Collaborative Sciences Center for ROAD SAFETY

Safe Systems Summit
Redefining Transportation Safety

Moving principles into practice

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What is a safe transportation system?

a system in which people cannot die <u>despite</u> human error.

Job, and Sakashita. 2016a

safe
system

What is a dangerous transportation system?

dangerous system

a system in which people can die with <u>no human error</u> (e.g., mine field, avalanche area).

Job, and Sakashita. 2016a
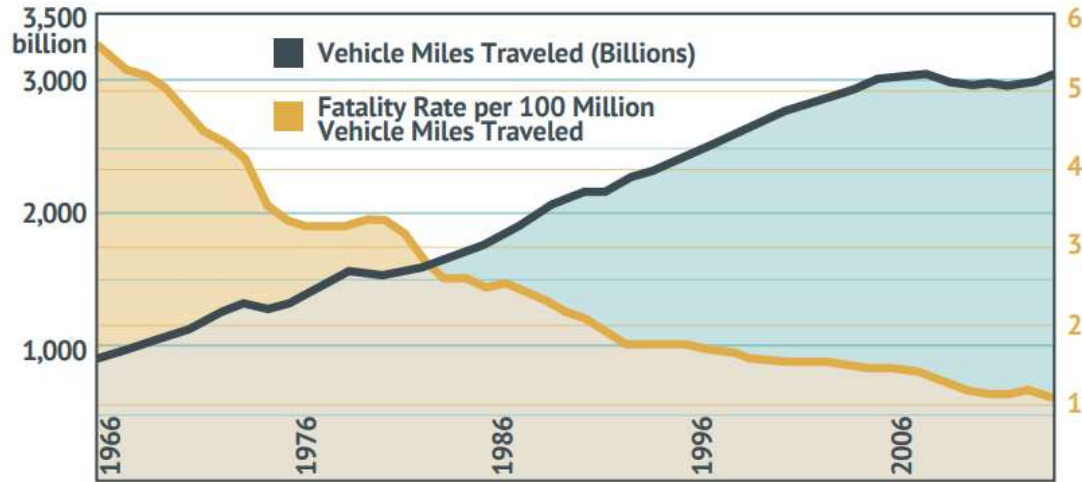
Our system is not safe and not dangerous

FIGURE 1-3: Fatality Rate and Vehicle Miles Traveled, 1966-2013 (Source: NHTSA FARS)

Vehicle Miles Traveled (Billions)

Fatality Rate per 100 Million Vehicle Miles Traveled

a system in which people can die through human error   Job, and Sakashita. 2016a

unsafe system

Policy innovation to move the needle

Vision Zero &
Safe System

challenge our
ability to reach
zero without a
major change

V1.0

V2.0

dangerous
system

unsafe
system
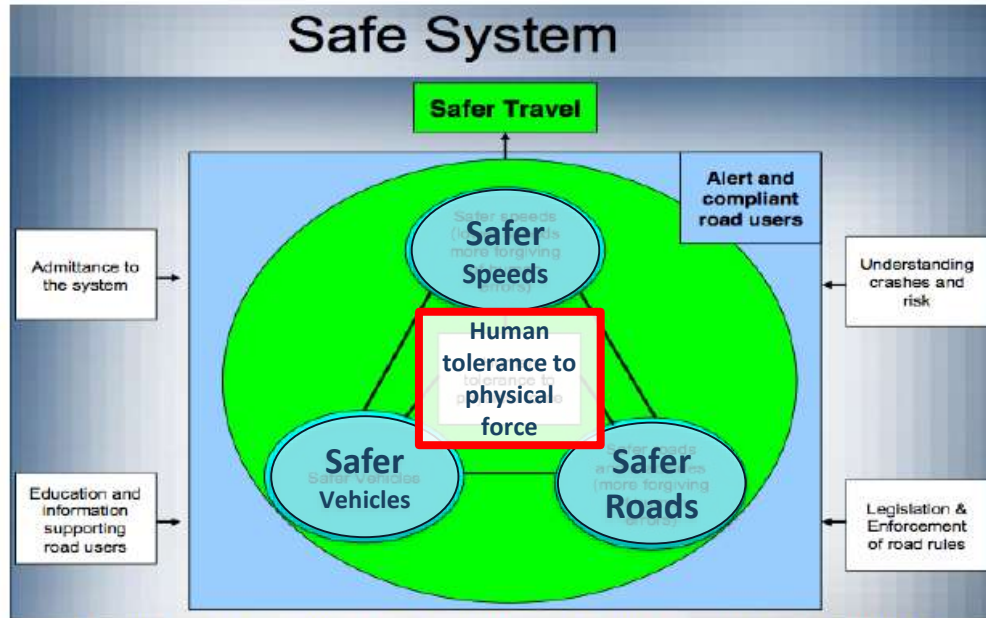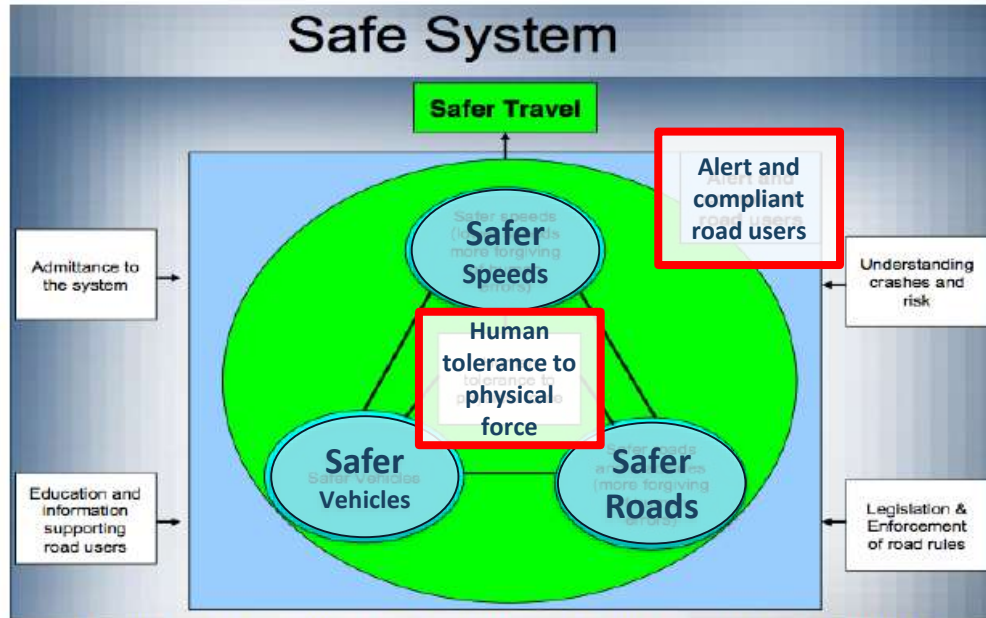
safe
system

Safe System: Multi-layered approach

Mooren et al., 2011

Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

dangerous system

unsafe system

safe system

Safe System core: human tolerance to force

Mooren et al., 2011
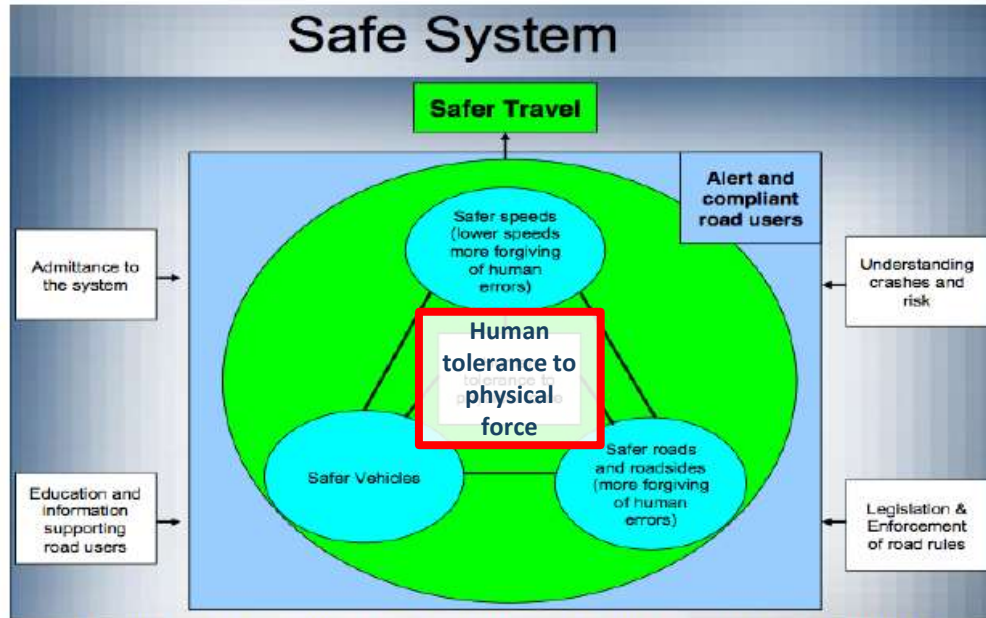
Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

dangerous system

unsafe system

safe system

Safe System: safe Speeds, Vehicles, Roads

Mooren et al., 2011
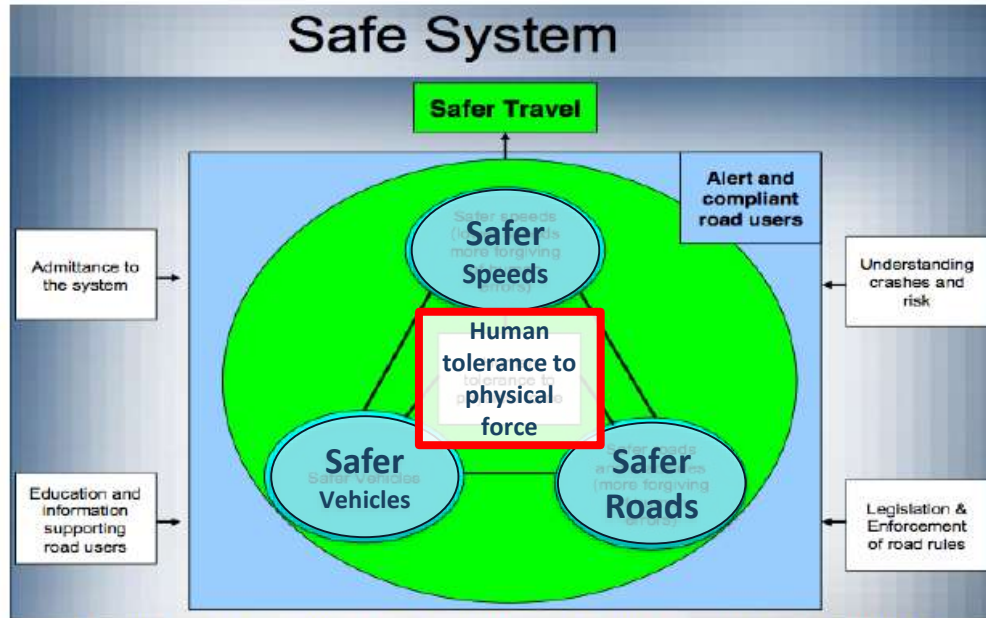
Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

dangerous system

unsafe system

safe system

Safe Speeds, Safe Vehicles, Safe Roads

Danny Bagwell Flips Violently At Daytona 1999
https://www.youtube.com/watch?v=IIotGXqBH0Y

Safe System: safe Speeds, Vehicles, Roads

Mooren et al., 2011

Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

dangerous system

unsafe system

safe system

Safe System: Alert and Compliant Users

Mooren et al., 2011

Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

dangerous system

unsafe system

safe system

Who is this safe/r road user we design for?

Goody two shoes minion

Phil

Error-prone minion

Carl

Unsafe system

Safe system

Variations in teen perception of risk factors

Chen K., Cooper J., Grembek O., 2015.

Variations in teen perception of risk factors

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Variations in teen perception of risk factors

Chen K., Cooper J., Grembek O., 2015.

Other than lack of driving experience, name five of the most common factors that contribute to teenagers being hurt (or killed) in a car crash.

RISK FACTORS BY AGE, GENDER, LICENSING STATUS

Differences by Age
The odds of reporting... with each one-year increase in age.

fatigued driving is **14%▼**
eating while driving is **12%▼**
distracted driving is **9%▼**
BUT... recklessness is **12%▲**

Differences by Gender

75.4% alcohol-impaired driving

72.7% texting and driving
44.4% distracted driving
30.7% talking on cell phone and driving

32.0% speeding

28.7% fatigued driving

26.0% drug-impaired driving

21.7% not wearing a seatbelt

Differences by **Gender**
The odds of a male reporting... than for a female.

texting and driving is **32%▼**
distracted driving is **25%▼**
speeding is **25%▼**
not wearing a seatbelt is **24%▼**
impaired driving is **24%▼**
BUT... other cell phone use is **42%▲**
recklessness is **36%▲**

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Variations in teen perception of risk factors

Chen K., Cooper J., Grembek O., 2015.

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Non-symmetric Perception

and
Misjudgment

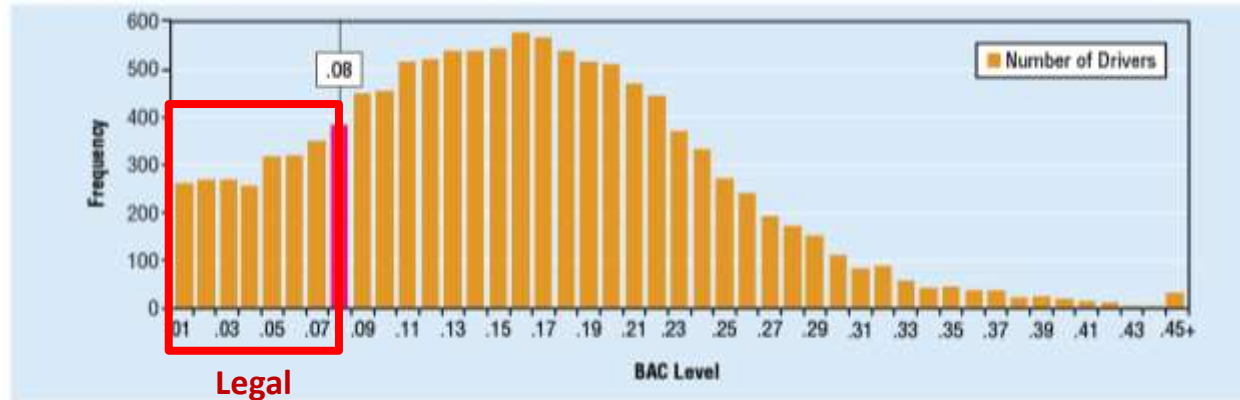# Safe/r road users and speed

Speed limits and weather

and
Misjudgment

Safe/r road users and alcohol

Distribution of BACs for Drivers With BACs of .01 g/dL or Higher Involved in Fatal Crashes, 2016

Source: FARS 2016 ARF

Alcohol

and
Misjudgment

Diminished performance below 0.08 BAC may not be accounted for in perception reaction time assumptions for current **design** standards

Does our unsafe system require us to be safer than what we are?

Mooren et al., 2011

Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

dangerous system

unsafe system

safe system

Hope for the best,

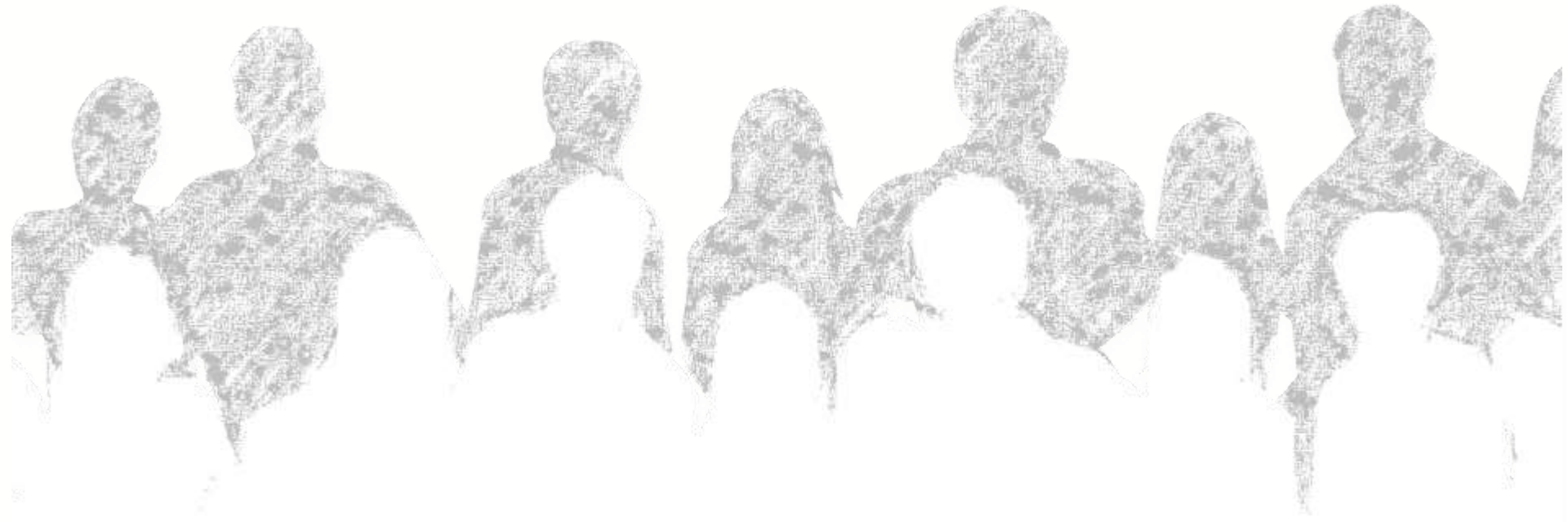Goody two shoes minion

Error-prone minion

Hope for the best, and design for the vulnerable

Goody two shoes minion

Error-prone minion

Thank you!

Berkeley SafeTREC