

Strandroth Inc.

Road Safety Advice, Research and Strategy

Human Impact: What In-Depth Analysis of Crashes Tells Us

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Dr Johan Strandroth

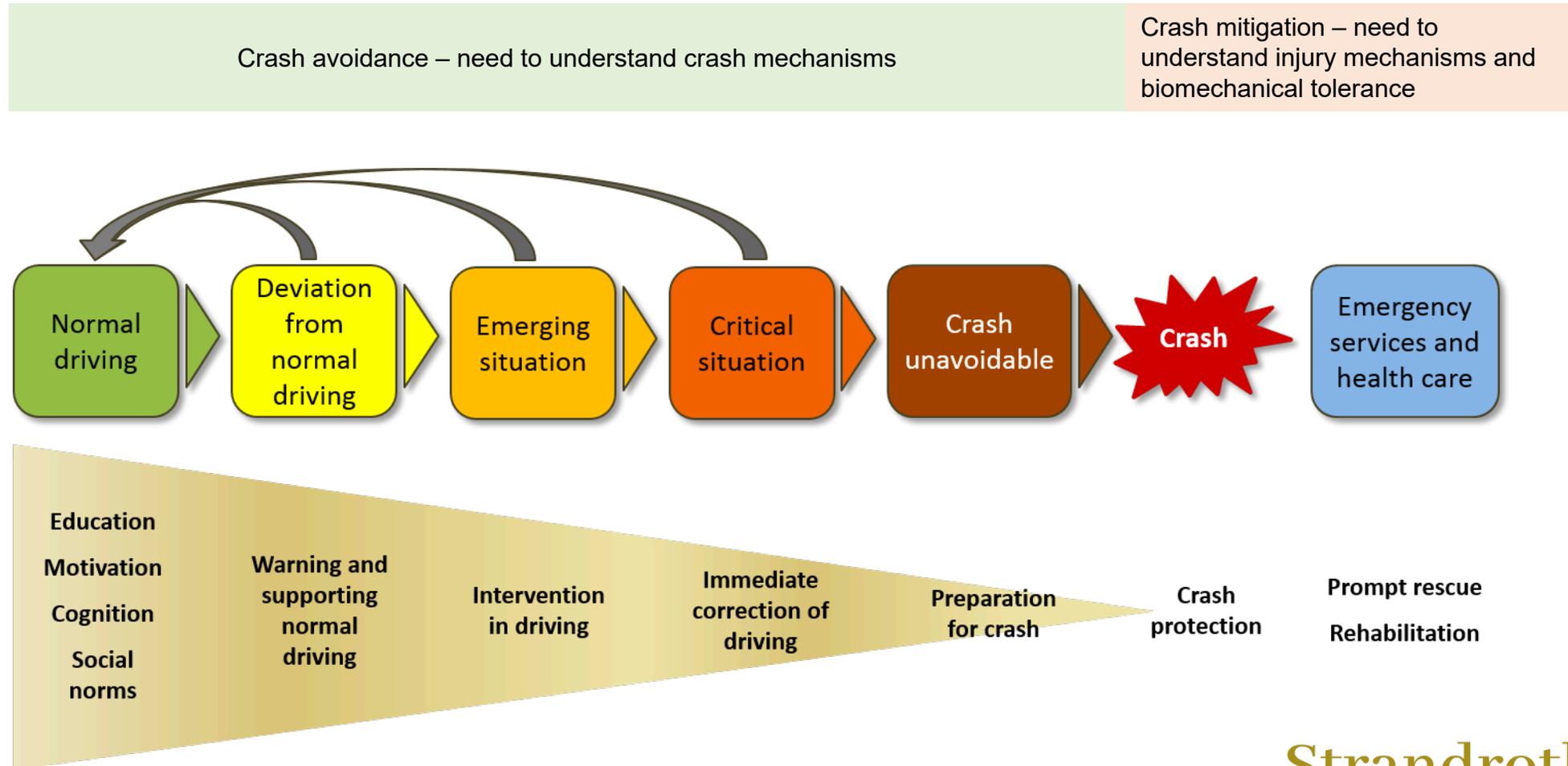
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Content

- First principle crash avoidance and injury mitigation
- Counterfactual analysis
- Local validation of Safe System boundaries and end states

First principle crash avoidance and injury mitigation



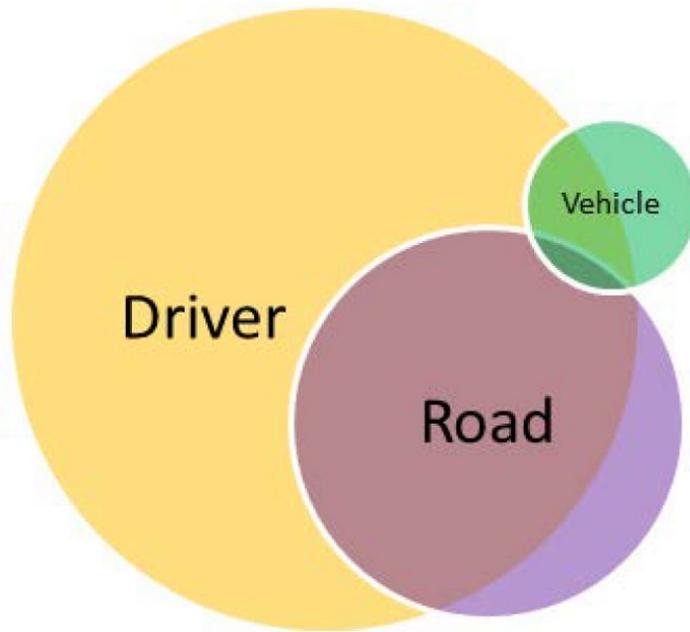
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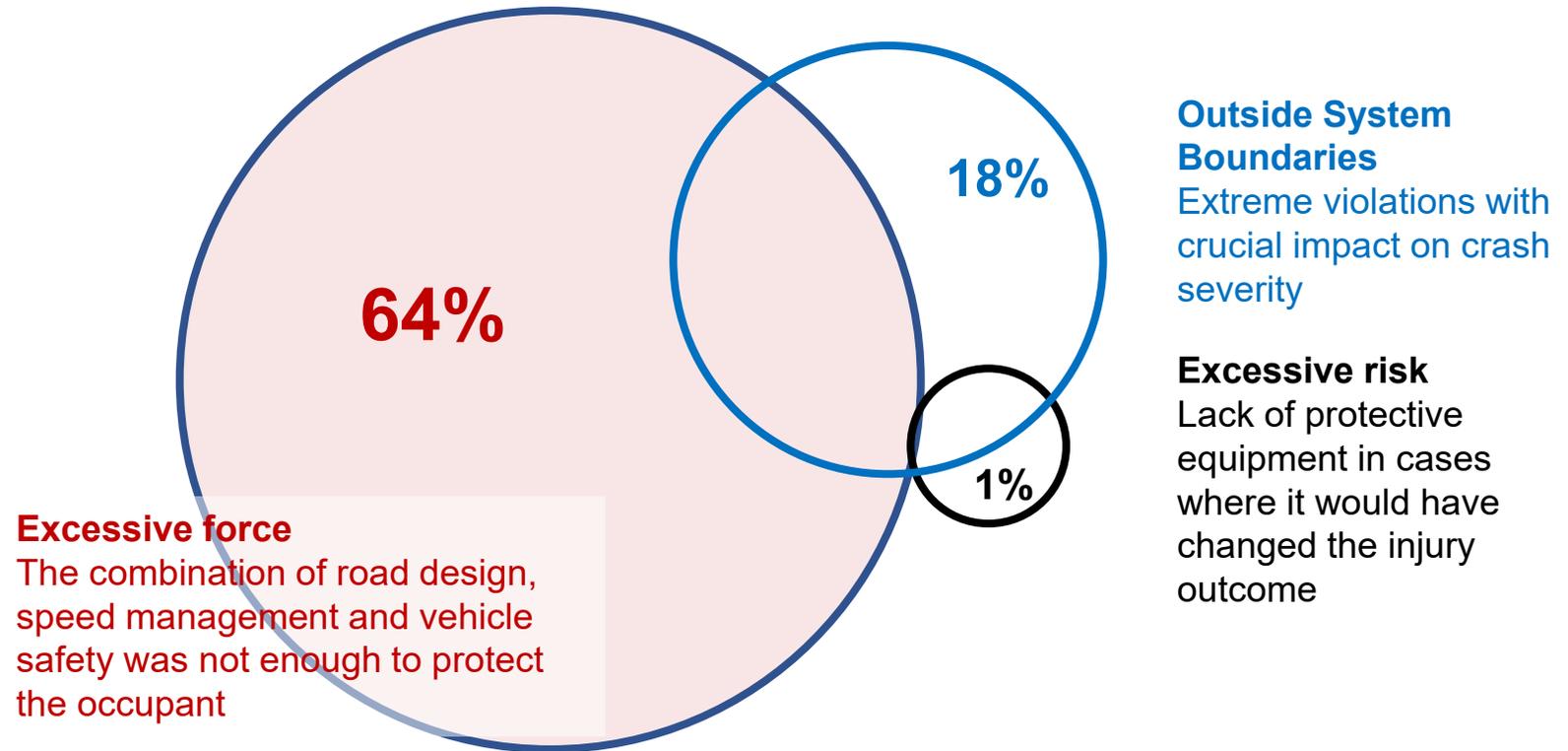
First principle crash avoidance and injury mitigation

Classification of all fatal motorcycle crashes in Sweden 2016-2018 (n = 163)

Traditional

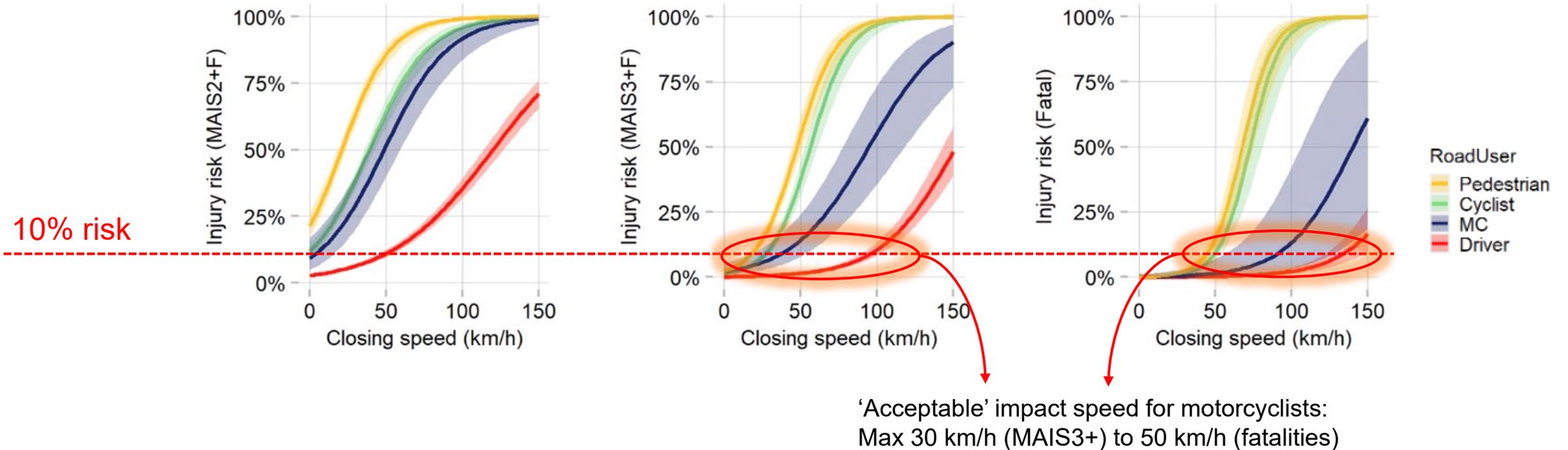


Safe System



First principle crash avoidance and injury mitigation

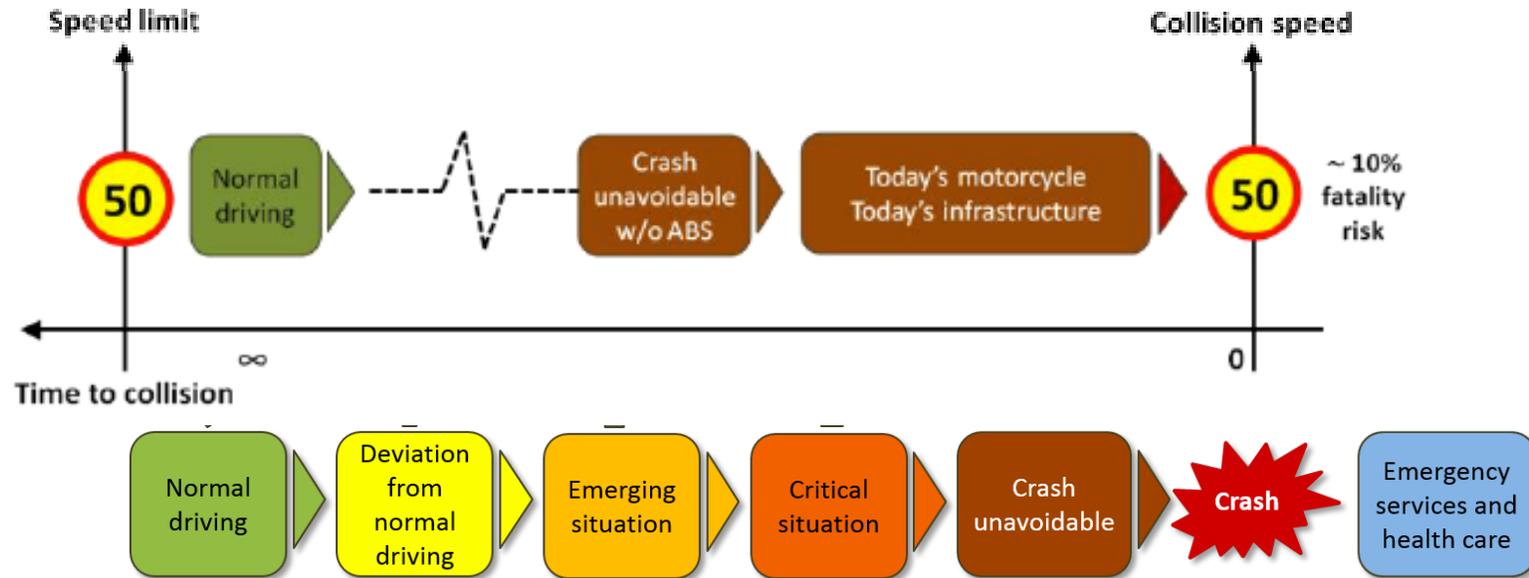
Human biomechanical tolerance



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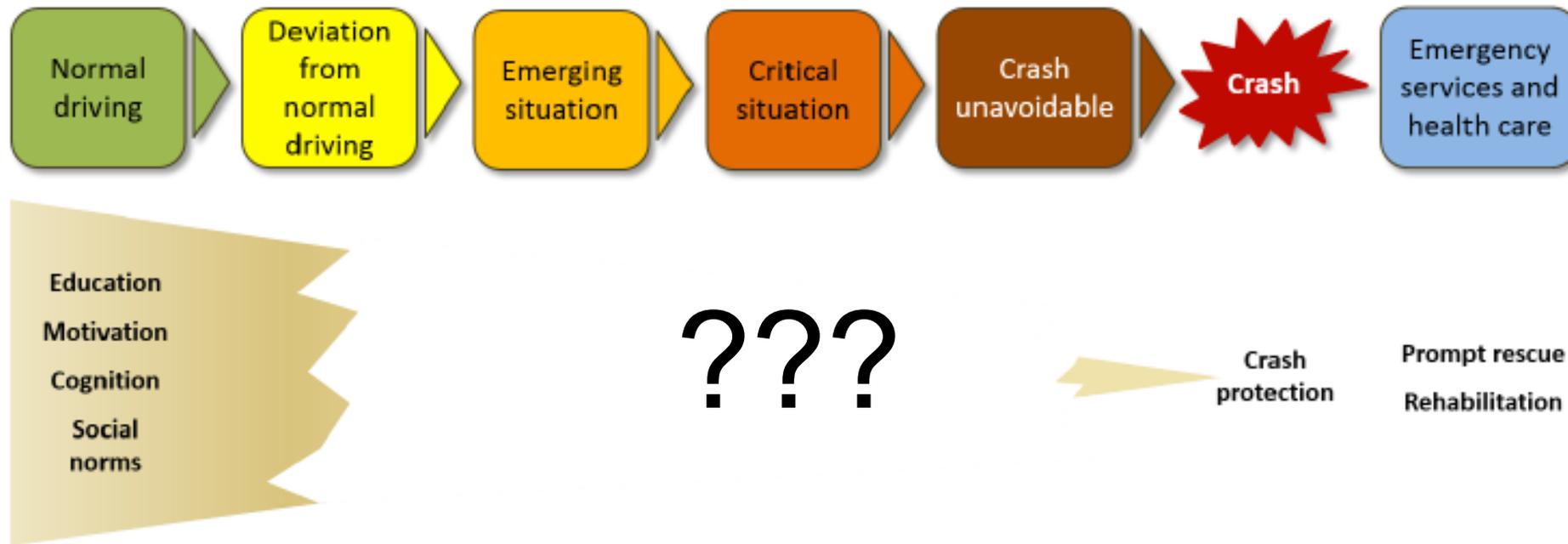
First principle crash avoidance and injury mitigation



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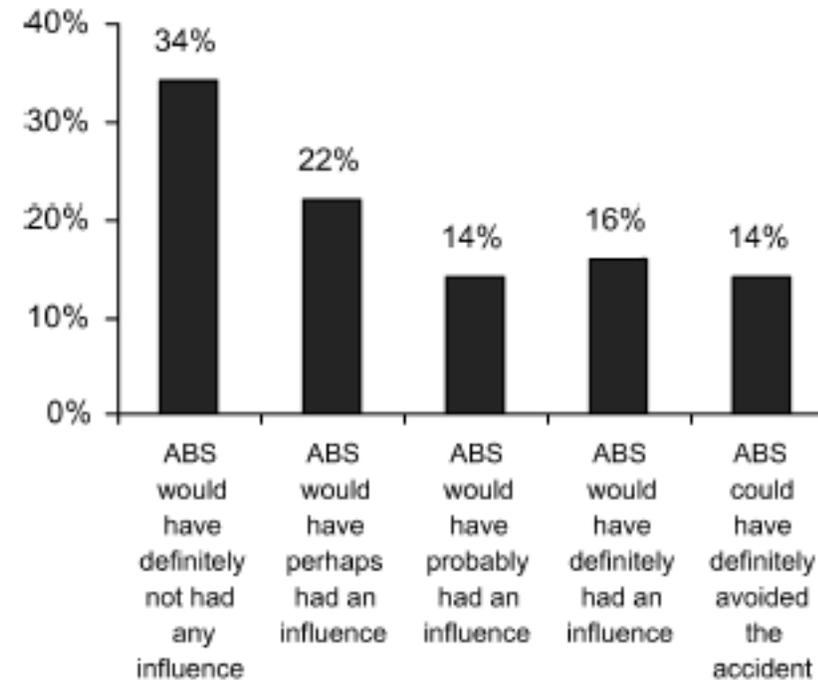
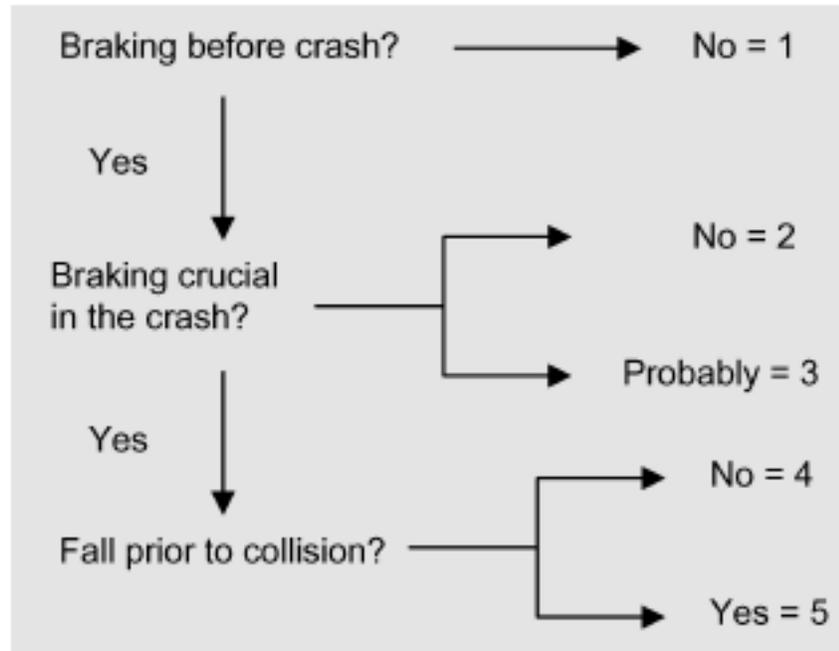
First principle crash avoidance and injury mitigation



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Counterfactual analysis using in-depth crash investigations



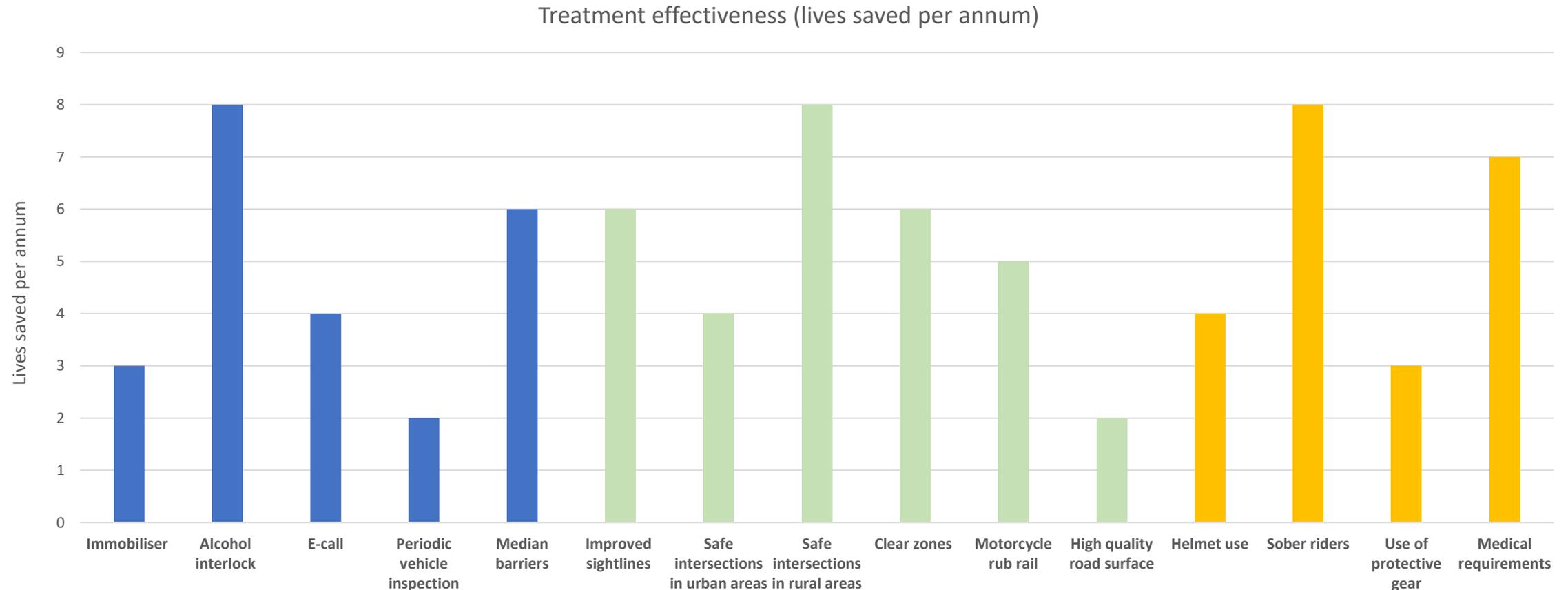
In-depth analysis: 2/3 fatal crashes with motorcycles involve braking where ABS could have made a difference
Statistical study: The overall effectiveness of ABS in Sweden was 48 percent on severe and fatal crashes.

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Counterfactual analysis using in-depth crash investigations

Potential benefits of motorcycle safety measures in Sweden



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Counterfactual analysis using in-depth crash investigations

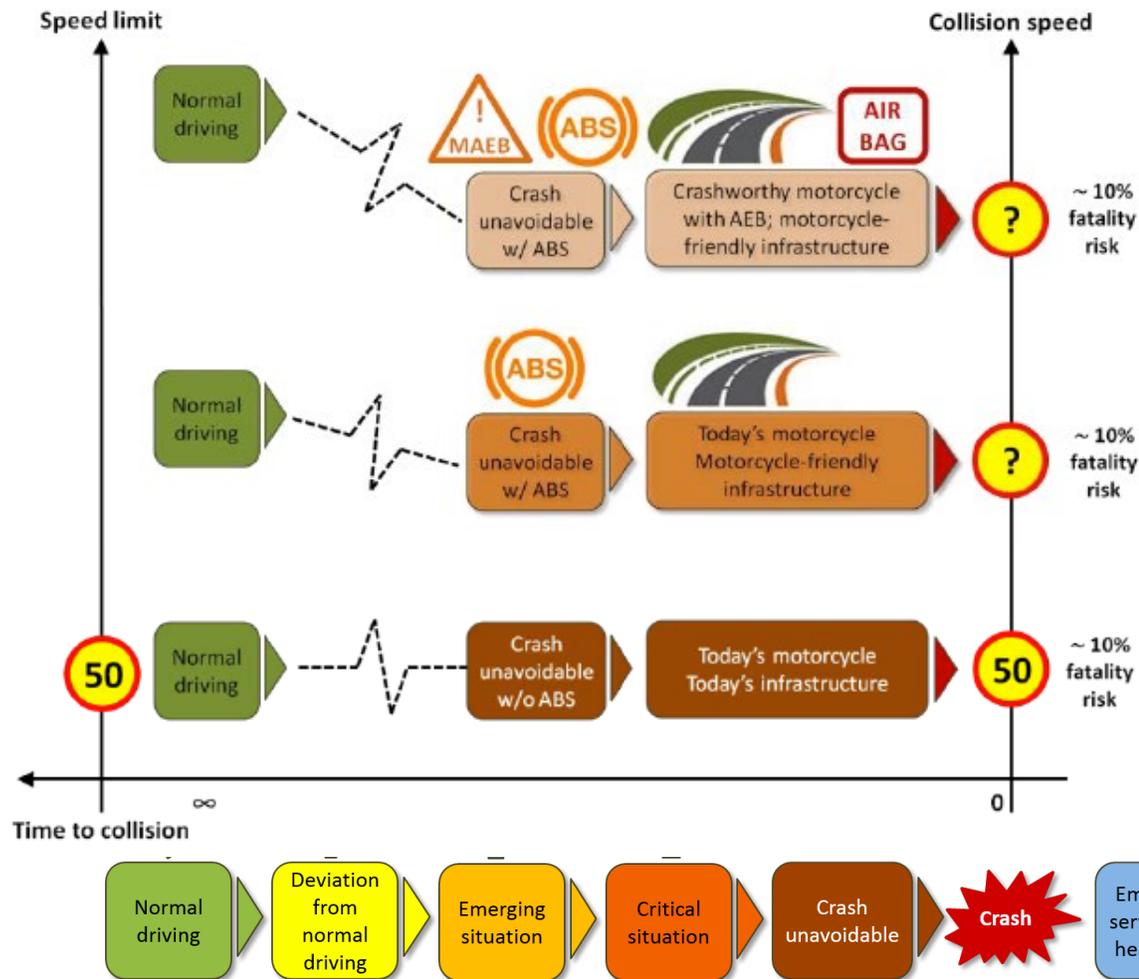
Performance Indicators to achieve interim targets

Performance Indicators	Lives saved at 100%	Current	Target	Effect
Share of new motorcycles sold with ABS	21	30%	98%	15
Motorcyclists speed compliance on arterial roads	11	?	80%	6
Motorcyclists speed compliance on municipality roads	4	?	80%	2,5
Share of safe intersections on the arterial road network	4	?	50%	2
Share of motorcycle friendly barriers on the arterial road network	5	0%	50%	2,5
Share of guard rails in curves fitted with motorcycle run rail	2	0%	50%	1
Total (number of lives saved)	47			29
Corrected for double counting	28			17
Target 50% reduction				26

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A conceptual Safe System for motorcycles



Safe System end state validation in Sweden:

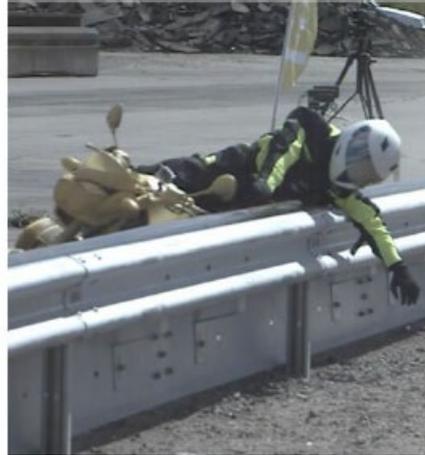
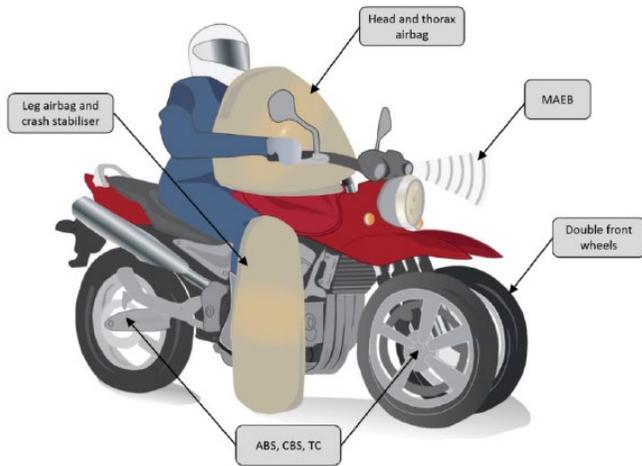
5 motorcycle fatalities per annum
→ 90% reduction

Baseline: 40 fatalities per annum

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A conceptual Safe System for motorcycles



Safe System end state validation in Sweden:

5 motorcycle fatalities per annum
→ 90% reduction

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Context sensitive implementation

Types of PTW



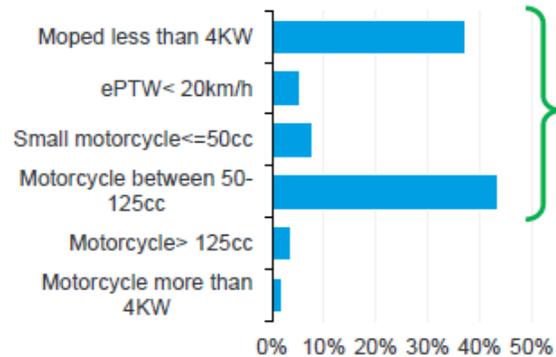
CIDAS



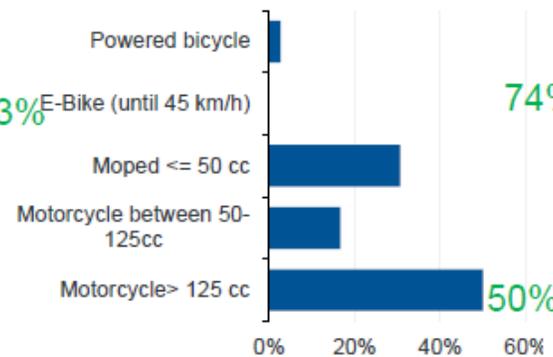
GIDAS



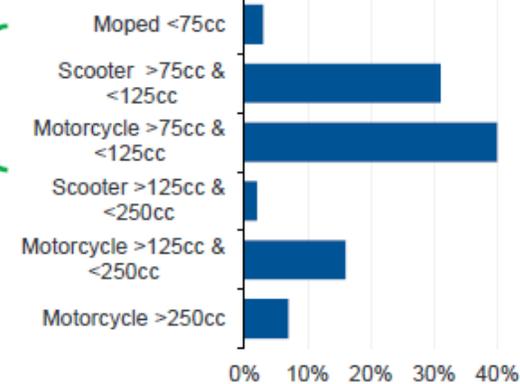
RASSI (n=2575879)



93%



74%



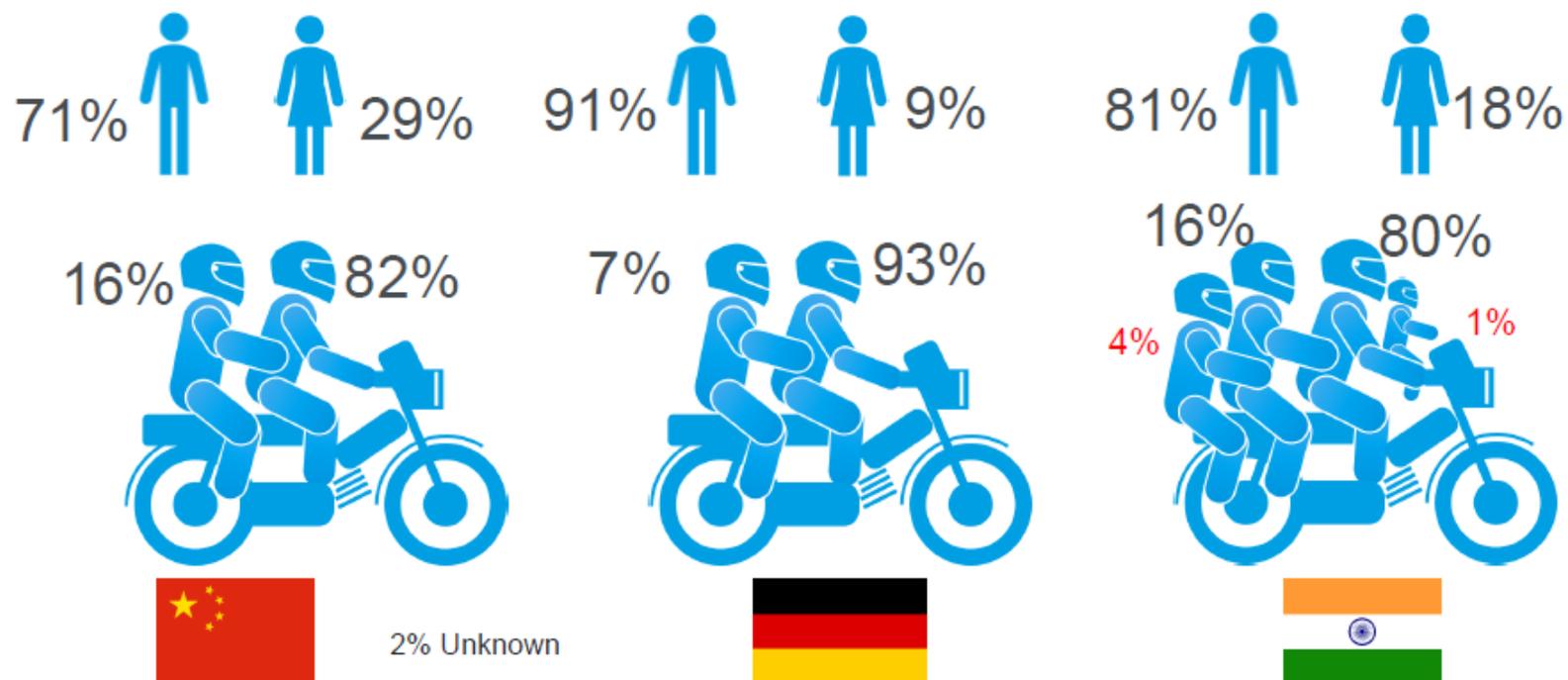
- India & China → Less powered PTW → Daily commute for transport/daily needs
- Germany → More of high powered PTW → Recreational use

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Context sensitive implementation

Seating Position & Gender distribution – PTW occupants



Mostly males as riders, In India, often try to accommodate full family (not necessarily helmeted!!)

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Recommendations

- Develop an evidence based Safe System end state for motorcycles that takes regional mobility needs into account
- Validate the Safe System end state for local conditions using in-depth analysis of fatal and serious motorcycle crashes