Achieving Vision Zero

A Safe Systems Approach to Transportation Planning and Design

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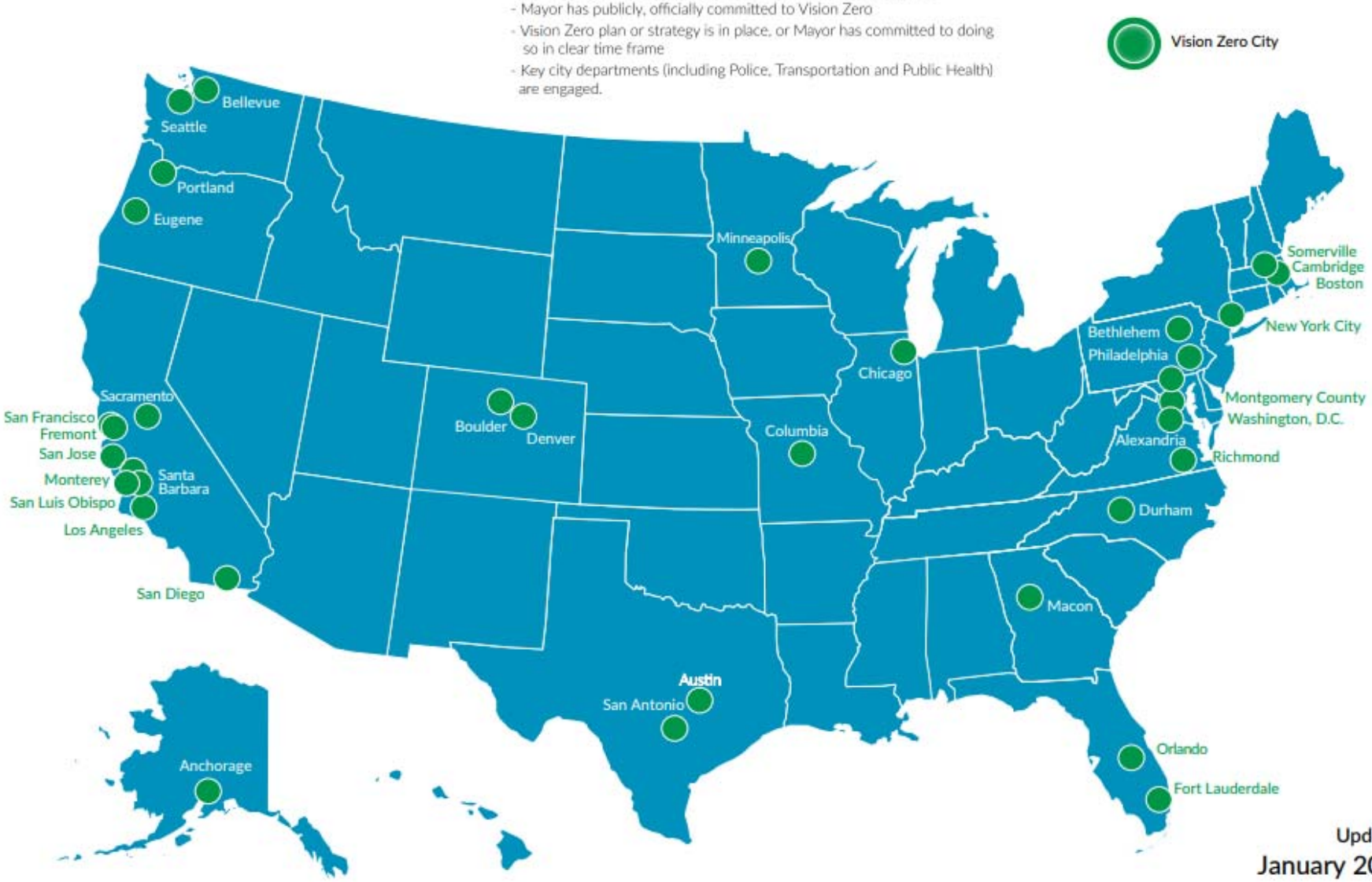
Vision Zero Cities

A Vision Zero City meets the following minimum standards:

- Sets clear goal of eliminating traffic fatalities and severe injuries
- Mayor has publicly, officially committed to Vision Zero
- Vision Zero plan or strategy is in place, or Mayor has committed to doing so in clear time frame
- Key city departments (including Police, Transportation and Public Health) are engaged.



Updated
January 2018

Conventional Wisdom: 90% of all crashes are attributable to driver error

Table 1. Driver-, Vehicle-, and Environment-Related Critical Reasons

Critical Reason Attributed to	Estimated	
	Number	Percentage* ± 95% conf. limits
Drivers	2,046,000	94% ±2.2%
Vehicles	44,000	2% ±0.7%
Environment	52,000	2% ±1.3%
Unknown Critical Reasons	47,000	2% ±1.4%
Total	2,189,000	100%

*Percentages are based on unrounded estimated frequencies
(Data Source: NMVCCS 2005–2007)

Source: NHTSA, 2015

Driver Error

- **Recognition error**, which may include driver inattention or distraction, as well as inadequate surveillance for oncoming hazards before entering an intersection of making a lane change.
- **Decision error**, such as driving too fast for conditions or misjudging gaps in oncoming traffic.
- **Performance error**, such as poor directional control over the vehicle prior to a crash, a factor most often attributable to drowsy driving.

Psychological Process

Counterfactual Reasoning: A form of logic that falsifies antecedents to determine whether they negate consequences.

Form:

Antecedent → Consequence

The Simulation Heuristic

Outcome Closeness: We focus on antecedents that are immediately proximate to consequences.

Outcome Normality: Exceptional outcomes are presumed to follow from exceptional antecedents. We construct counterfactuals that shift the exceptional antecedent to its “normal” value.

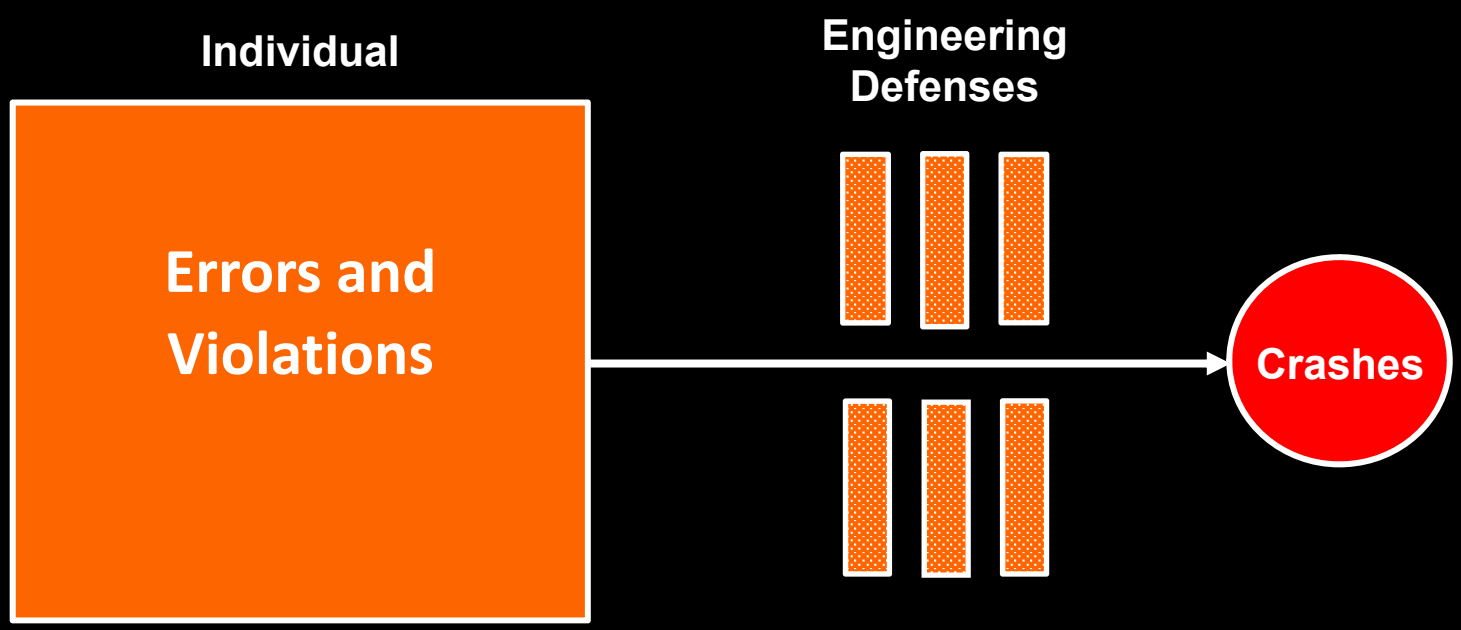
Extant Norms: Counterfactual content is based on social norms of expected behavior (which are modifiable and socially constructed).

Source: Roese, 1997

“Blaming individuals is more emotionally satisfying than targeting institutions.”

- James Reason

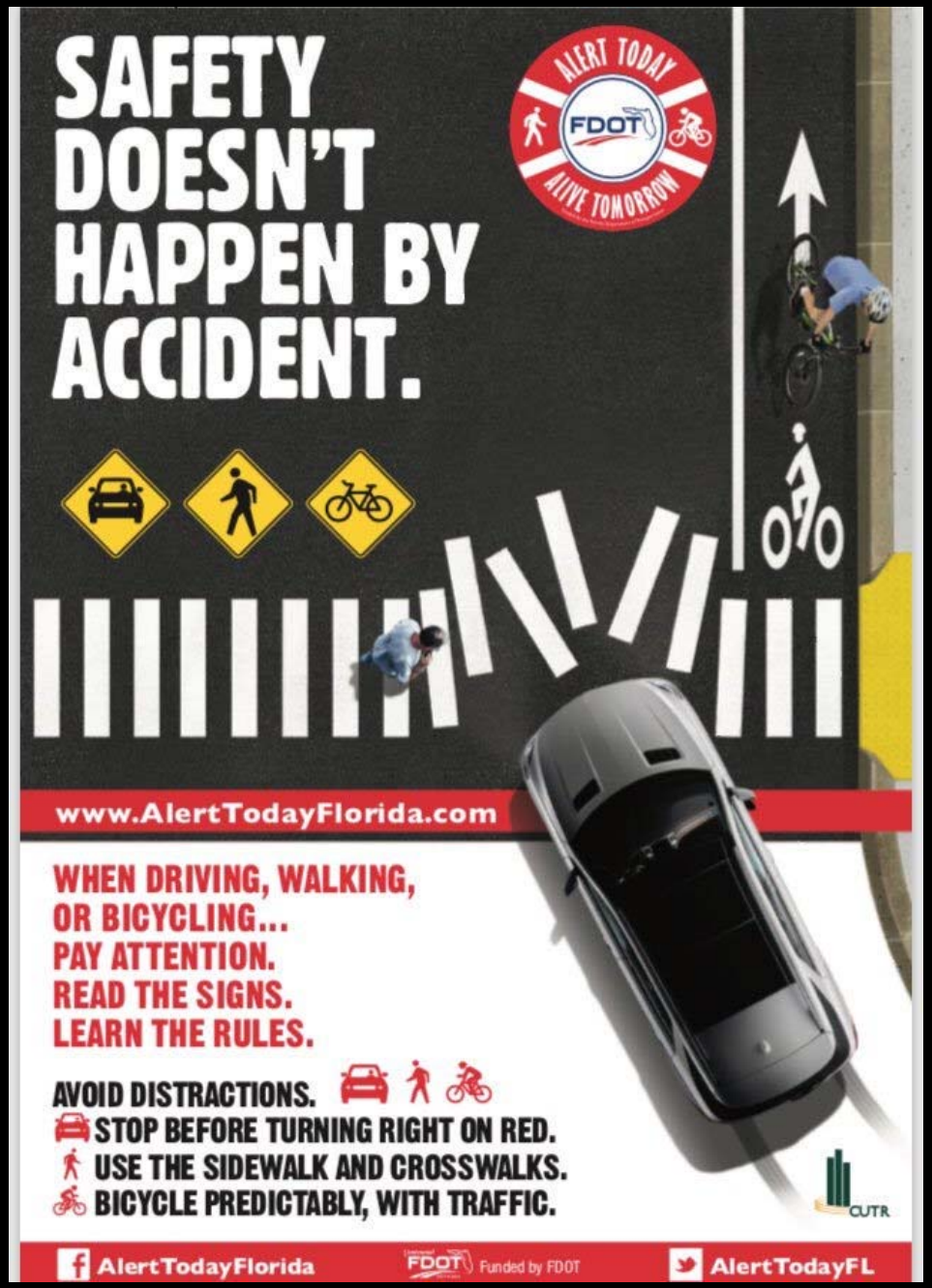
Conventional Safety Approach



"Active failure"

Passive safety features:

- Forgiving geometry
- Clear roadsides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FDOT
ALIVE TOMORROW
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WHEN DRIVING, WALKING, OR BICYCLING...
PAY ATTENTION.
READ THE SIGNS.
LEARN THE RULES.
AVOID DISTRACTIONS.
STOP BEFORE TURNING RIGHT ON RED.
USE THE SIDEWALK AND CROSSWALKS.
BICYCLE PREDICTABLY, WITH TRAFFIC.
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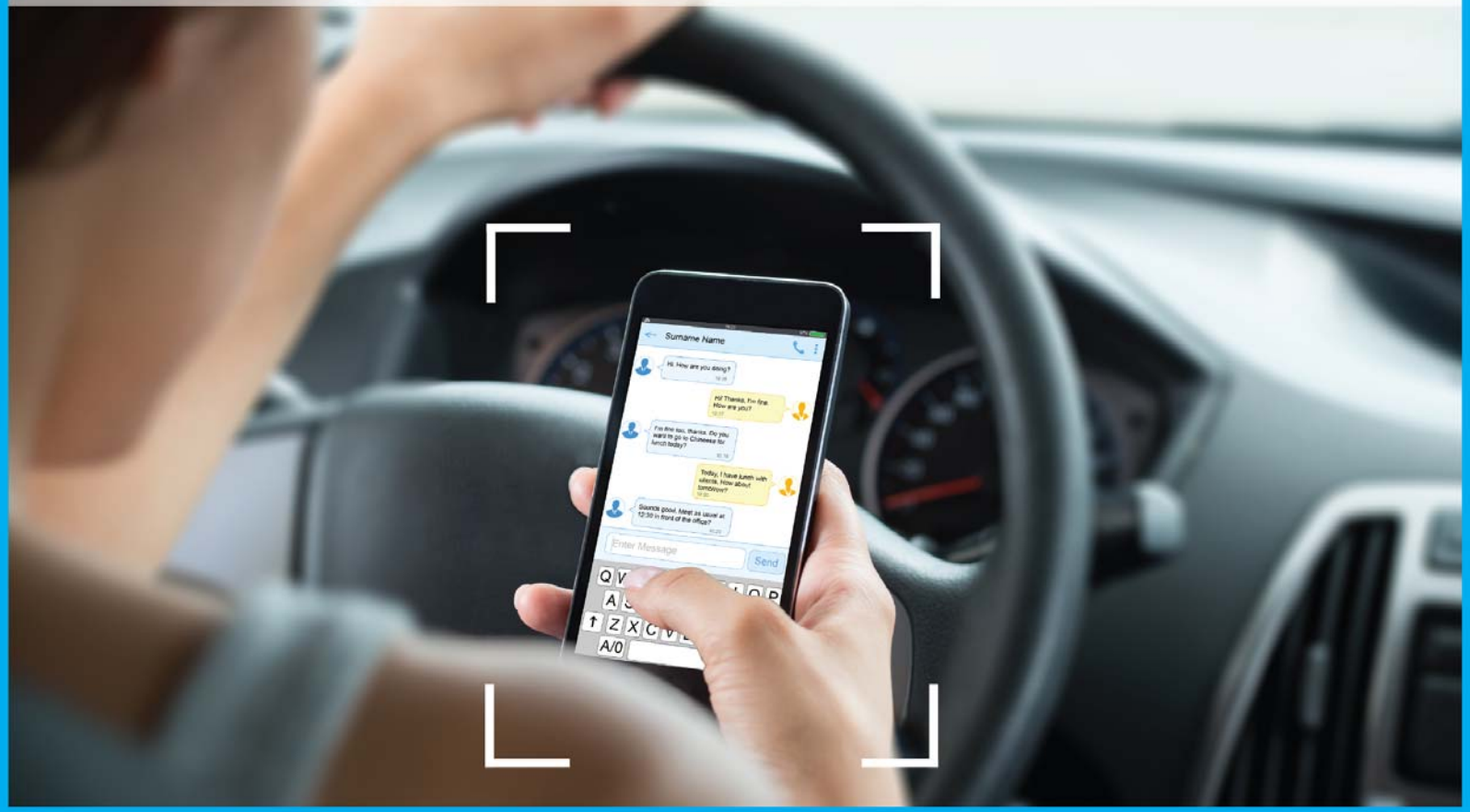
FOCUS ON DRIVING

A SAFER FLORIDA
HIGHWAY SAFETY AND MOTOR VEHICLES

HIGHWAY PATROL FLORIDA

#FocusOnDrivingFL



EYES ON THE ROAD

DON'T DRIVE DISTRACTED

Application of Counterfactual Reasoning

Pedalcyclists Killed, by Related Factors

Factors	Number	Percent
Failure to yield right of way	216	25.7
Not visible (dark clothing, no lighting, etc.)	87	10.4
Failure to obey traffic signs, signals, or officer	83	9.9
Under the influence of alcohol, drugs, or medication	53	6.3
Making improper turn	43	5.1
Improper crossing of roadway or intersection	39	4.6
Operating without required equipment	31	3.7
Wrong-way riding	31	3.7
Failure to keep in proper lane or running off road	22	2.6
Riding on wrong side of the road	20	2.4
Inattentive (talking, eating, etc.)	17	2.0
Darting or running into road	16	1.9
Improper or erratic lane changing	15	1.8
Failing to have lights on when required	8	1.0
Physical impairment	7	0.8
Vision obscured (reflected glare, parked vehicle, sign, etc.)	6	0.7
In roadway improperly (standing, lying, working, playing)	5	0.6
Making improper entry or exit from trafficway	4	0.5
Ill, blackout	3	0.4
Improper passing	3	0.4
Traveling on prohibited trafficways	2	0.2
Erratic, reckless, careless, or negligent operation	1	0.1
Passing with insufficient distance	1	0.1
Other factors	26	3.1
None reported	163	19.4
Unknown	204	24.3
Total Pedalcyclists	**840**	**100.0**

Notes: The sums of the numbers and percentages are greater than total pedalcyclists killed as more than one factor may be present for the same pedalcyclist.

Source: NHTSA, 2016

Anatomy of a Crash:
The Case of Raquel and A.J. Nelson

Pedestrian convicted of vehicular homicide in own child's death

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By Elise Hitchcock
The Atlanta Journal-Constitution

A Marietta mother may serve more time than the driver who hit and killed her 4-year-old son.

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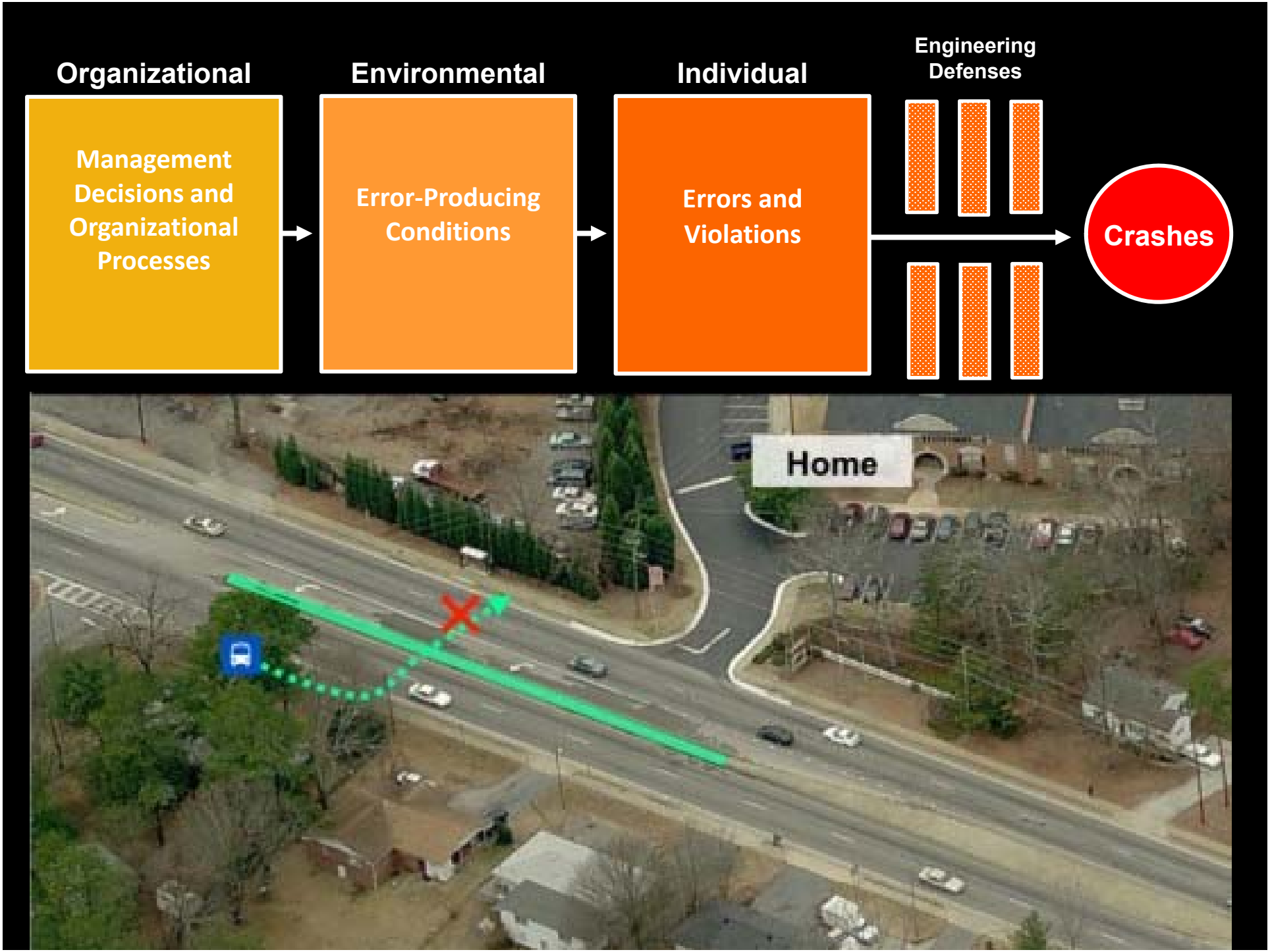
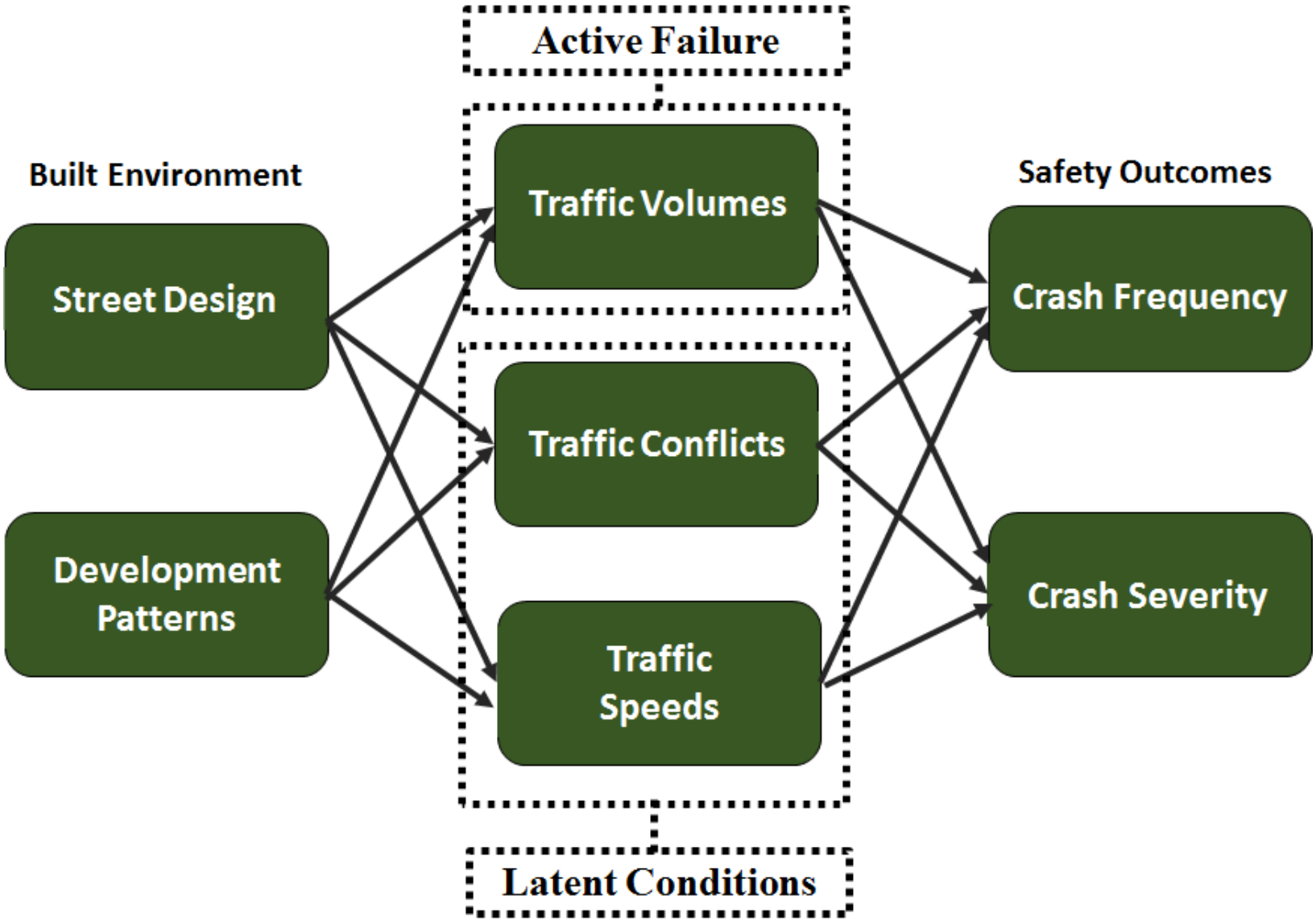
Raquel Nelson, 30, could be sentenced to up to 36 months at a hearing July 26, said David Savoy, her attorney. She was convicted Tuesday of homicide by vehicle in the second degree, crossing roadway elsewhere than at crosswalk and reckless conduct, said Savoy.

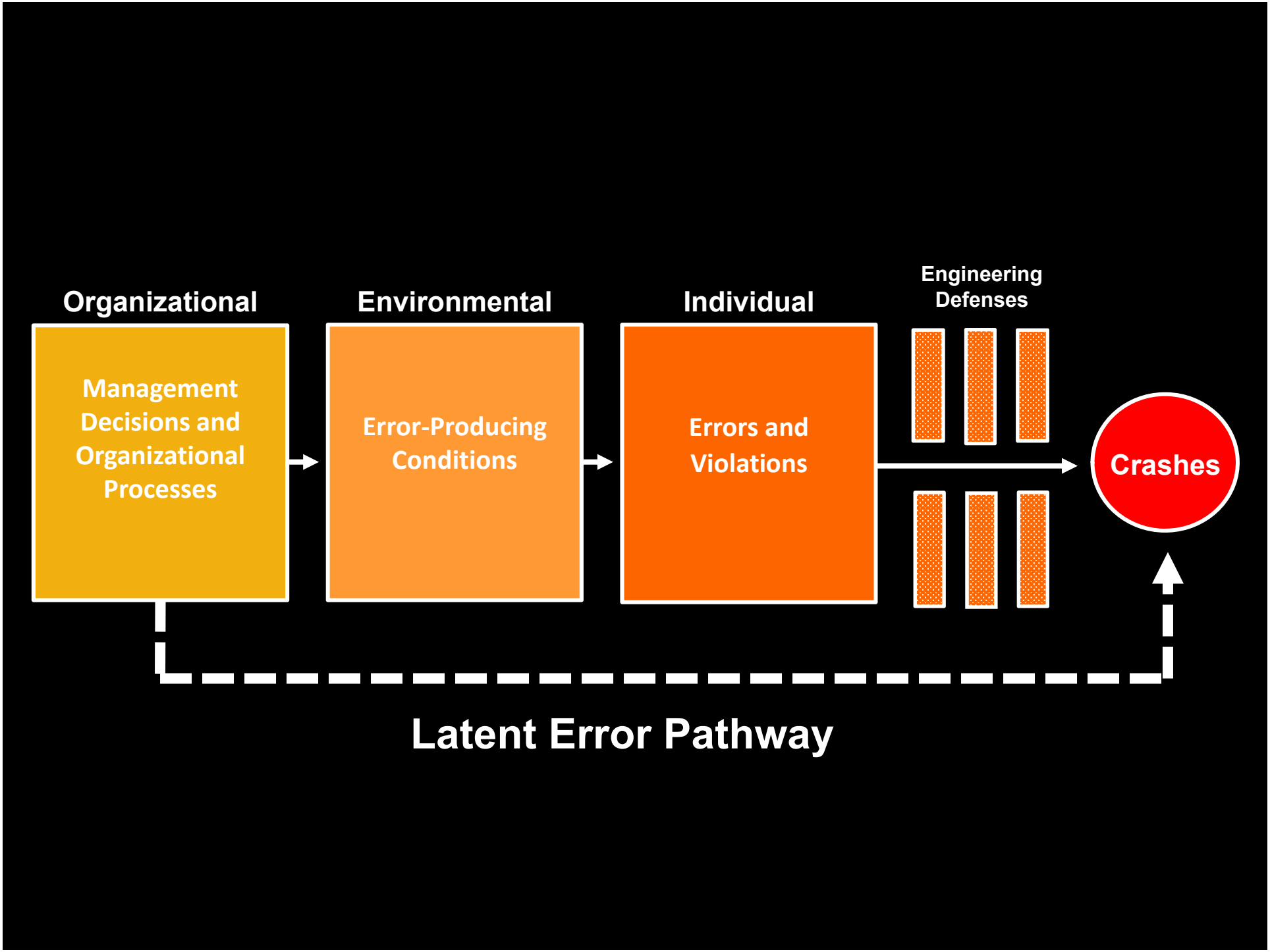
Jerry L. Guy, the driver who admitted hitting the child when pleading guilty to hit-and-run, served a 6-month sentence. He was released Oct. 29, 2010, and will serve the remainder of a 5-year sentence on probation, according to Cobb court records.


Organizational
Environmental
Individual
Engineering Defenses
Management Decisions and Organizational Processes
Error-Producing Conditions
Errors and Violations
Crashes
Home

Active Failure: Actions taken by individuals that result in crashes.

Latent Error: Dormant conditions that, when combined with active triggers, lead to crashes.

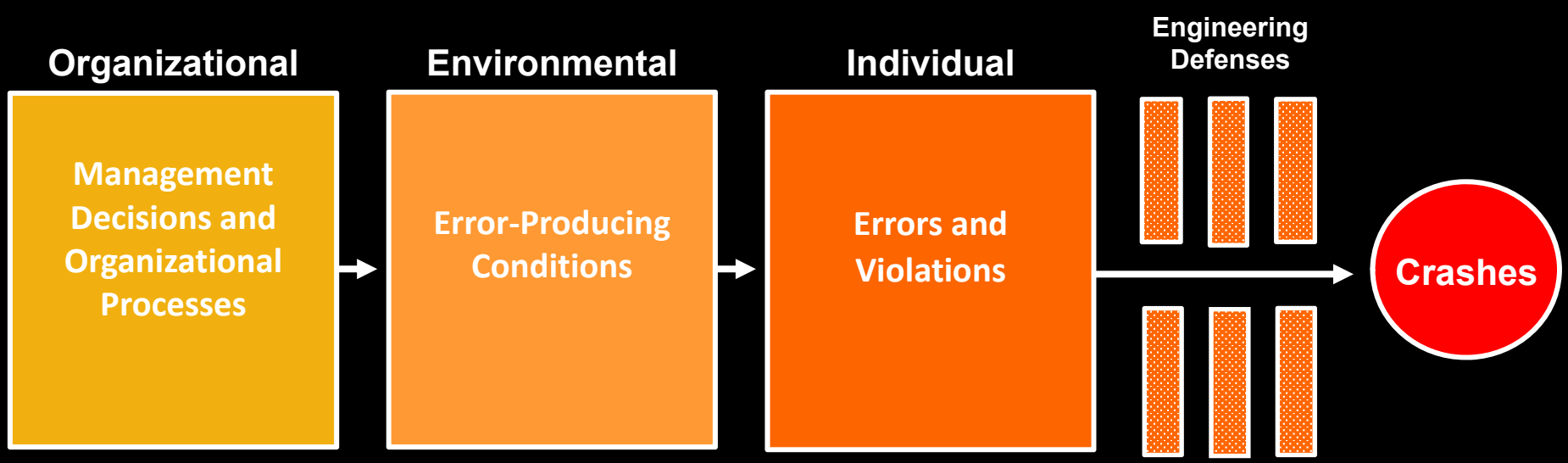

Active Failure
Built Environment
Safety Outcomes
Traffic Volumes
Street Design
Crash Frequency
Traffic Conflicts
Development Patterns
Crash Severity
Traffic Speeds
Latent Conditions


Organizational
Environmental
Individual
Engineering Defenses
Management Decisions and Organizational Processes
Error-Producing Conditions
Errors and Violations
Crashes
Latent Error Pathway

Principles of Safe Systems

1. Human error should not be viewed as the primary cause of crashes.
2. Transportation facilities should be designed for the safety of the most vulnerable user.
3. A shared responsibility exists amongst those who design, build, manage and use roads and vehicles.
4. All parts of the system must be strengthened to multiply their effects; and if one part fails, road users are still protected.

A Model for Creating Safe Systems



- Zoning Ordinances
- Subdivision Regs.
- Regional Development Plans
- Functional Classification
- LOS

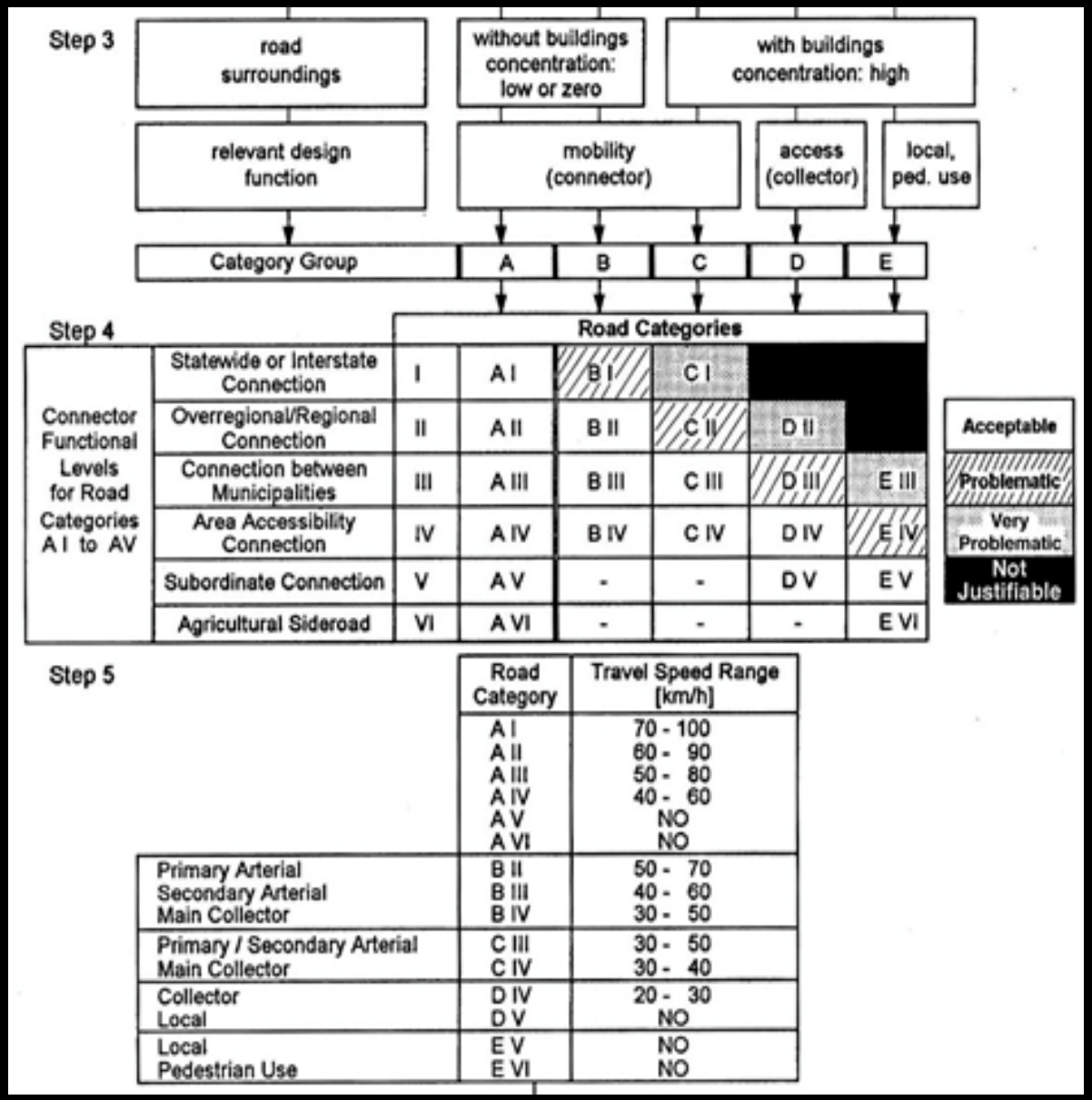
- Geometric Design
- Traffic Control
- ROW Allocation
  - Bike
  - Ped
  - Transit

- Education
- Licensure
- Enforcement
- Legal Sanctions

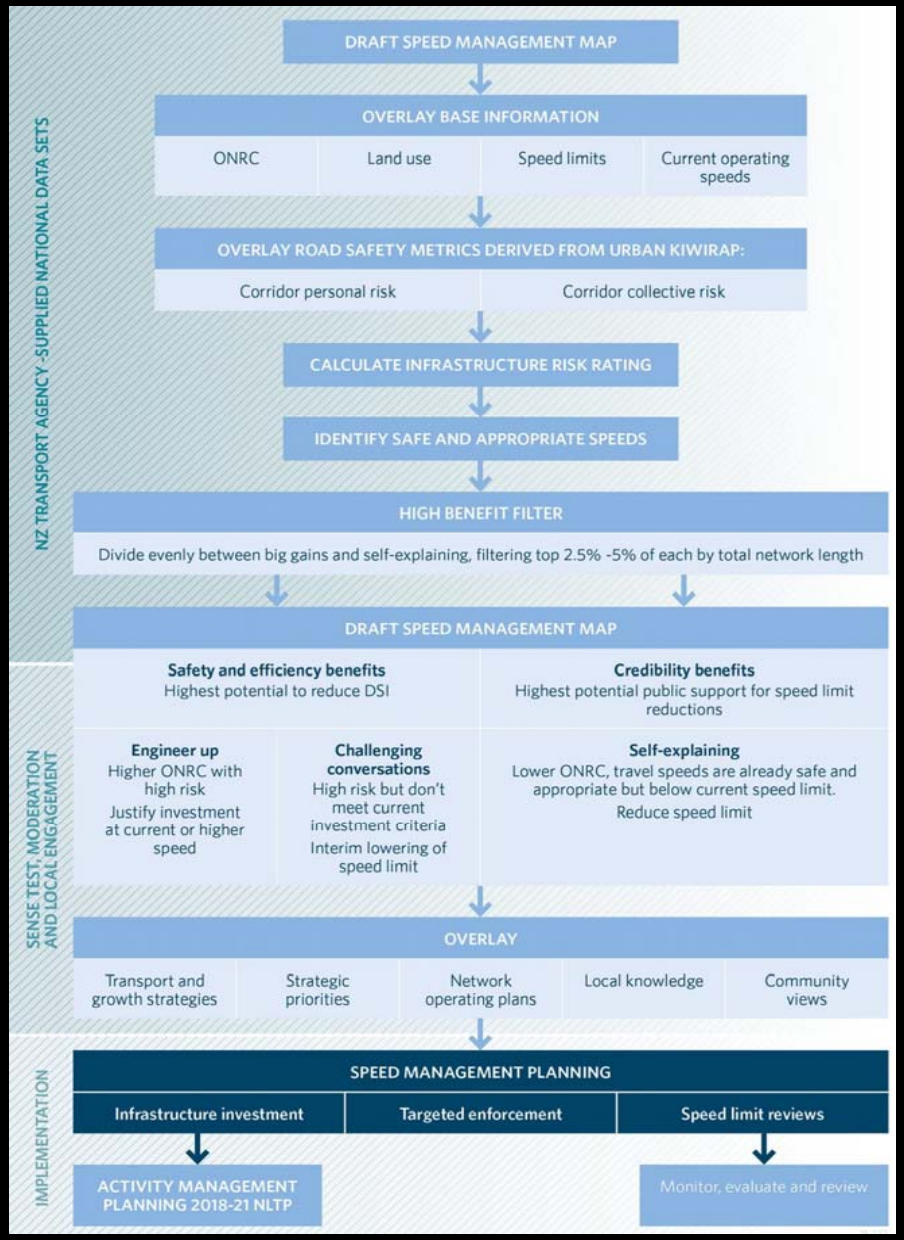
- Passive safety
- Intelligent vehicles
- Traversable hardware


Education and information
Innovation
Standards
Coordination
Data, research and evaluation
Road rules and enforcement
Licensing and registration
SAFE ROADS
SAFE SPEEDS
SAFE VEHICLES
SAFE PEOPLE
Work to prevent crashes that result in death or serious injury
HUMAN TOLERANCE OF CRASH IMPACTS

Road Class, Design Speed, and Environment: Germany



Speed Management Program:
New Zealand



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