopman, Carnegie Mellon University
• Details and full agenda: [www.roadsafety.unc.edu/summit](http://www.roadsafety.unc.edu/summit)
Thank You!
gelinne@hsrch.unc.edu