The Four Pillars of Traffic Safety

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Harmonize Three Components of Transportation System
Four Key Areas to Improve Traffic Safety

- Data
- Design
- Dissemination
- Enforcement
Why **Data**?

Provide trends & show “trouble areas”

Priority improvement needs

Aid in investment/resource allocation decisions

Implement systematic approach to improve safety

https://nats.aero/blog/2014/03/europe-24-air-traffic-data-visualisation/


http://www.trafficvision.com/
Traffic Fatality Around the World – 2015

Fatalities per billion vehicle-km

Source: IRTAD (International Traffic Safety Data and Analysis Group, OECD)
Traffic Fatality Statistics – Overview

Deaths in Motor Vehicle Crashes

Source: NHTSA’s FARS, Analyzed by AAAFTS
(2016 Data, Extrapolated from Jan-Sept 2016 estimate)
## Three Major Crash Types in U.S. – 2015

<table>
<thead>
<tr>
<th>Type</th>
<th>Crashes</th>
<th>Injuries</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersection &amp; Intersection-Related</td>
<td>2,658,000</td>
<td>1,193,000</td>
<td>7,778</td>
</tr>
<tr>
<td>Road Departure</td>
<td>889,000</td>
<td>343,000</td>
<td>10,278</td>
</tr>
<tr>
<td>Pedestrian/Cyclist</td>
<td>121,000</td>
<td>127,000</td>
<td>5,518</td>
</tr>
</tbody>
</table>

Source: NHTSA’s FARS & GES, Analyzed by AAAFTS
## Major Crash Types Involving Errors in Longitudinal Control of Vehicle – 2015

<table>
<thead>
<tr>
<th>Crash Type</th>
<th>Crashes</th>
<th>Injuries</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear-End</td>
<td>2,006,000</td>
<td>804,000</td>
<td>2,186</td>
</tr>
<tr>
<td>Turn Across Path</td>
<td>538,000</td>
<td>293,000</td>
<td>1,728</td>
</tr>
<tr>
<td>Turn Into Path</td>
<td>526,000</td>
<td>212,000</td>
<td>1,107</td>
</tr>
<tr>
<td>T-Bone</td>
<td>418,000</td>
<td>281,000</td>
<td>2,306</td>
</tr>
<tr>
<td>Frontal Crash into Parked Car</td>
<td>222,000</td>
<td>42,000</td>
<td>153</td>
</tr>
<tr>
<td>Frontal Crash into Pedestrian/Cyclist</td>
<td>112,000</td>
<td>114,000</td>
<td>4,865</td>
</tr>
</tbody>
</table>

Source: NHTSA's FARS & GES, Analyzed by AAAFTS
What about **Design**?

Keep in mind about limitations of the users

- Capabilities
- Experiences

Other factors about the users

- Attitudes
- Preferences
- …
https://www.washingtonpost.com/local/mall-centric-no-more-aging-suburb-targeted-for-a-sweeping-makeover/2015/05/30/

https://commons.wikimedia.org/wiki/File:Taiwan_2009_Taipei_GongGuan_At_Night_FRD_8551.jpg

http://thecityfix.com/blog/the-most-dangerous-roads-in-the-world/

https://commons.wikimedia.org/wiki/File:Complex_road_crossings_-_geograph.org.uk_-_780283.jpg
http://andyoverseas.blogspot.com/2006/09/i-was-going-through-pictures-i-had.html

http://www.dailymail.co.uk/news/article-2048696/Road-signs-make-sense-unnecessary-removed.html

http://sugolyasokuhou.doorblog.jp/archives/43649685.html

Design Supports
More Design Supports

Human Factors Design Guidance For Driver-Vehicle Interfaces


AUTOMATED DRIVING SYSTEMS

A Vision for Safety

TED International

DRIVER DISTRACTION AND INATTENTION
Advances in Research and Countermeasures, Volume 1

THE MULTISENSORY DRIVER
Implications for Ergonomic Car Interface Design

Cristy Ho and Charles Spence

HUMAN FACTORS IN ROAD AND RAIL TRANSPORT

U.S. Department of Transportation

NHTSA

NHTSA

SAE International
How to **Disseminate?**

Multiple methods to deliver clear & critical messages to users

- Safety campaigns
- Education & trainings
- ...

Repeated messages & encouragements from various stakeholders
Example 1: Share information about ‘distracted driving’

According to *2016 Traffic Safety Culture Index* …

**Cell Phone vs. Driving**

- 70% said it is unacceptable to talk on hand-held phone; 33% said the same about hands-free phone
- 59% indicated that talking on cell phones as a very serious threat to safety

However …

> 2/3 of drivers reported talking on phone while driving in past month
More on Example 1

Texting vs. Driving

• 93% feel it is unacceptable to type texts while driving
• 81% view drivers texting as a very serious threat

However …

≈1/3 admitted typing/sending a text message or email while driving

40% read a text while driving
DISTRACTED DRIVING
Example 2: Share information about ‘impaired & drowsy driving’

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Proportion of Drivers that Rate Behavior as Unacceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive when may have drank too much</td>
<td>97</td>
</tr>
<tr>
<td>Drive within 1 hour of using cannabis</td>
<td>89</td>
</tr>
<tr>
<td>Drive within 1 hour of using cannabis + alcohol</td>
<td>96</td>
</tr>
<tr>
<td>Drive when so sleepy that one has trouble keeping eyes open</td>
<td>96</td>
</tr>
</tbody>
</table>
More on Example 2

Past Year Behavior

- Drove when alcohol level might have been close to or over legal limit: 13
- Drove within 1 hour of using cannabis: 5
- Drove within 1 hour of using cannabis + alcohol: 3
Traffic Safety Messages

Continuous Reinforcement

Behavioral Adjustment
The Role of Enforcement

Law enforcement officers
• Identify & mitigate potential hazardous situations
• Ensure users follow laws & regulations

When apply properly, automatic enforcement strategies can be useful

Impact of family & friends
The Vest Knows Best

Hey, you!
Yeah, you behind the wheel!
PAY ATTENTION

You're entering a work zone, a dangerous place.
Follow my instructions – I'll keep you safe – and we'll both make it home today.

Nationally, drivers and passengers account for about 83 percent of work zone traffic deaths each year. That's why it's necessary for you to follow these tips when you enter a work zone:

- OBVERSE THE SIGNS
- SLOW DOWN
- MERGE SAFELY
- DON'T TAILGATE
- STAY ALERT

http://www.lazybrook.org/2015/01/24/school-zone-safety-reminder/


https://www.army.mil/article/165236/why_should_i_yield_to_an_emergency_vehicle_with_lights_and_siren

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Supporting Traffic Law Enforcement

Other entities that can impact traffic violators’ future behaviors & choices,

- Judicial system
- DMV
- Insurance
- Family & friends


https://www.alaskapublic.org/2017/01/13/how-traffic-court-works/

http://portland.citymomsblog.com/family/family-meetings/

Discourage Improper Behavior

Practice Safe Driving, Walking, ...

Improve Traffic Safety
Integrating the Key Areas

Data <-> Design

Enforcement <-> Dissemination