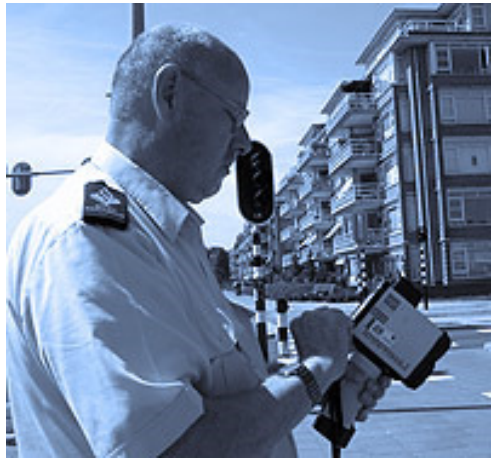
Typically Dutch!



Walking and cycling in a sustainably safe system

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Outline

- Dutch crash data on walking and cycling.
- The relation between number of casualties, distance travelled and risk.
- The principles of *sustainable safety*.
- Safety Sensors (where to put the effort).
- Specific components of *sustainable safety* for walking and cycling.
- Recreational cycling infrastructure
- Current road safety policy issues.

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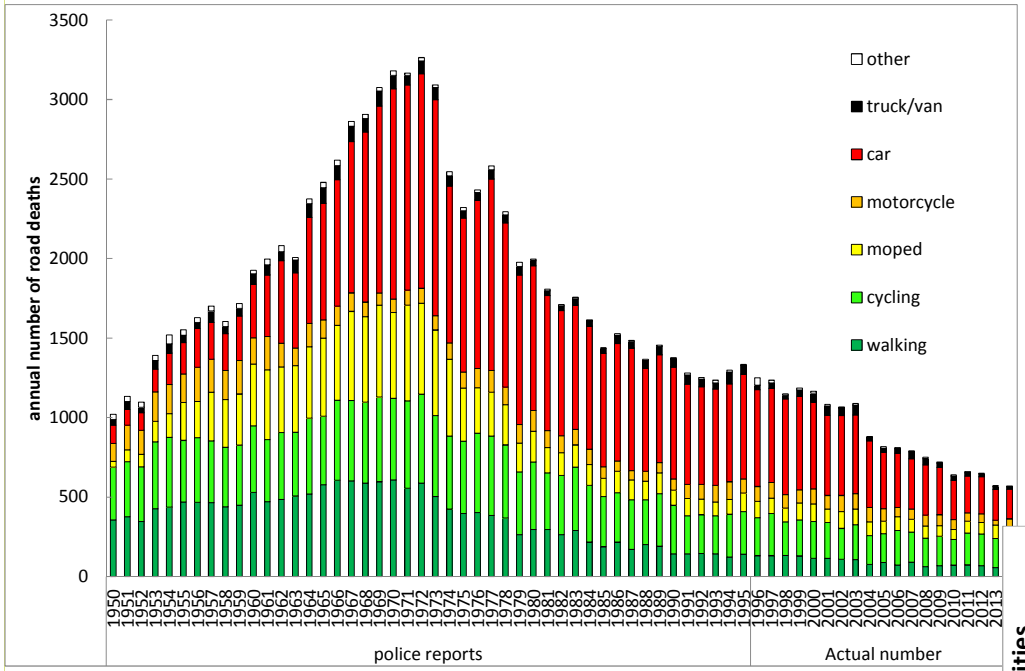
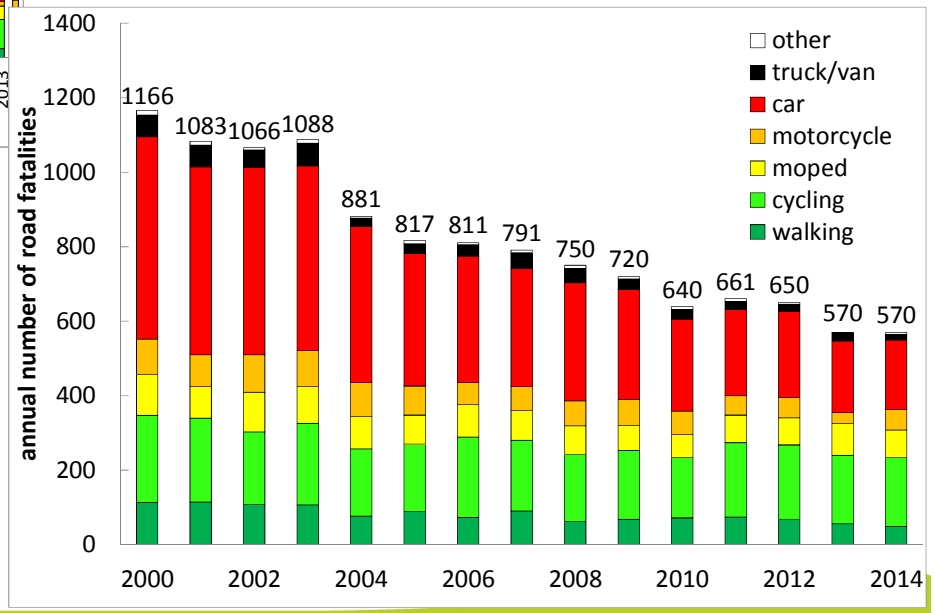
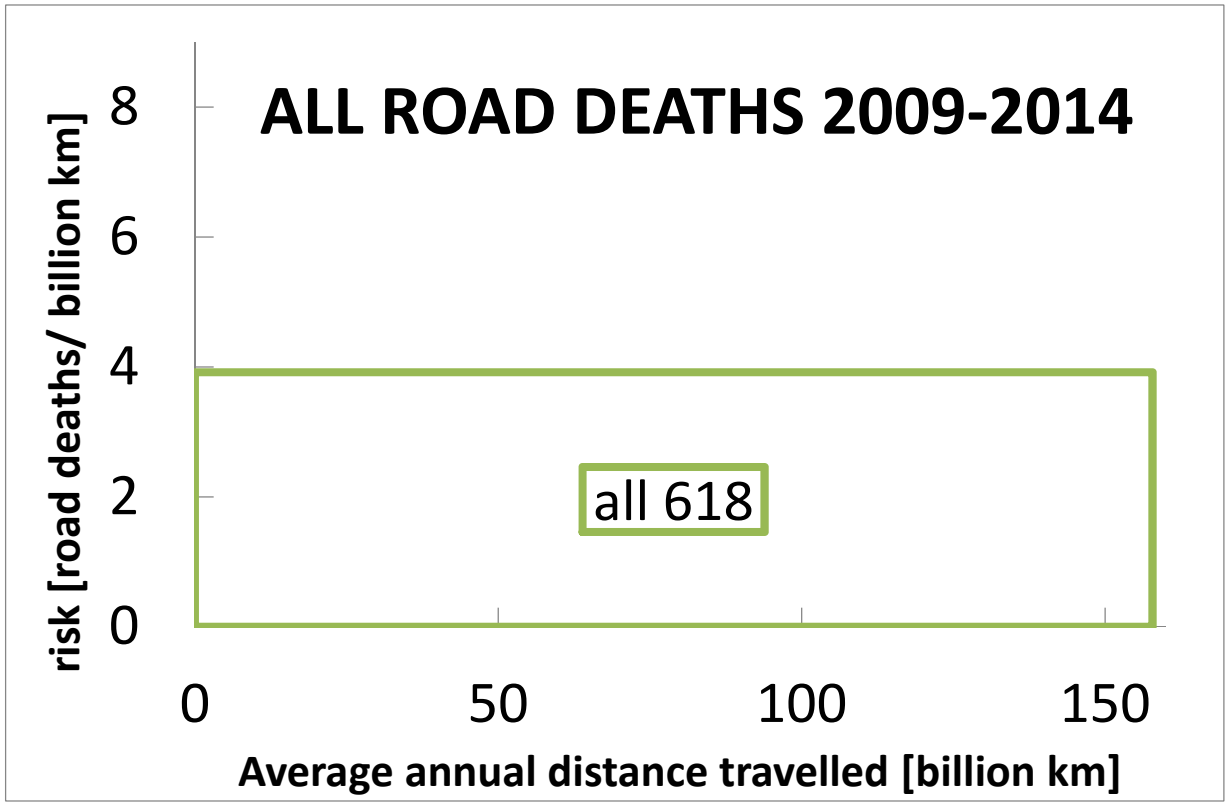
All road deaths in NL since 2000





Risk (=deaths/distance travelled)



deaths = proportional to risk and to distance travelled

- More distance travelled => more deaths
- More risk => more deaths

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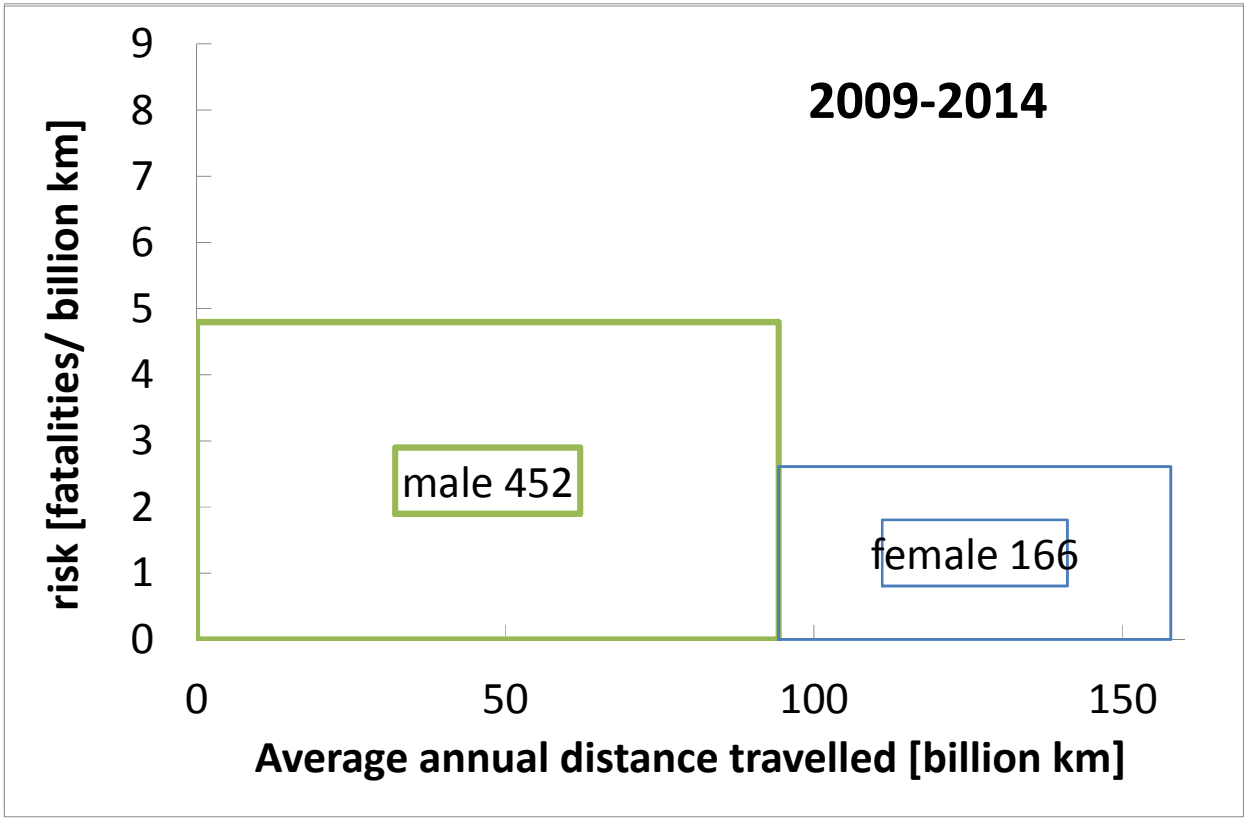
Risk is far from uniform for all travel



Males travel more *and* more dangerously
Three times more male victims than females

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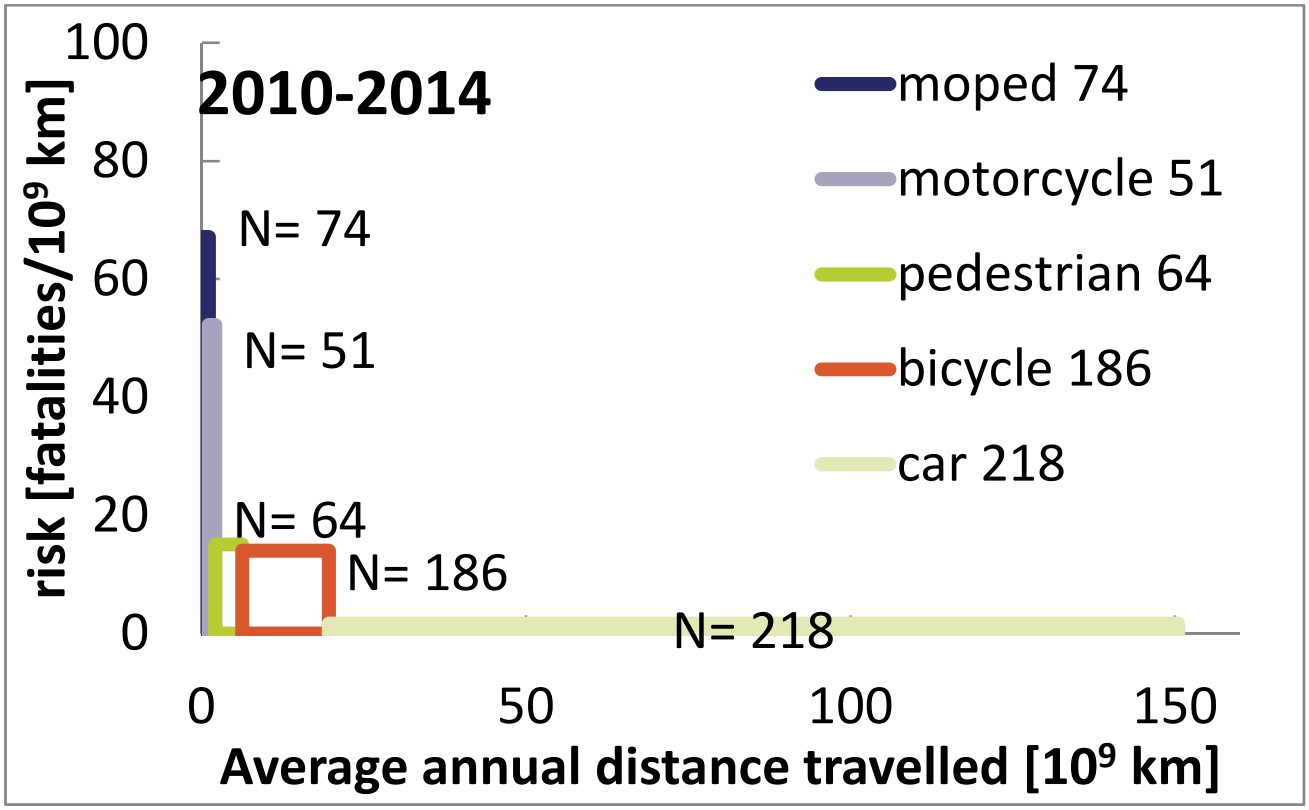
Risk differs for different travel modes



High risk and low travel for powered two wheelers
Low risk and high travel for passenger cars
Walking and cycling are intermediate modes

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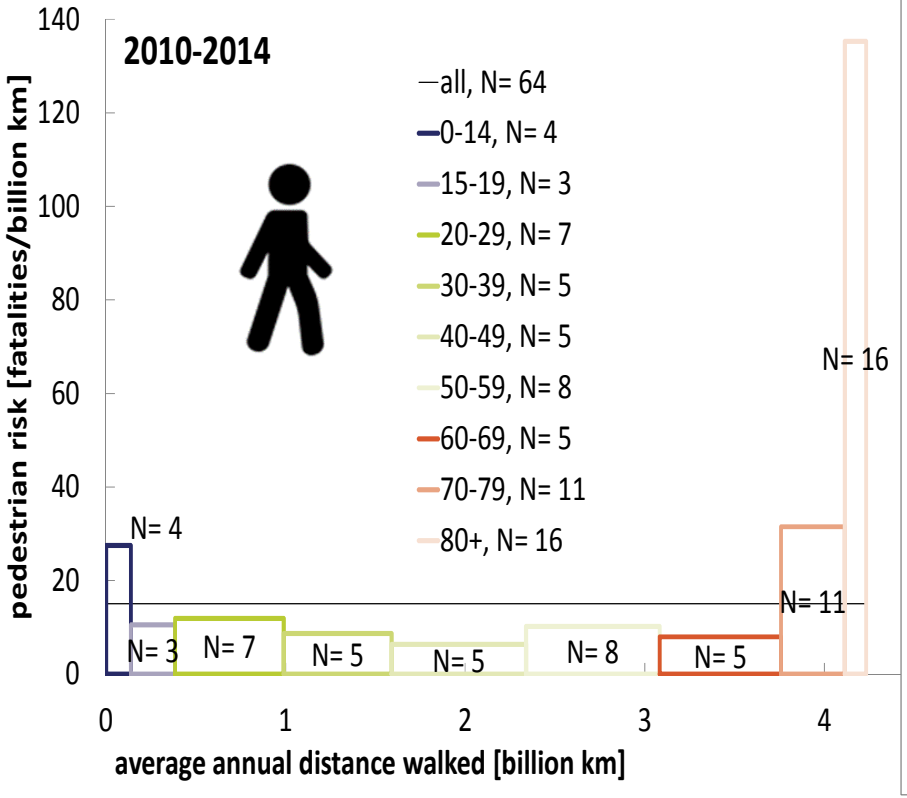
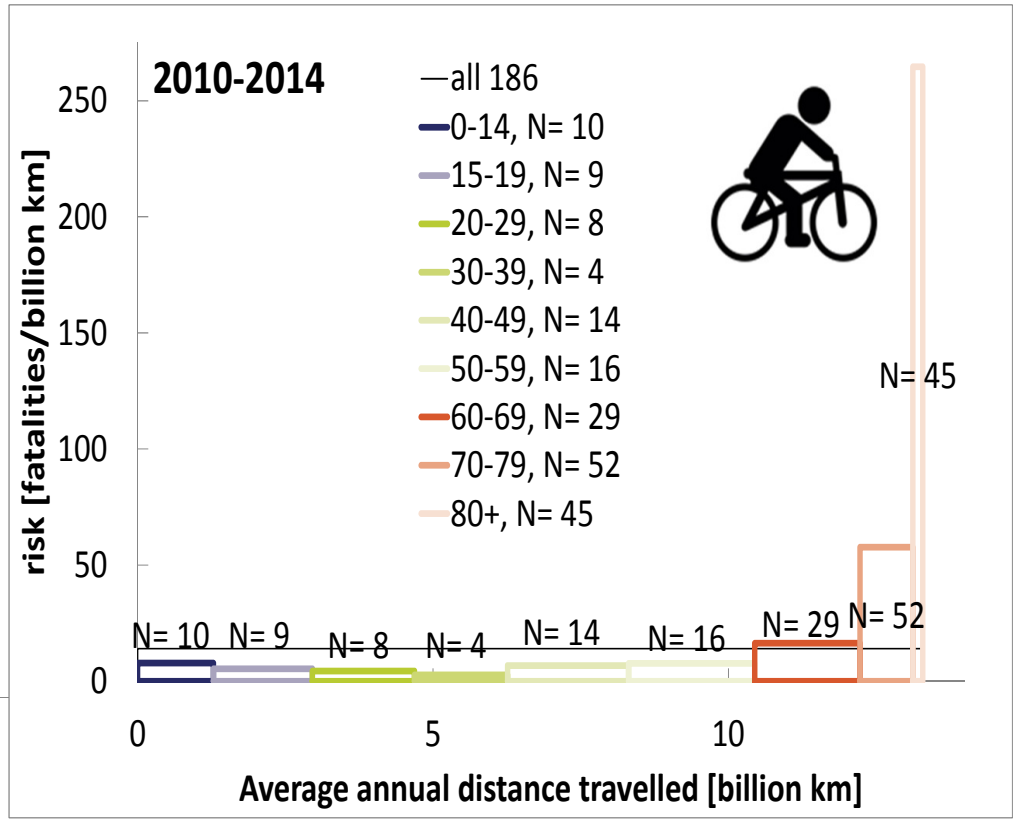
Pedestrian and bicycle risk by age (2010-2014)





Active travel modes are healthy, but unsafe

We aim at reducing risk, not distance travelled

(Mark the scales of the axes)

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The secret behind Dutch road safety: Principles of *sustainable safety*

Proactive instead of reactive

- Determine the function of the road
- Design a safe road that follows this function
- Ensure a predictable vehicle course and speed, with recognizable road types

➢ Homogeneous vehicle mass & speed

- Build forgiving roadsides

➢ Improve safety

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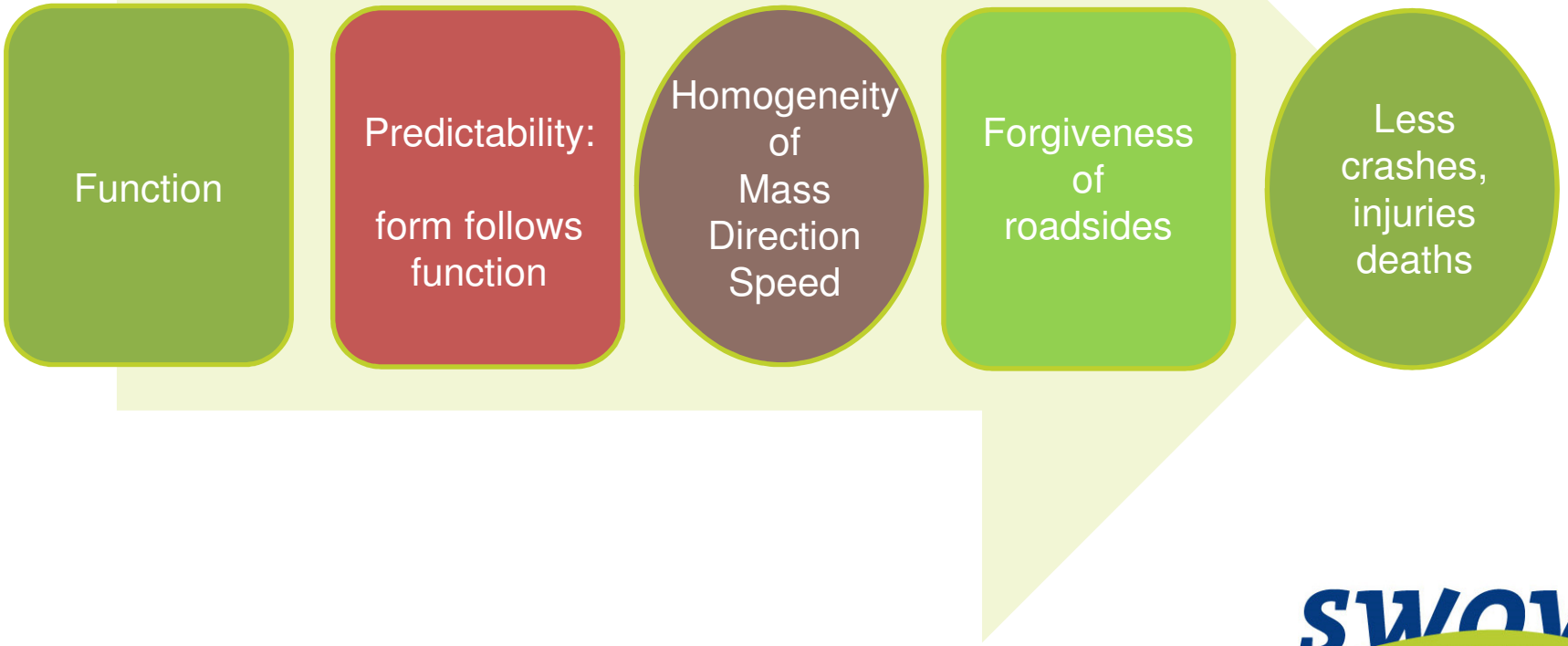
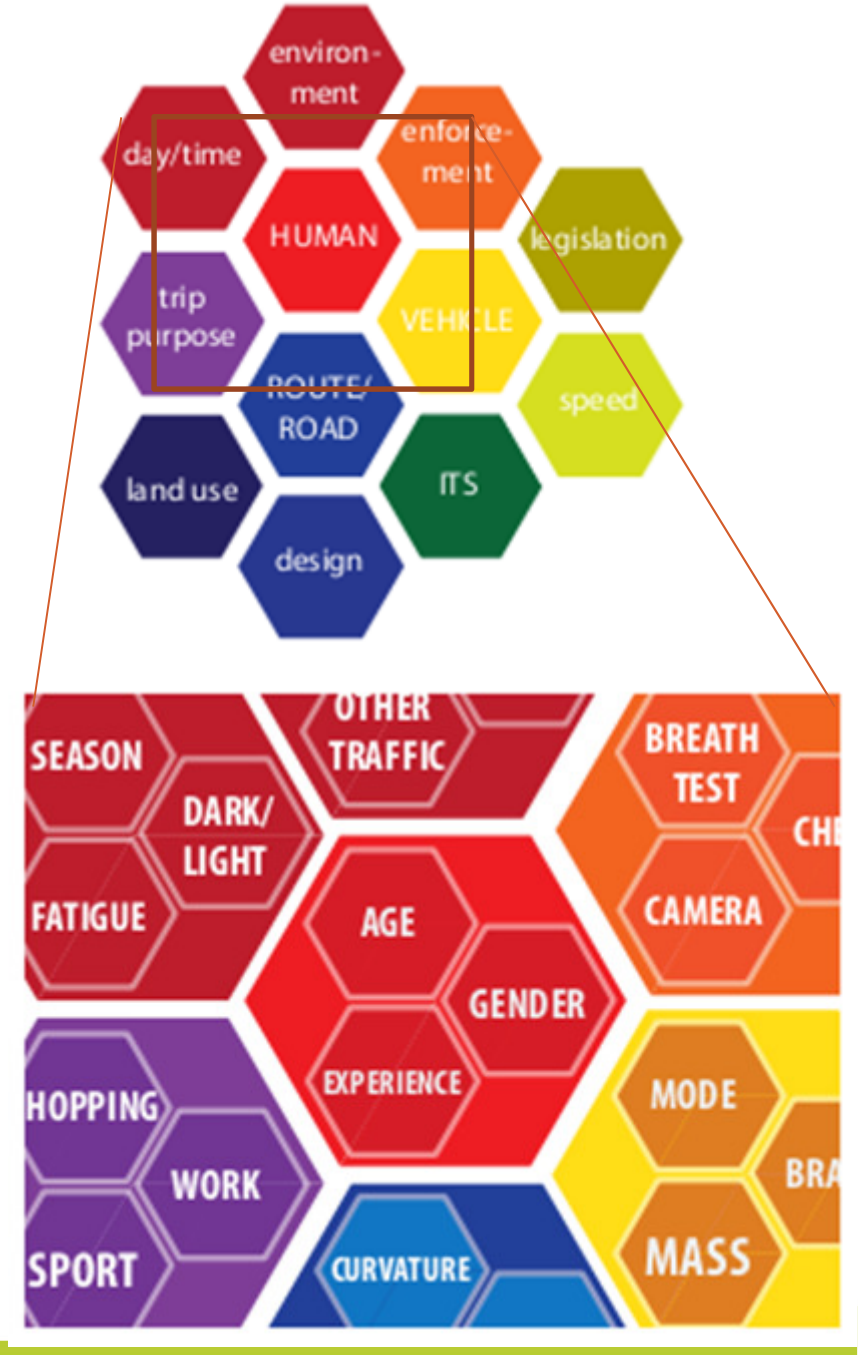
The secret behind Dutch road safety: Principles of *sustainable safety*



Integrated approach

- Education
- Infrastructure
- Vehicle design
- Enforcement

All factors are connected



Sustainable safety (safety by design). Make man the measure of the system.

- Accept that people are vulnerable, make mistakes and occasionally disobey the rules.
- Design a forgiving traffic system.
- Use human factors, cognitive ergonomics and physical tolerance to design the system.
- Change environment instead of man

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System approach: Safe speeds

Conflict types	Inside urban areas	Outside urban areas
Cars, cyclists pedestrians mix	**30 km/h**	**60 km/h**
	speed bumps; NO bicycle paths	
Intersections conflicts: right angles	**50 km/h**	**80 km/h**
	Elevated intersection area; bicycle paths; traffic lights; roundabouts	
Frontal conflicts cars	**70 km/h**	**120 km/h**
	Speed enforcement; separate lanes on motorways	

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Results: less road deaths

Less road deaths for cyclists and pedestrians

- 30km/h zones: - 15 %
- Cycle paths: - 24 %
- Roundabouts: - 30 % (all: -75%)
- 60km/h zones: - 32 %

- Result in NL: 300 to 400 less road deaths
- Ratio of benefit to cost = 4

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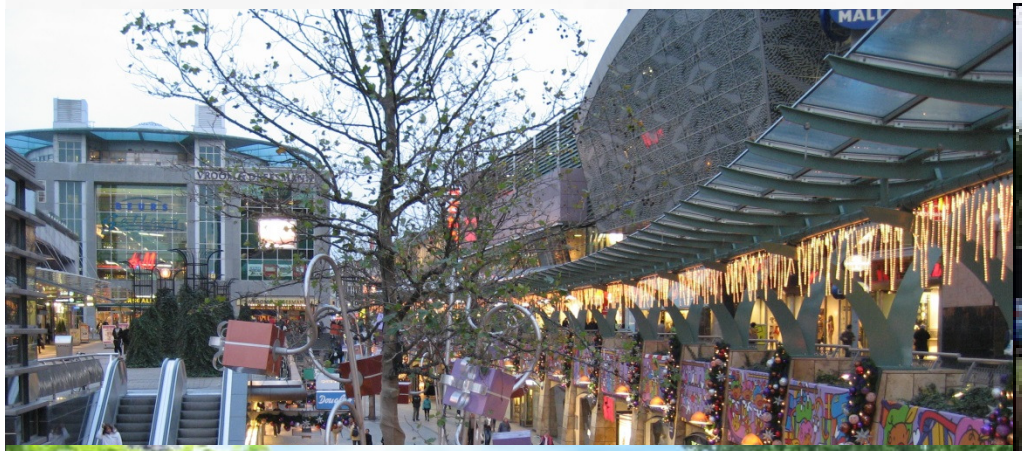
Road infrastructure safety evaluation tools in the Netherlands

- Proactive - quantitative
  - Sustainable safety test
  - RPS (v2.0)/iRAP
  - Safe and credible speed limits (SaCred)
  - Ranking the roads
- Proactive - qualitative
  - Audits/inspections
  - Internal design checks
- Reactive
  - Network screening
  - Blackspots/BSM

Infrastructure Measures that work



A word about serious injuries

- Crashes with motorized vehicles are prevented by the *sustainable safety* approach.
- However, cyclists can get seriously injured by “just” falling of their bike, especially 60+.
- These crashes are partly related to some sustainable safety measures (poles etc.).
- Hence: a serious injury cycling problem in the Netherlands.

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Recent improvements

Walking and cycling:

- Further infrastructure improvements
- Improved side view for trucks and vans (blind spot mirror)
- Passenger car safety improvements (both passive and active)

Cycling:

- Improved quality of bicycle lights
- Removal of poles etc. on bicycle paths.

Safety sensors (such as the SCN) to identify unsafe locations (See www.SWOV.nl R2014-14E)

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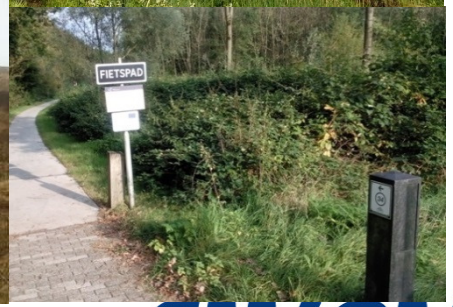
Recreational cycling

- Mandatory cycle paths (along roads with cars, trucks…)
- Non mandatory cycle paths e.g. in recreational regions.



- Literature: SWOV R2014-14E SCN

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Conclusions

1. Walking and cycling are healthy but unsafe: cyclists live a year longer due to health effects (minus 9 days due to road safety effects).
2. Fatalities and serious injuries are different issues.
3. Just as car safety, bicycle and pedestrian safety are multidimensional problems.
4. Many effective measures available.
5. Development of SPI's and safety sensors.
6. Implementation is difficult; SWOV helps provinces and municipalities to find ways to improve safety.

But the bottom line is:

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Love walking and cycling