Vison Zero – A Scientific Based Traffic Injury Reducing Strategy in Sweden

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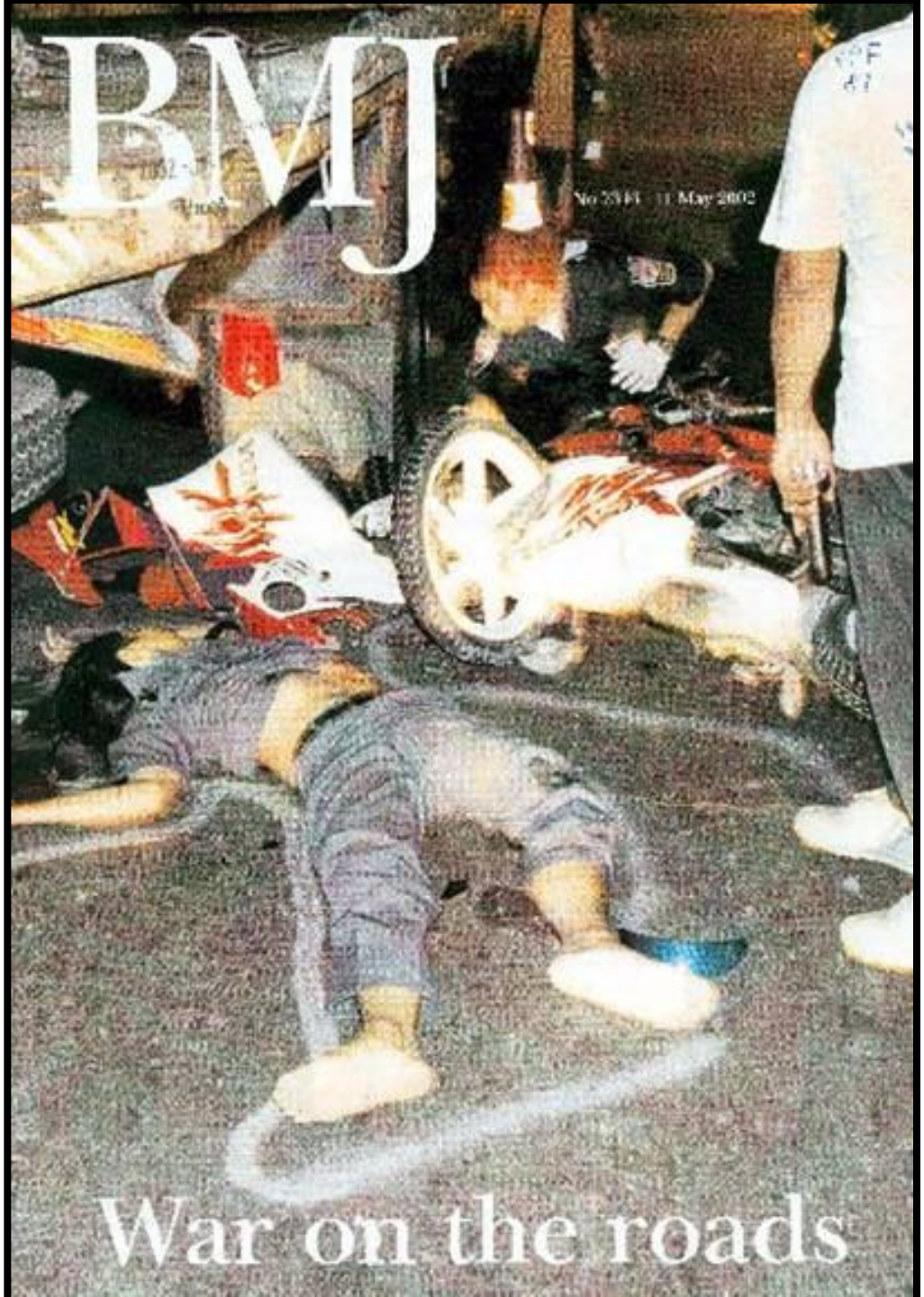

BMJ
War on the roads

Vision Zero – what it really means

- Vision Zero is an image of a desirable future society

- Vision Zero do not accept people being killed or seriously injured in the road traffic system

Vision Zero

Shift of paradigm from:

- **Avoiding ”accidents” to** -----

  reducing serious, disabling and fatal injuries

- **Trauma energy------limiting factor**

Vision Zero - responsibility

1. The designers (owners) of the transport system are responsible for the design, operation and use of the system and for the safety within the entire system
2. The road users are responsible for obeying the rules in the system

Vision Zero - responsibility

3. If the road users fail to obey these rules due to lack of understanding, acceptance or ability, or if injuries occur, the system designers must take further steps to make the system safe

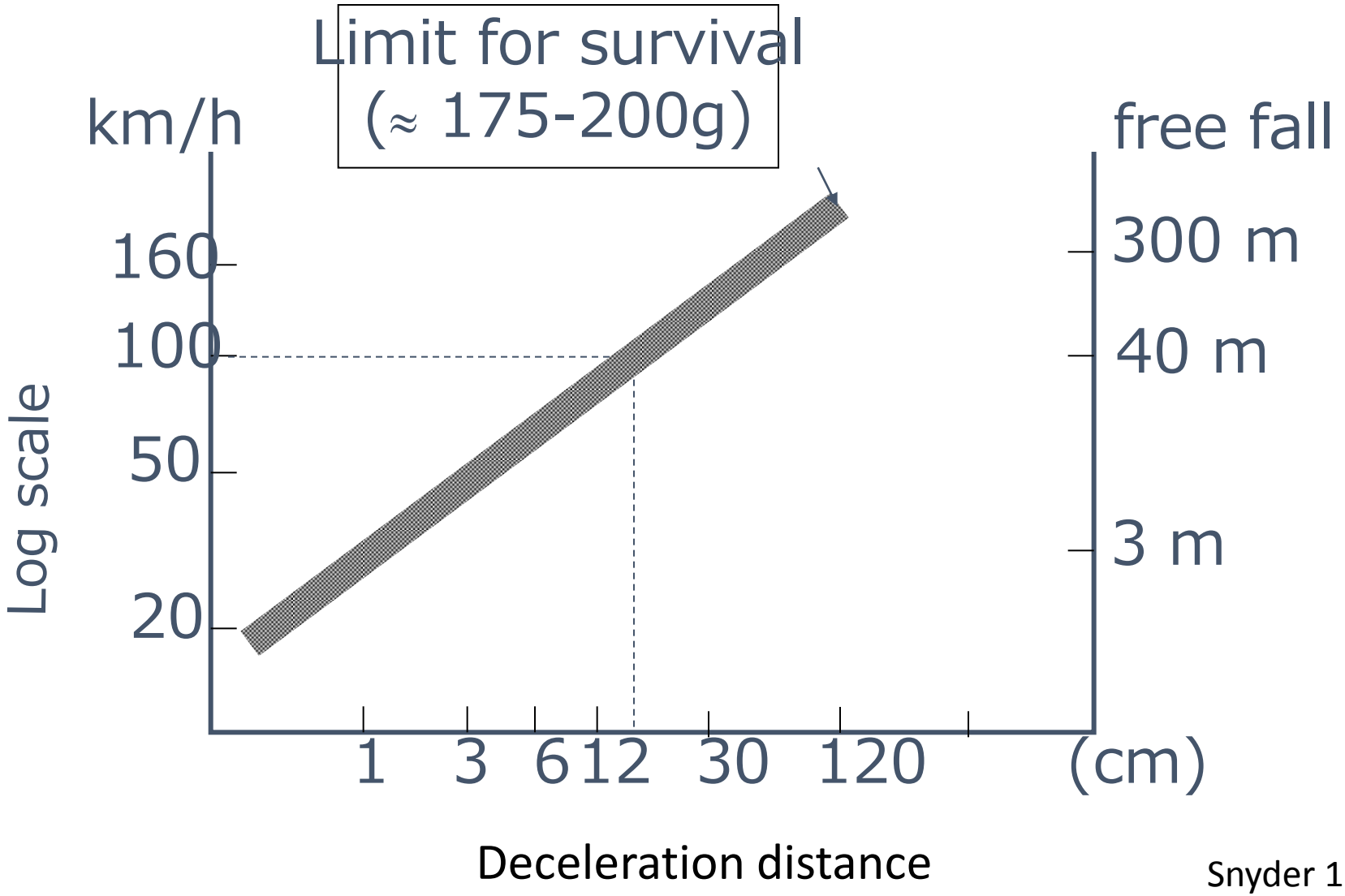
(Swedish Parliament 1997)

Hugh De Haven

Surviving
falls from
50 – 150 feet
15 – 45 meter

Free fall:
40 meter
100 km/h

Critical survival factor:
A deceleration distance


Limit for survival
(≈ 175-200g)
km/h
free fall
160
100
50
20
300 m
40 m
3 m
Log scale
1
3
6
12
30
120
(cm)
Deceleration distance

Snyder 1970

1000 km/h to zero - deceleration time 1.4 sec

Check the ride at Youtube – John Stapp

Trauma energy

The human body can withstand severe crashes given:

- a deceleration distance
- ”package”

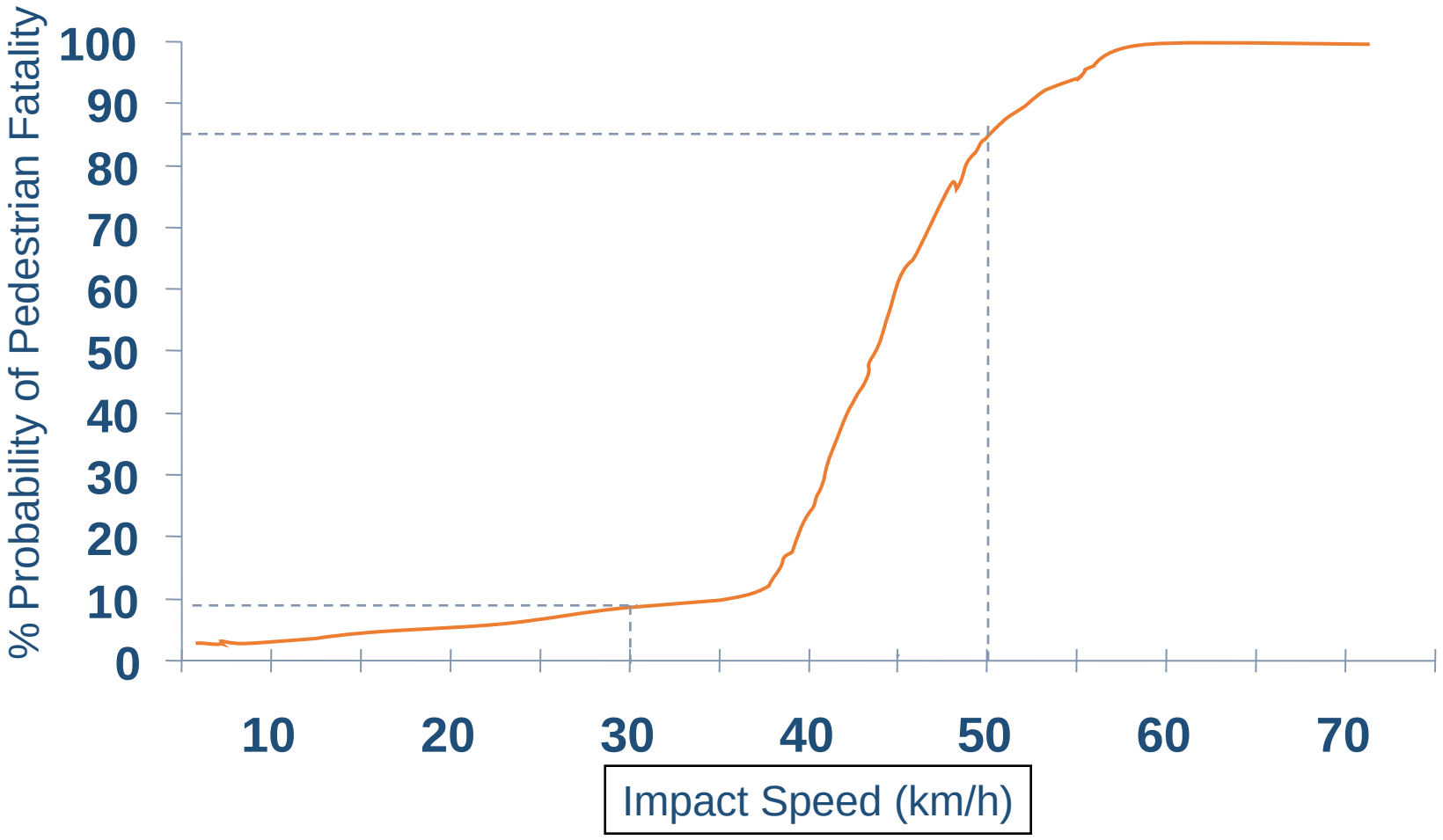
Injuries are preventable non-random events

W Haddon Jr

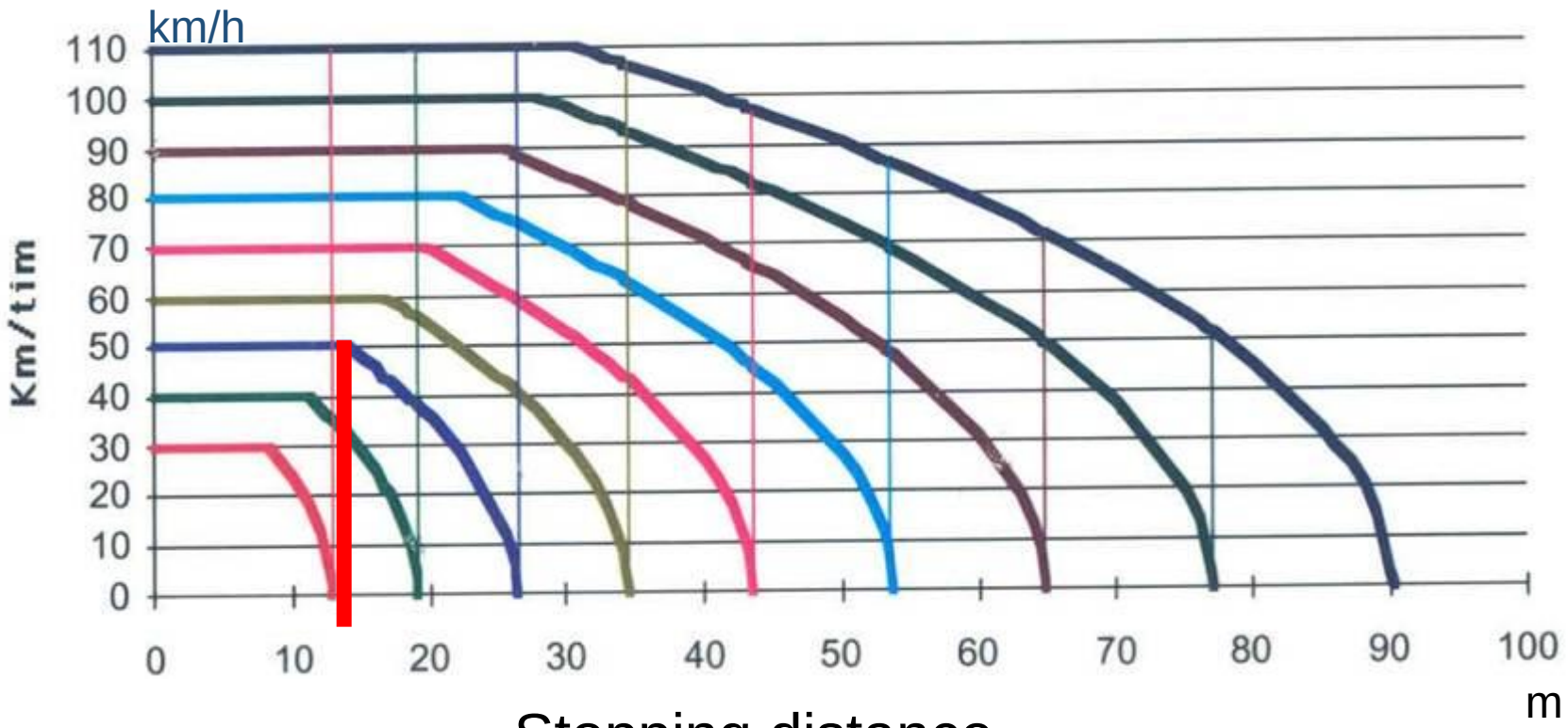
Haddons matrix

Phases	Factors			
	Human	Vehicle/ equipment	Physical environment	Socio-economic environment
Pre-crash				
Crash				
Post-crash				

Risk / Impact speed



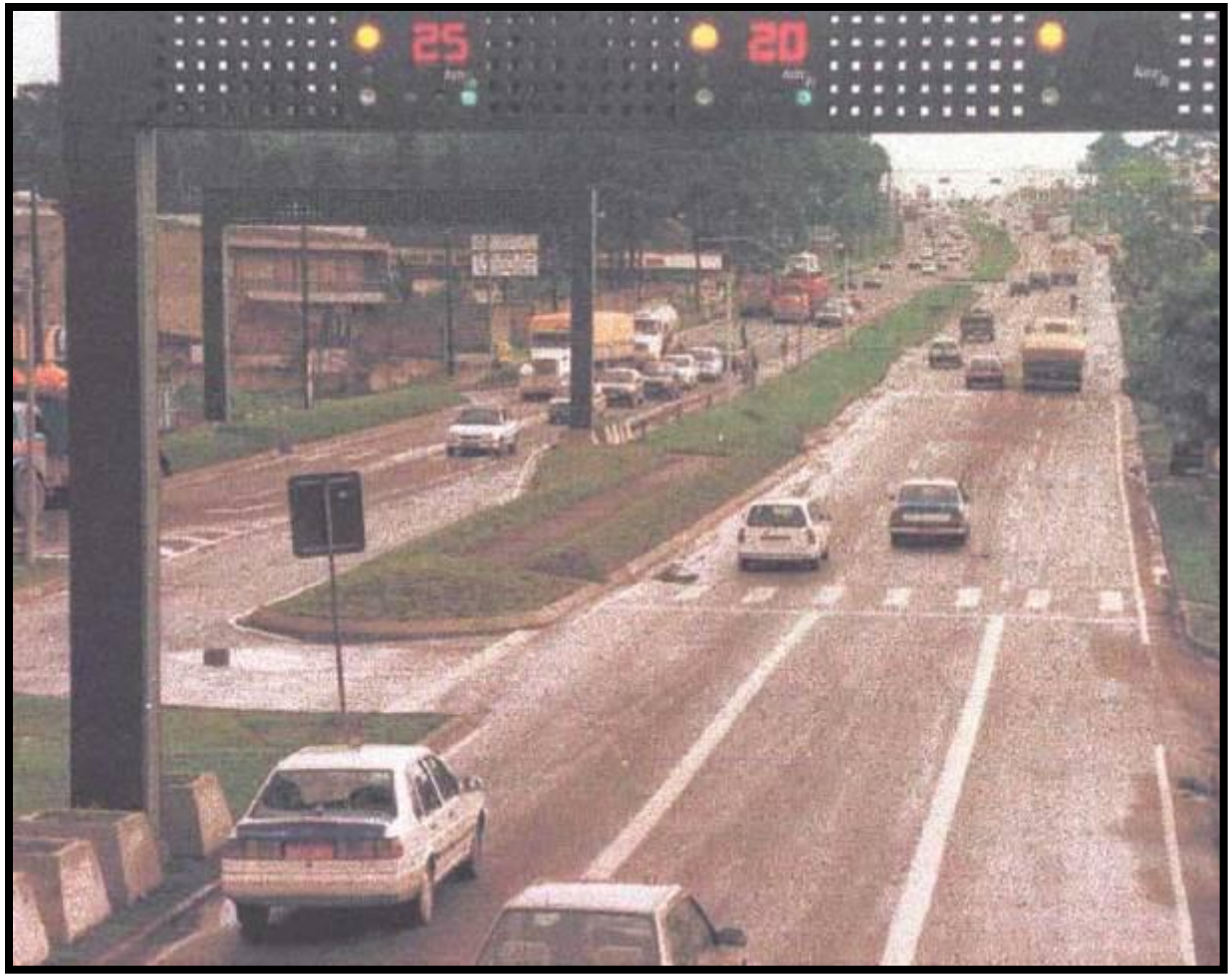
Safe speed?



Stopping distance

Safe speed

Automatic speed camera ---pedestrian crossing



Curitiba, Brazil, year 2000

Safe speed - responsibility of the system owner
Speed bumps

Safe speed

Automatic speed camera

Road-side hazards

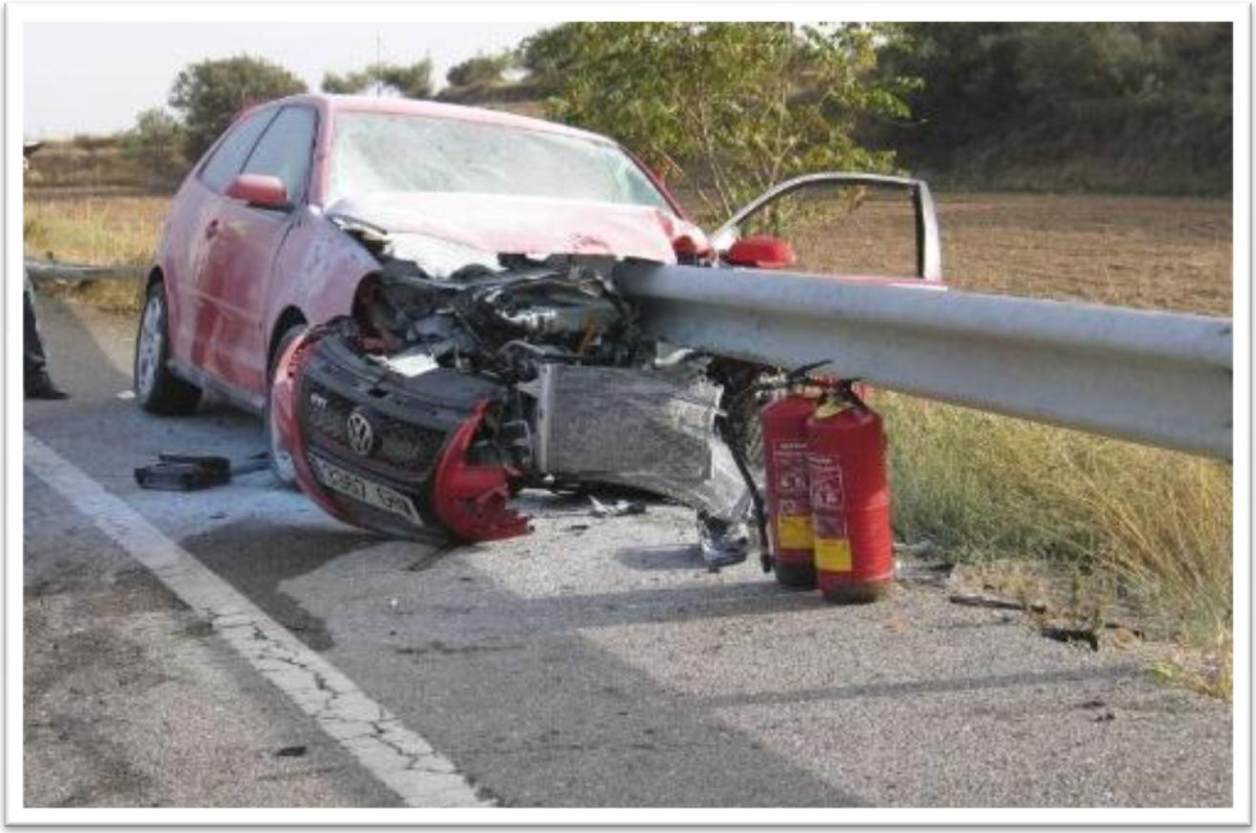
Un-deformable light-pole

Deformable light-pole

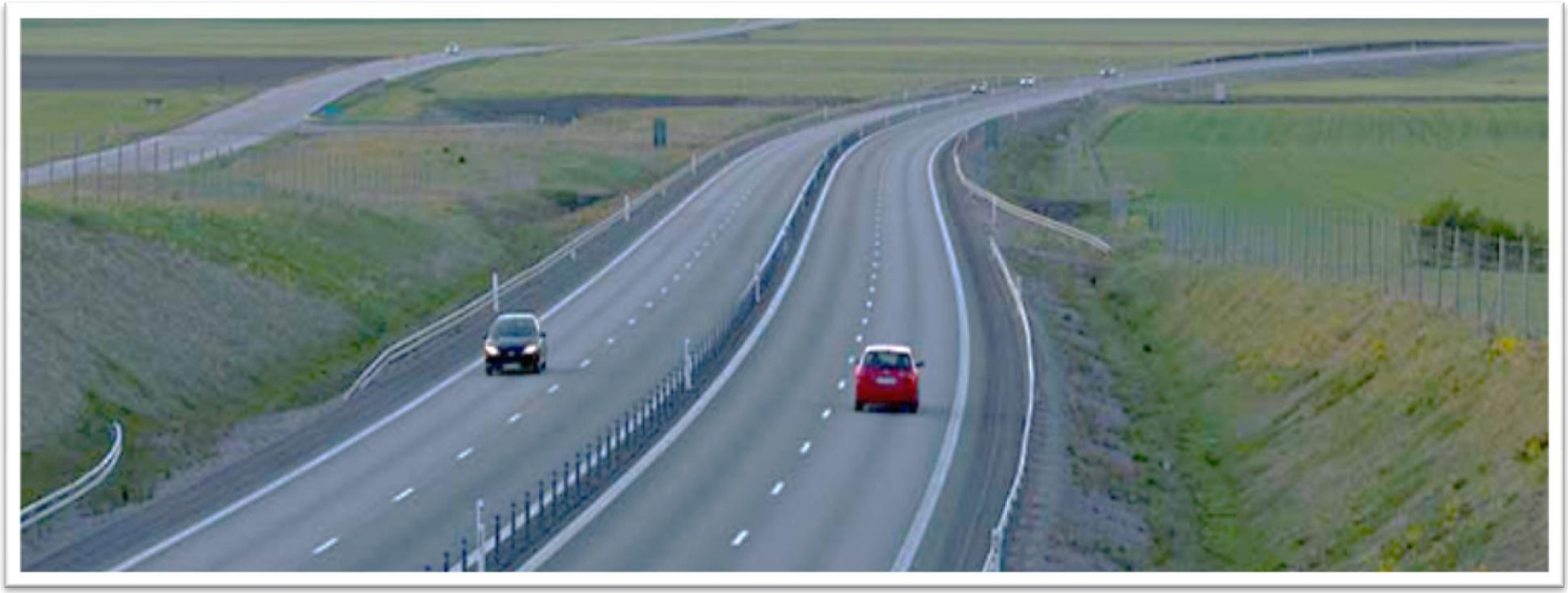
Danger !
Road barrier

Road side hazards

EuroRAP – National Automobile Clubs in cooperation with road authorities



Forgiving road (side)



Prevention of frontal crashes -responsibility of the system owner

Heavy vehicles vs passenger cars

Increasing problem!!
1/3 to 1/2 of passanger car collision deaths

Collision deaths – passenger car occupants

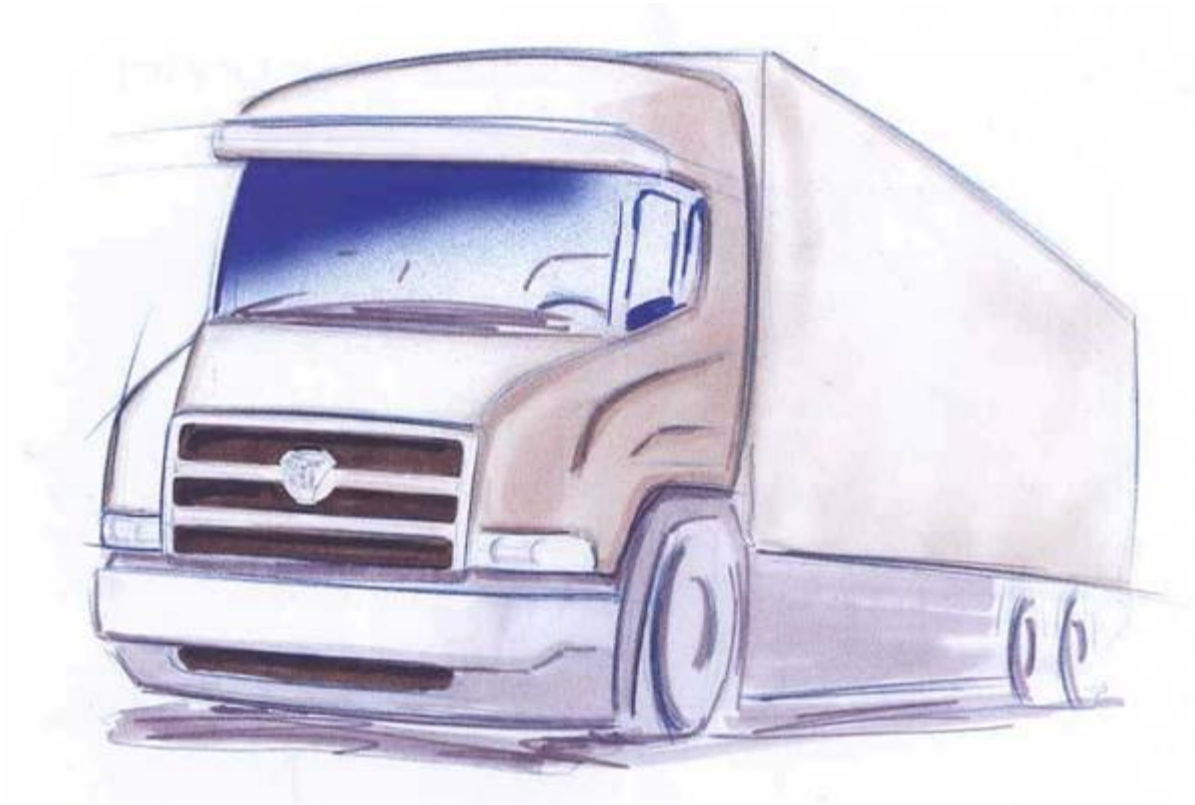
- 1990:ies 1/3 crashes against heavy vehicles

- 2000:ies 1/2 crashes against heavy vehicles
  (but in 2/3 of the crashes a heavy vehicle is involved either as crash object or as overtaken object)

Collisions deaths - heavy vehicles

Trucks and buses, as collision objects, kills five times as many passenger car occupants per driven km as passenger cars do.

Deformable front (0.5 m) on trucks would reduce fatal injuries 1/3 = 900 lives/yr in Europe



Design: Scania

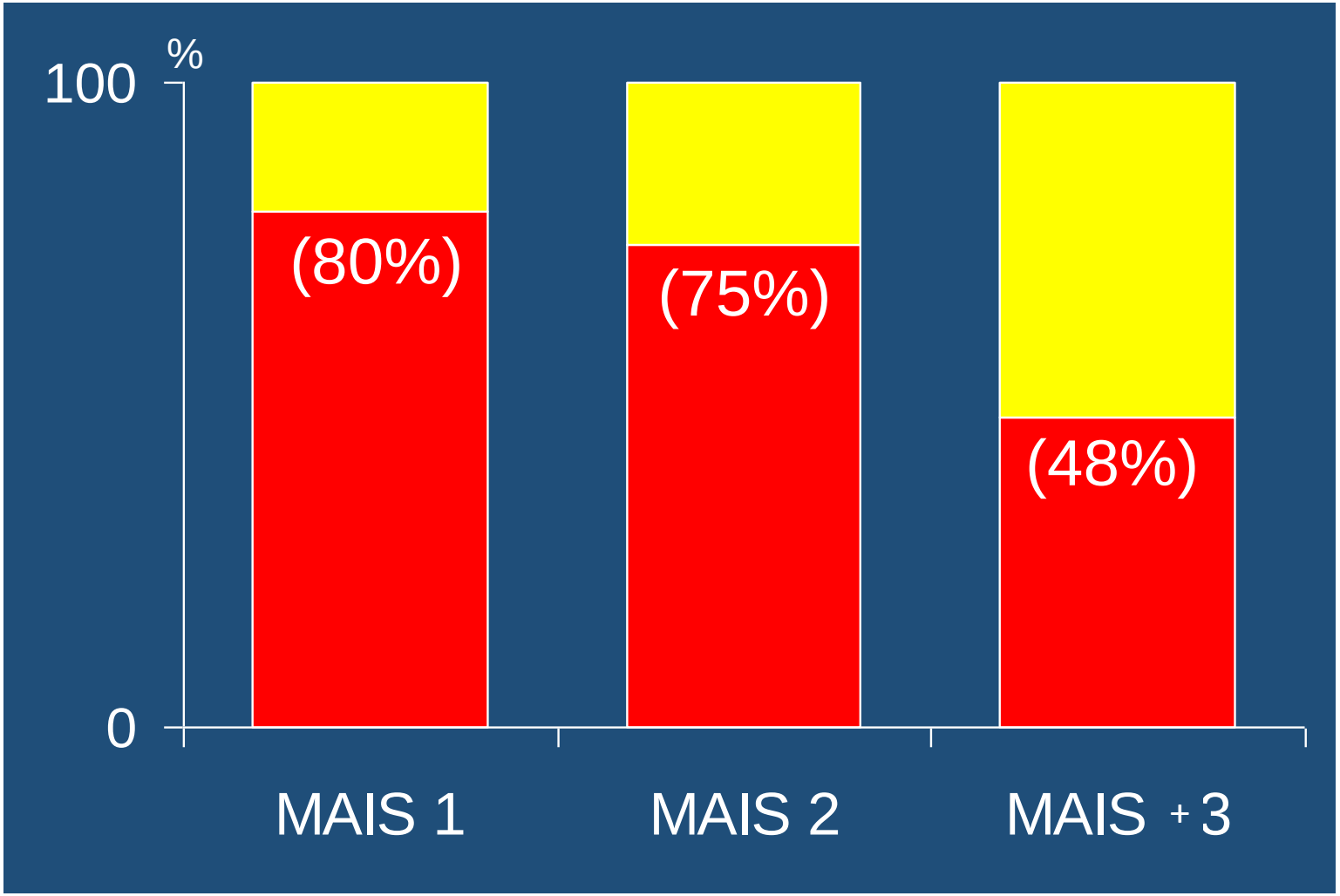
Midbarrier - preventing frontal crashes

Seat belt non-user
50 km/h crash

Seat belt reduces fatal injuries by 69%

(Evans 2004)

Seat-belt use vs injury severity



Seat belt reminders

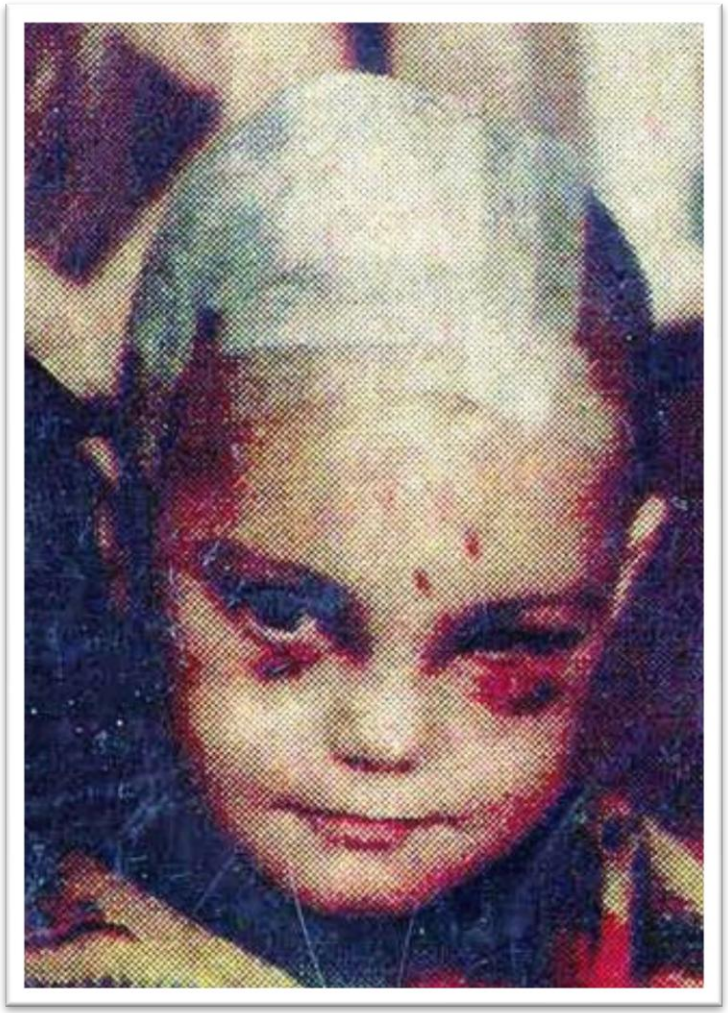
- In the 1990:ies 80 % used seat belt

- A decade later:

  About 99% of car occupants in cars with seat belt reminders use their belts

Drunk and impaired driving

- Increasing problem…



Alcohol and drugs in fatally injured drivers - Sweden

	1991-1993	2005-2006
Alcohol-/drug positive	26%	50%
Alkocol positive	24%	38%

Alcohol and drugs in non-fatally injured hospitalized drivers Umeå - Sweden

	1991-1993	2005-2006
Alcohol-/drug positive	21%	31%
Alcohol positive	12%	21%

Traffic Law Enforcement

The police ”owns the laws”

Photo: Police

Alco-lock

Photo: Carl Johan Erikson

Vision zero - success factors and difficulties

Sucess factors:

- A transport minister, Ines Uusmann, understanding the problem and the scientific base for reducing traffic injuries, put forward by Claes Tingvall, traffic safety director.
- Processed Vision Zero quickly to a Parliament decision October 1997

Difficulties:

- Road administration and other traffic authorities felt left behind in the decision process – causing resistance at many levels

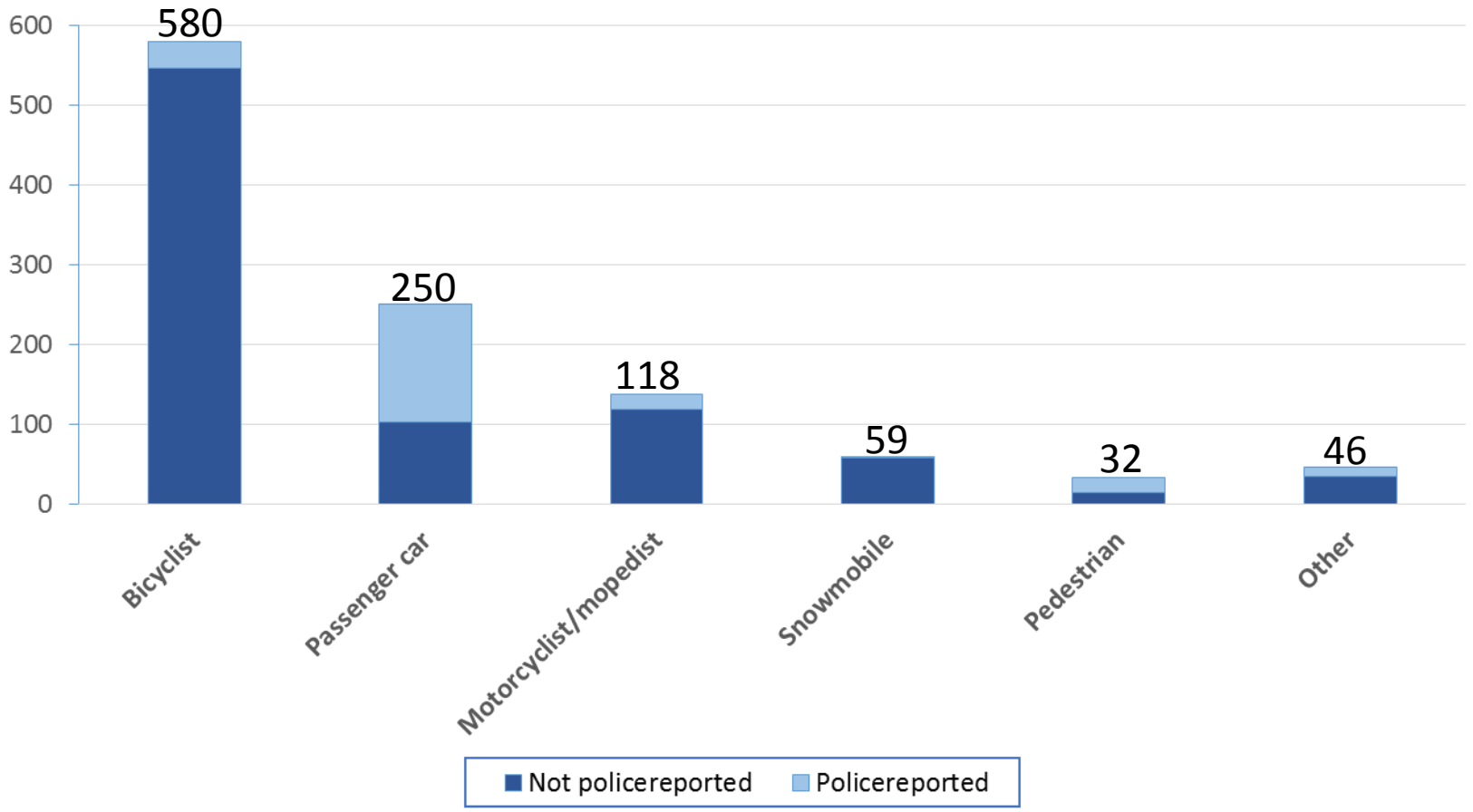
Number of fatalities in the official statistics last decade - Sweden

Year	Fatalities
2005	440
2006	445
2007	471
2008	397
2009	358
2010	266*
2012	285
2013	260
2014	270
2015	259

* **From 2010, excluding killed by suicide – about 20-30/year**

Vehicle-related injuries in and around a medium sized Swedish city

Non fatal injuries treated at hospital v.s. police reported injuries



Development last decade of non fatal traffic injuries - Umeå

- Passenger car injuries has decreased 44 percent from 450 to 250 in a decade.
- Two wheel motor vehicle riders has decreased 35 percent.
- The number of injured bicyclists and pedestrian have not decreased

Three remaining problems

- Alcohol and drugs
- Passenger car collisions against heavy vehicles
- Roadside hazards

Vision Zero 2.0 – new focus

- Vulnerable road users
- Preventing suicides in traffic environment
- New technique – crash avoidance systems

www.trafikverket.se/en/startpage/operations/Operations-road/vision-zero-academy/

www.visionzeroinitiative.com/en/Academy

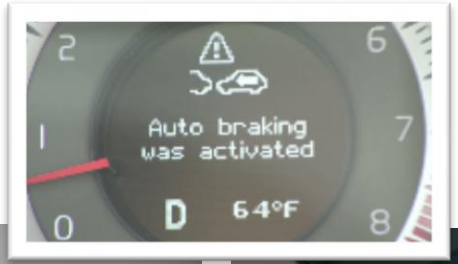
Swedish Government September 2016

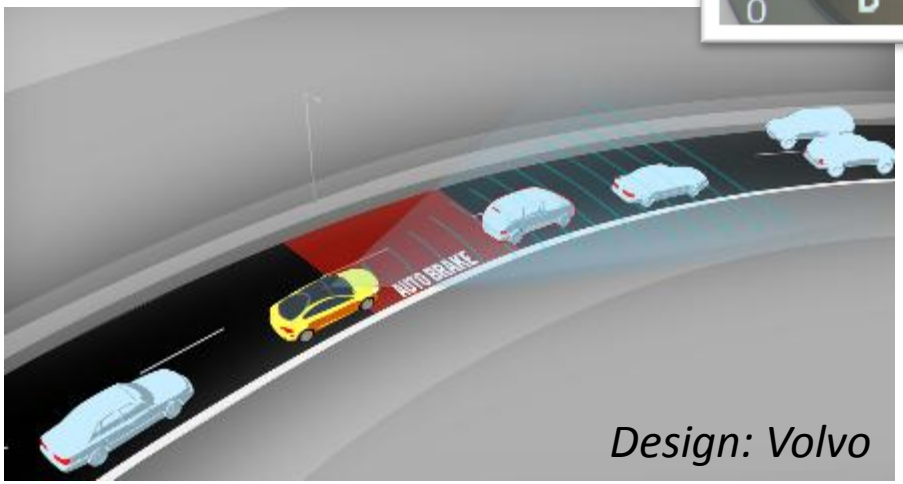
Development -vulnerable road users

Airbag for pedestrians

Development
-front crash prevention

Front crash prevention goes by many names, the terms ”forward collision warning” and ”automatic emergency braking” is widely used. Volvo – City brake





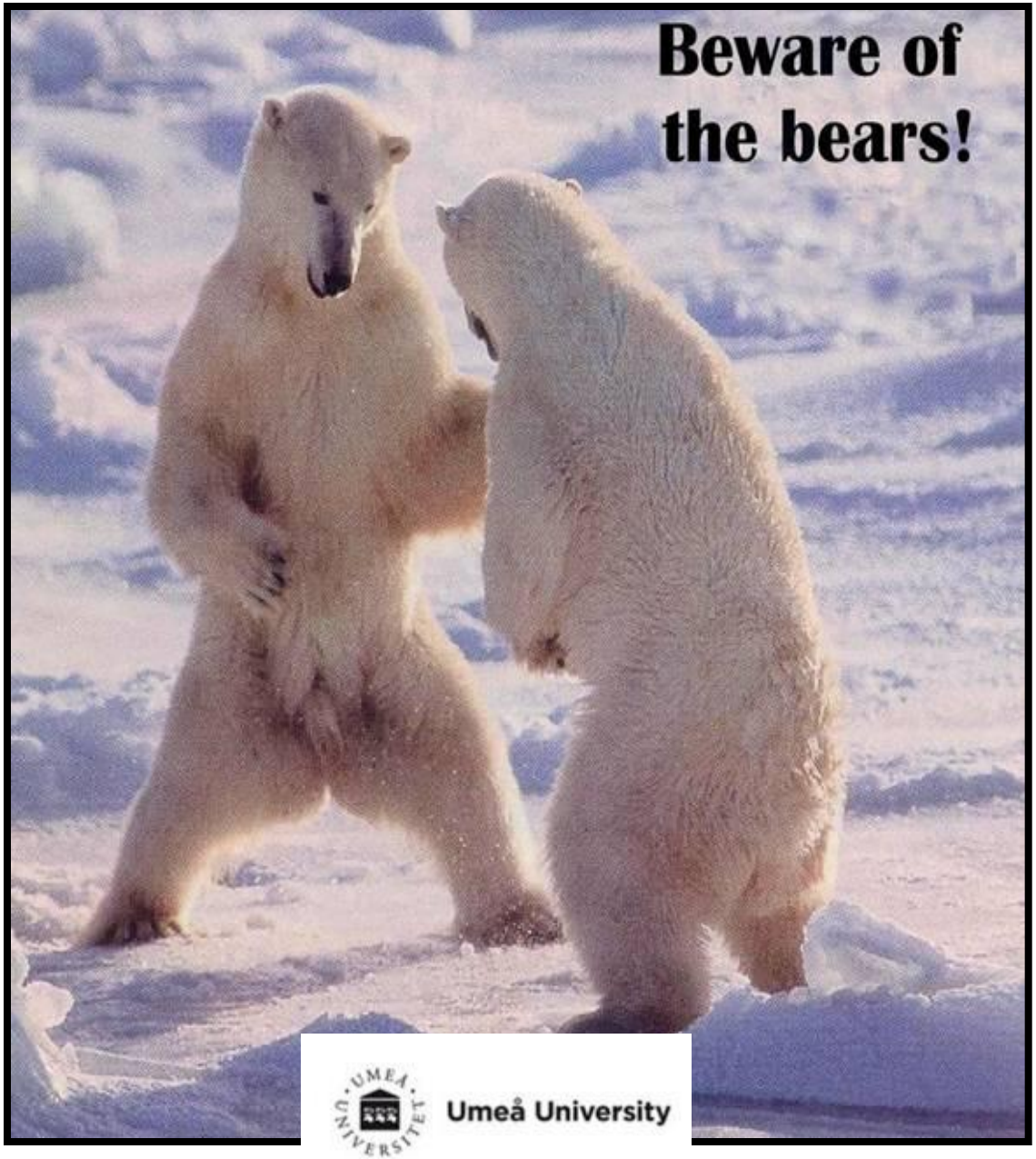
Design: Volvo

Development
-self driving car

All with influence on road traffic safety

Working together

Multi-disciplinary cooperation at all levels engaging medicine, engineering, human factors etc. will make the road traffic safe


Beware of
the bears!
Umeå University