Safe speeds in a sustainably safe system

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INSTITUTE FOR
ROAD SAFETY RESEARCH

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Expertise
physics, traffic theory, navigation safety, road safety, data, analysis

Team
data-experts, civil engineers, psychologists, mathematicians, …

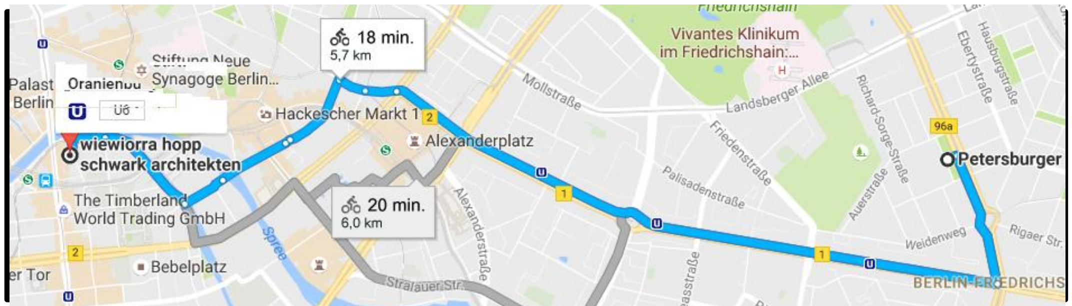
Projects
Pendant, SafetyNet, DaCoTA, SafetyCube, SaferWheels, SaferAfrica, …

Methods
In depth analysis, data matching, empirical research, instrumented bicycles, …

Data sets
Crashes, mobility, hospital, violations, fleet, driving license, infrastructure, ...

Risk, distance travelled and casualties

Distance travelled



Casualties (road deaths, serious road injuries)

Risk determined by conditions and properties: **SPI's, measures, factors**

Dominant factor: Vehicle speed & speed difference

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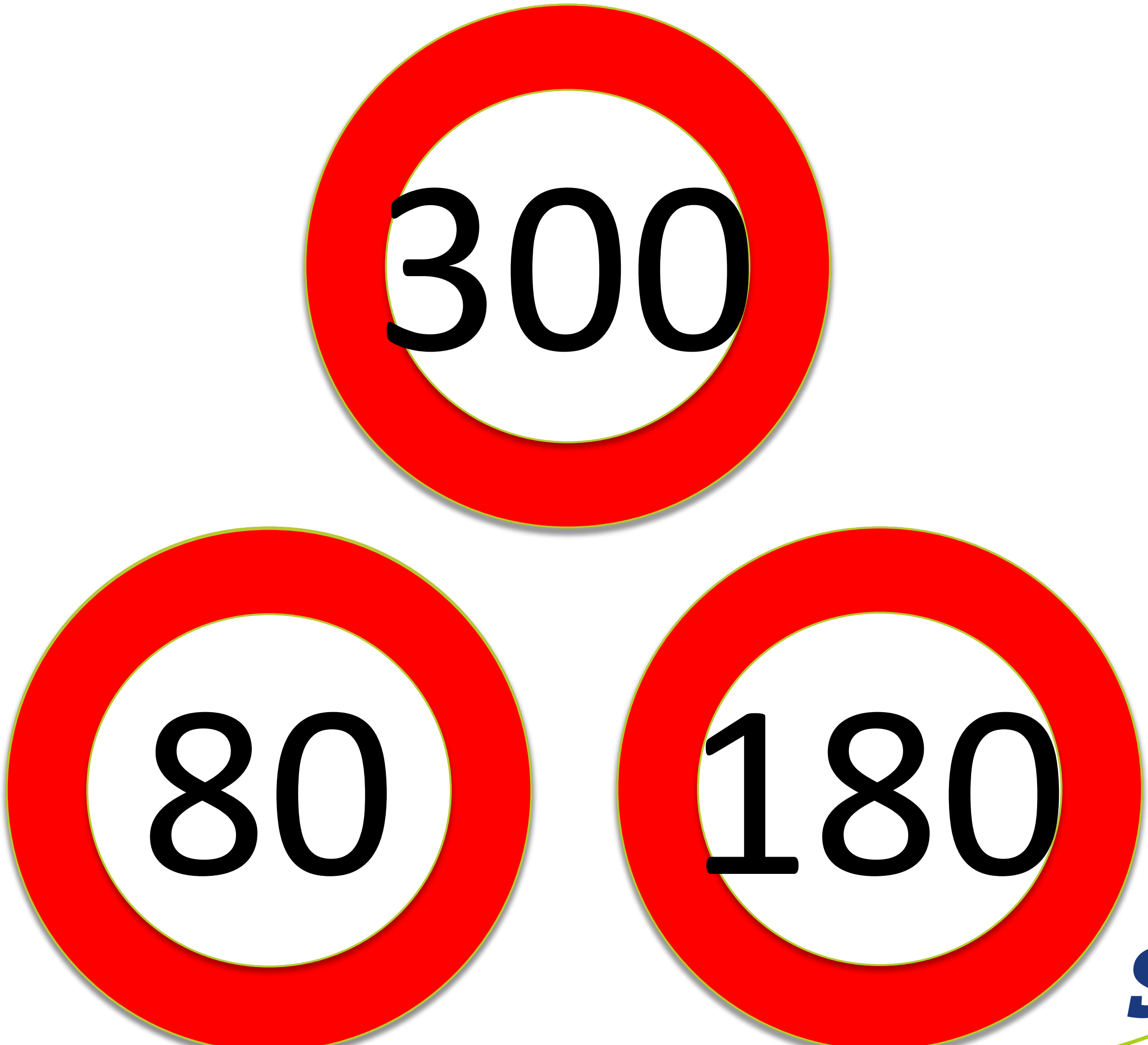
How to achieve safe speeds always, everywhere?



How to achieve safe speeds always, everywhere?

Can we train all travellers, until they are perfect drivers, that obey all rules always?

Should we bet on intelligent vehicles that know and obey the speed limit?

Or should we design safe roads that enforce safe speeds?

A safe system starts with safe roads, but traffic is not uniform!

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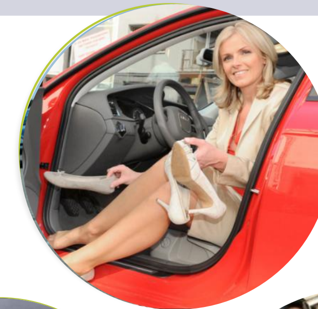
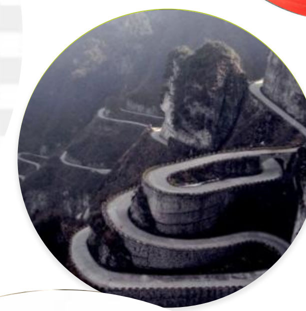
Traffic is not uniform!

Traffic is not uniform!





Sustainable safety in a nutshell

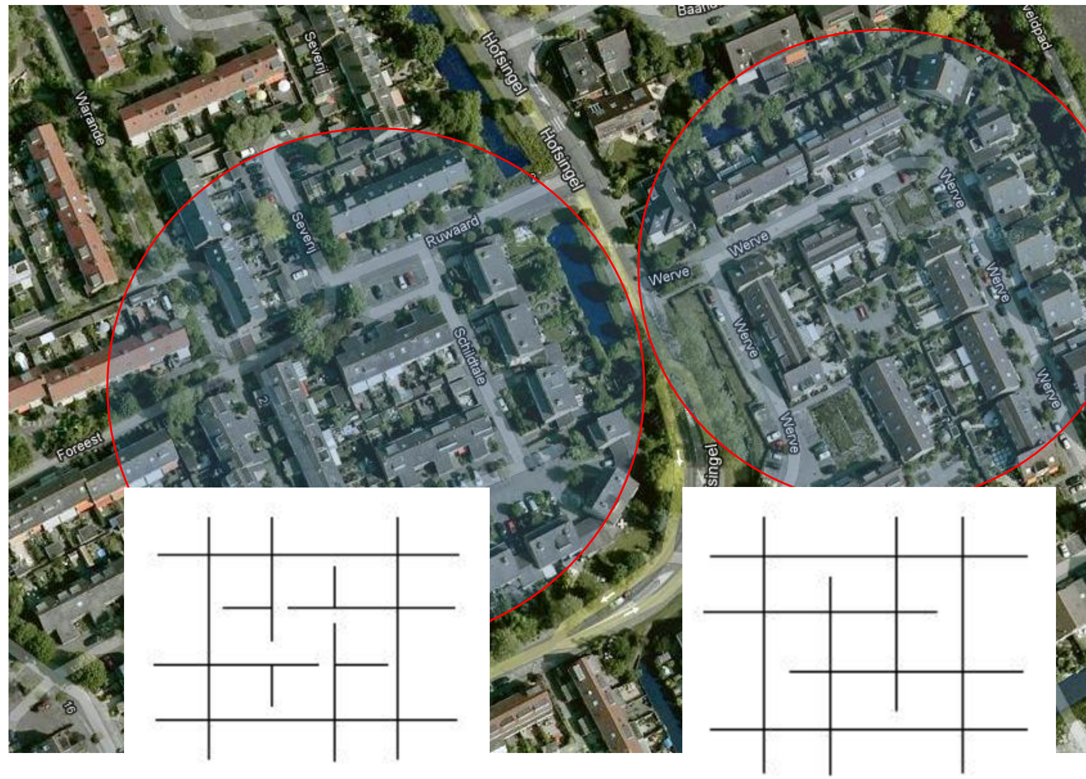
- As humans are fallible and vulnerable,
- … although **drivers** should know and obey the rules, and enforcement efforts are essential,
- **vehicles** cannot ensure road safety for all, although it certainly helps (and has helped a lot).
- **roads** should be designed to meet the requirements for the road's traffic function.

How do safe speeds depend on road function

Types of road and traffic	Safe travel speed (km/h)
Locations with possible conflicts between cars and pedestrians (low traffic volume q)	30 km/h
Intersections with possible side collisions between cars (and no possible conflicts as mentioned above!)	50 km/h
Roads with possible frontal collisions between cars (and no conflicts as above)	70 km/h
Roads with no possibility of side or frontal collisions and safe roadsides (and no conflicts as above, high q)	≈120 km/h

The design requirement: Safe roads should have a ***safe and credible speed limit***, given the function of the road

30 km/h roads (urban), some Dutch examples



Traffic structures: tree

limited access

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30 km/h roads (urban), no credible speed limit

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30 km/h roads (urban), properties

	Property	Value	SSA	SaCreD	extra
1	Length of road links	**short**/long		X	
2	Road width	**narrow**/ wide		X	
3	Paving	**pavers**/asphalt	X	X	
4	Street lighting	**low**/high			X
5	Surroundings	**closed**/ open		X	
6	Connections to houses/shops	**yes/**no	X		
7	Road axis marking	**no**/ **special**/ yes	X	X	
8	Road side marking	**no**/ yes	X		
9	Separate lanes	**no**/ yes/ green/ water	X	X	
10	Priority intersections	**no**/ yes/ roundabout/ priority bicycle lane	X	X	
11	Intersection layout	**plateau**/ punaise/ other color/ roundabout/ none	X		
12	Traffic sign installations	**no**/ yes	X		
13	Speed controlling measures	**hump**/ road narrows/ road axix shifts/ none	X	X	
14	Pedestrian crossing possible	**everywhere**/ specific (ZEBRA)/ none			X
15	Pedestrian lane	sidewalk/ **none**			X
16	Bicycle lane	**none**/ coloured pavement/ separate	X	X	
17	Car parking	**parking spaces/ along the road**/ none		X	

30 km/h roads (urban), credible speed limit

30 km/h roads (urban), some Dutch examples

50 km/h roads (urban), some Dutch examples

60 km/h roads (rural), before

- Before sustainable safety:
- 80 km/h
- central marking

60 km/h roads, before-after

Wrong. Side strip too narrow

Right: side strip with correct width

Wrong: no marking at roadside, no speed hump (road width >4,5m)

Right: correct roadside marking line and speed hump

60 km/h roads, intersections, before-after

Right: plateau speed reduction and clearly recognizable intersection

Wrong: unclear priority, no speed humps

60 km/h roads, transition region, before-after

Wrong, roads look similar

Right, recognizable road design elements

60 km/h roads, transition region, before-after

Wrong: beacons on road surface

Right: beacons on the hard shoulder

Right: rumblestrips

80 km/h roads (rural), before

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80 km/h roads (rural), before-after

Wrong: overtaking whith possible countertraffic above 70km/h

The sign doesn't prevent overtakings!

Right: physical barries between directions

80 km/h roads (rural), before-after

Wrong: obstacle-free zone to narrow

Right:

- Double solid line road axis marking
- Dashed roadside marking + correction zone
- Obstacle free zone > 6m

Concluding remarks

- Roads need to be categorized by their functions
- Speeds should match the road function.
- Road design should enforce those safe speeds
- When road design cannot do the trick, we need enforcement.
- This is especially the case for high speed roads (motorways, highways).