

Safe Systems Summit

Redefining Transportation Safety



Moving principles into practice

Dr. Offer Grembek

Co-Director, UC Berkeley SafeTREC

Associate Director, CSCRS

April 23, 2019

What is a **safe** transportation system?



a system in which
people cannot die
despite human error.

Job, and Sakashita. 2016a

| safe
system

What is a **dangerous** transportation system?



**dangerous
system**

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

Job, and Sakashita. 2016a

Our system is not **safe** and not **dangerous**

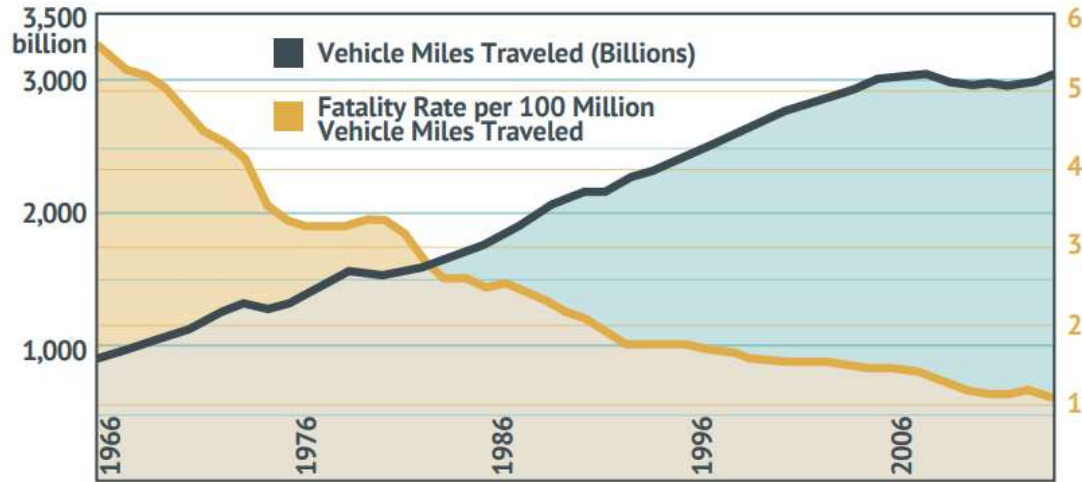


FIGURE 1-3: Fatality Rate and Vehicle Miles Traveled, 1966-2013 (Source: NHTSA FARS)

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

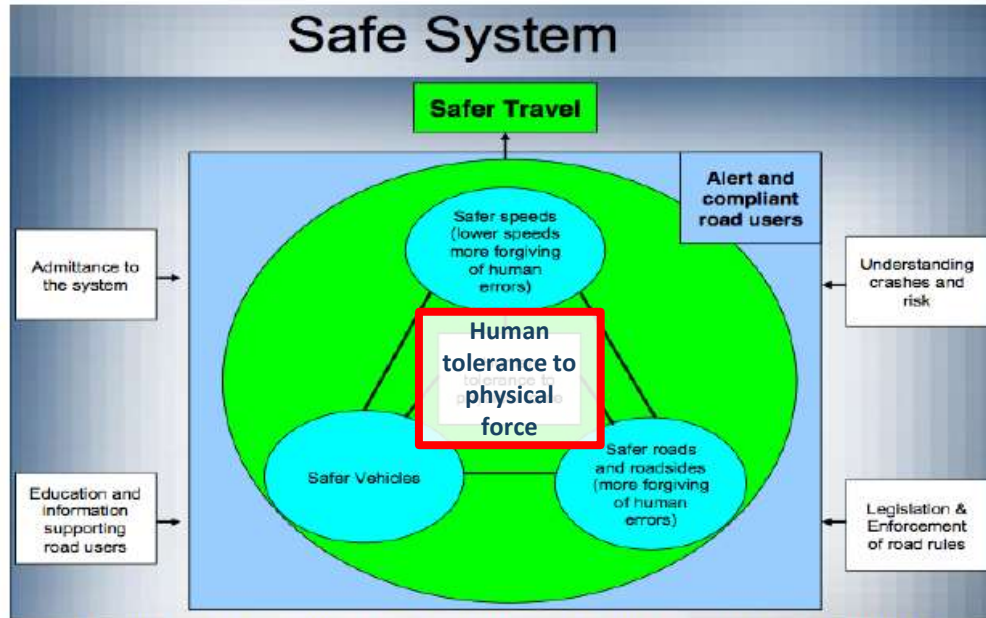


Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

dangerous
system

unsafe
system

safe
system

Safe System: safe Speeds, Vehicles, Roads

Mooren et al., 2011

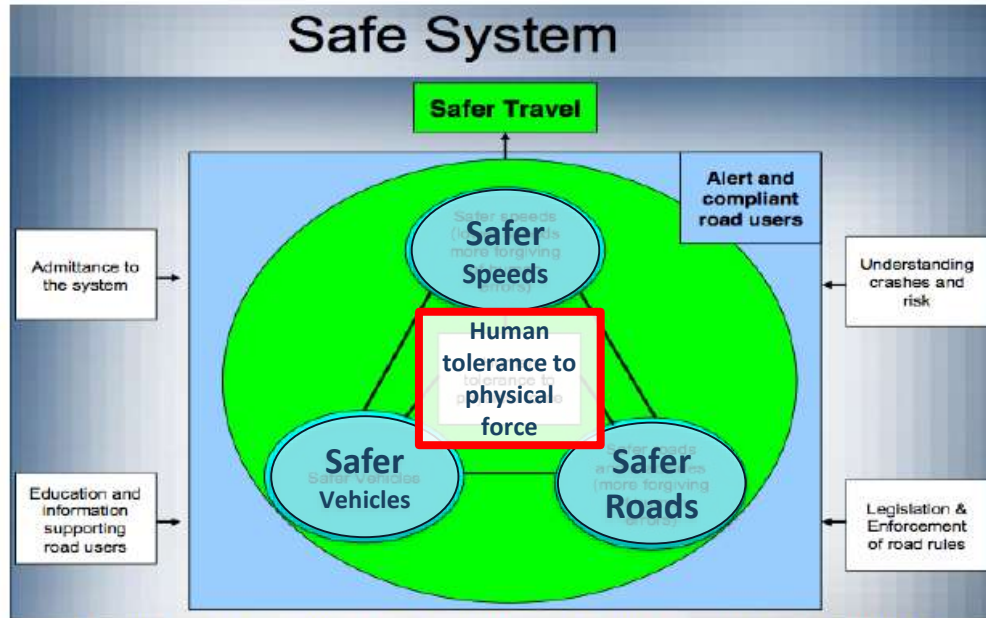


Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

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=llotGXqBH0Y>

Safe System: safe Speeds, Vehicles, Roads

Mooren et al., 2011

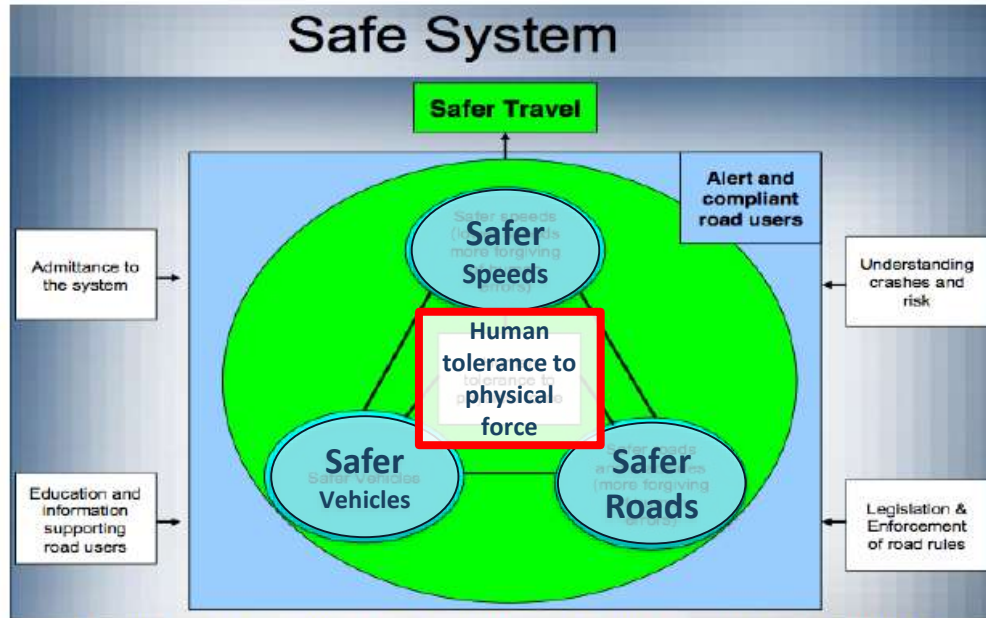


Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

dangerous
system

unsafe
system

safe
system

Safe System: Alert and Compliant Users

Mooren et al., 2011

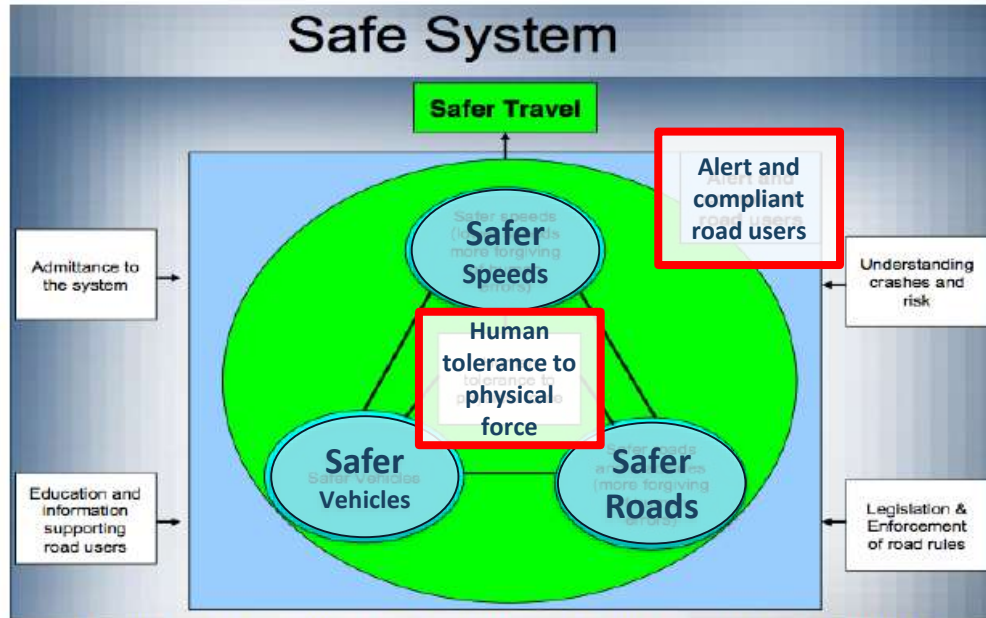


Figure 3 – The Safe System model reproduced from Howard, 2004 [25]

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.

INTRODUCTION	REPORTED RISK FACTORS	RISK FACTORS BY AGE, GENDER, LICENSING STATUS*
<p>Teen drivers, especially males, are known to be at greater risk of being involved in a motor vehicle collision than any other age group. While novice teen drivers' primary risk factors are commonly known, less is known about what teens perceive as crash risk factors.</p>	<p>Teens reported the following risk factors with the greatest frequency:</p>	<p>*Only statistically significant findings are reported (p < 0.05)</p>
<p>METHOD</p>	<ul style="list-style-type: none">  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 	<p>Differences by Age The odds of reporting...with each one-year increase in age:</p> <ul style="list-style-type: none">  fatigued driving is 14%▼ eating while driving is 12%▼ distracted driving is 9%▼ BUT... recklessness is 12%▲ <p>Differences by Gender The odds of a male reporting... than for a female:</p> <ul style="list-style-type: none"> 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%▲ <p>Differences by Licensing Status The odds of someone with a permit or license reporting... than for someone without a permit a license:</p> <ul style="list-style-type: none"> not wearing a seatbelt is 32%▼ alcohol-impaired driving is 22%▼ BUT... distracted driving is 56%▲ impaired driving is 33%▲ fatigued driving is 32%▲
<p>California high school students participating in Teens in the Driver Seat were asked to complete a baseline survey to identify their baseline knowledge of motor vehicle crash risk factors. Specifically, teens were asked:</p> <p> 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.</p>	<p>ACTUAL RISK FACTORS</p>	<p>ACKNOWLEDGEMENTS</p>
<p>SURVEY DEMOGRAPHICS</p>	<p>Teens in the Driver Seat identifies the following as the top five risks:</p> <ol style="list-style-type: none"> 1. Driving at night 2. Speeding and street racing 3. Distractions - e.g. cell phones, passengers 4. Not wearing a seatbelt 5. Driving under the influence 	<p>Funding for this project was provided by a grant from the California Office of Traffic Safety, through the Federal Highway Traffic Safety Administration.</p> <p>Images by iStockphoto Illustrations by iStockphoto Photos by iStockphoto Photos by iStockphoto Photos by iStockphoto</p>
<p>During the 2012-2013 school year, 28 high schools across 15 counties in California participated in Teens in the Driver Seat. 2,378 surveys completed</p> <p>Gender of respondents: </p> <p>Age of respondents: </p> <p>Permit/license status of respondents: </p> <p>Geographic distribution of respondents: </p>		 

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.



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.

SURVEY DEMOGRAPHICS

During the 2010-2012 school year, 38 high schools across 13 counties in California participated in Teens in the Driver Seat.

2,378 surveys completed

Gender of respondents



Age of respondents



Permit/licensing status of respondents



Geographic distribution of respondents



32.0% speeding



28.7% fatigued driving



26.0% drug-impaired driving



21.7% not wearing a seatbelt

ACTUAL RISK FACTORS

Teens in the Driver Seat identifies the following as the top five risks:

1. Driving at night
2. Speeding and street racing
3. Distractions - e.g. cell phones, passengers
4. Not wearing a seatbelt
5. Driving under the influence



RISK FACTORS BY AGE, GENDER, LICENSING STATUS*

*The odds are reported relative to someone aged 16-17.

Differences by Age

The odds of reporting ... with each one-year increase in age:



- fatigued driving is 14%▼
- wearing while driving is 12%▼
- distracted driving is 9%▼
- BUT... reckless is 12%▲

Differences by Gender

The odds of a male reporting ... than for a female:



- testing 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%▲

Differences by Licensing Status

The odds of someone with a permit or license reporting ... than for someone without a permit or license:



- not wearing a seatbelt is 32%▼
- drugs-impaired driving is 22%▼
- BUT... distracted driving is 56%▲
- Impaired driving is 33%▲
- fatigued driving is 32%▲

ACKNOWLEDGEMENTS

Funding for this project was provided by a grant from the California Office of Traffic Safety, through the Center for Applied Research on Transportation.

SafeTREC is a project of the California Office of Traffic Safety, a division of the California Department of Transportation. SafeTREC is a project of the California Office of Traffic Safety, a division of the California Department of Transportation.

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.



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

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%↑**

wearing while driving is **12%↑**

distracted driving is **9%↑**

BUT... reckless is **12%↓**

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%↓**

Differences by Licensing Status

The odds of someone with a permit or license reporting ... than for someone without a permit or license:



not wearing a seatbelt is **32%↑**

alcohol-impaired driving is **22%↑**

BUT... distracted driving is **56%↓**

impaired driving is **33%↓**

fatigued driving is **32%↓**

ACKNOWLEDGEMENTS

Support for this project was provided by a grant from the California Office of Traffic Safety, Department of Transportation, Office of Traffic Safety Administration.

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Variations in teen perception of risk factors

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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.



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

RISK FACTORS BY AGE, GENDER, LICENSING STATUS*

Differences by Age

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



drugged driving is **14%▼**

wearing white driving is **12%▼**

distracted driving is **9%▼**

BUT... recklessness is **12%▲**

Differences by Gender

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%▲**

Variations in teen perception of risk factors

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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.



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

RISK FACTORS BY AGE, GENDER, LICENSING STATUS*

Differences by Age

The odds of reporting... with each two-year increase in age.



Delayed driving is 14%▼

Being white driving is 12%▼

Distracted driving is 9%▼

BUT... recklessness is 12%▲

Differences by Gender

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%▲

Non-symmetric Perception
and
Misjudgment

Safe/r road users and speed

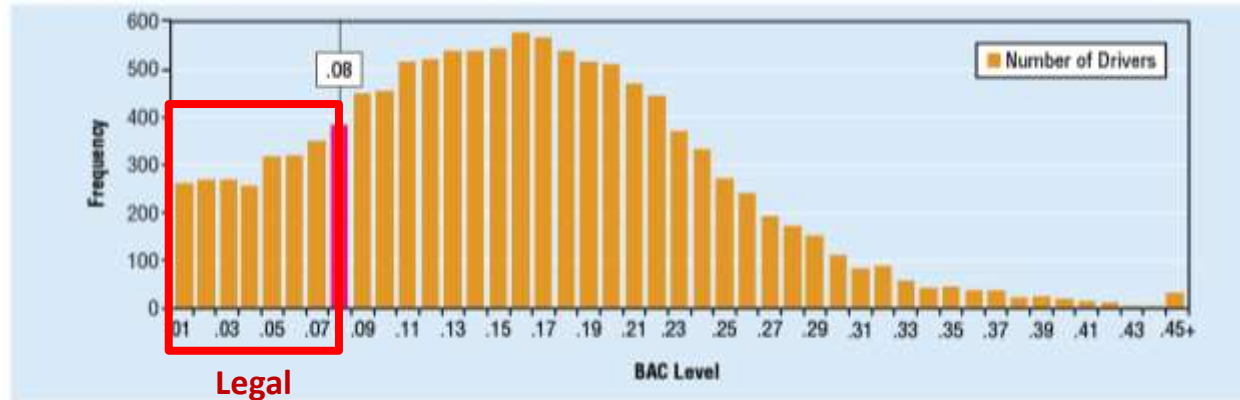


**Speed limits
and weather**

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



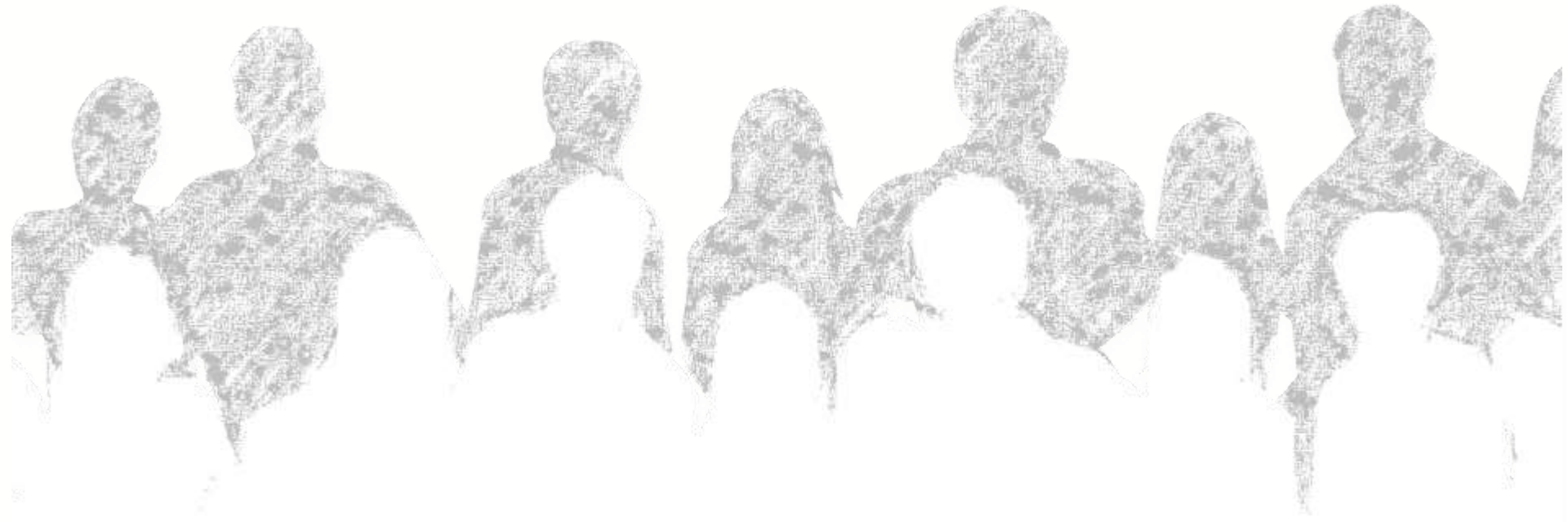
Hope for the best, and design for the vulnerable

Goody two shoes minion



Error-prone minion





Thank you!