



European Transport Safety Council

Ministry of the Interior, Zagreb

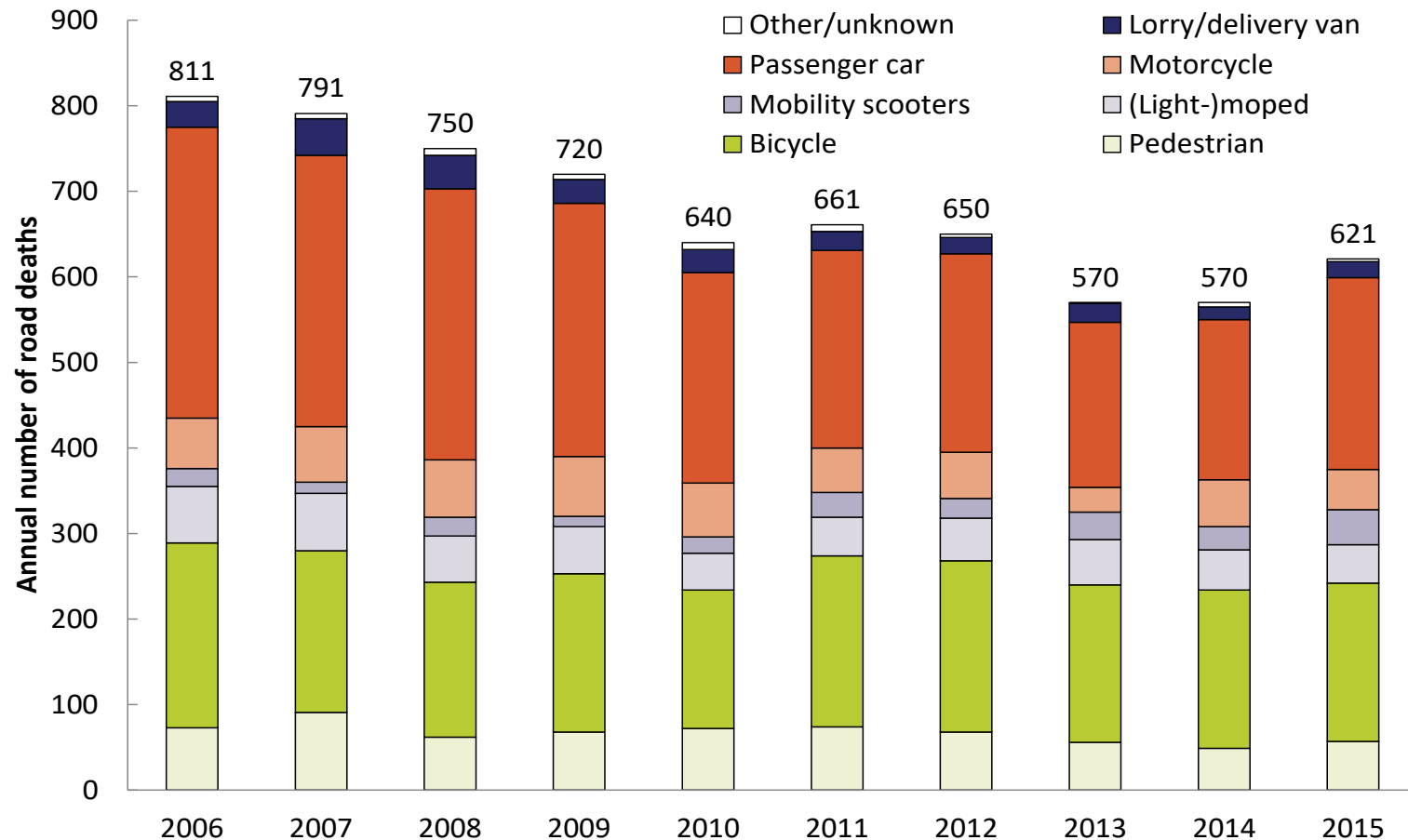
Cyclist safety in the Netherlands: Past, present and future

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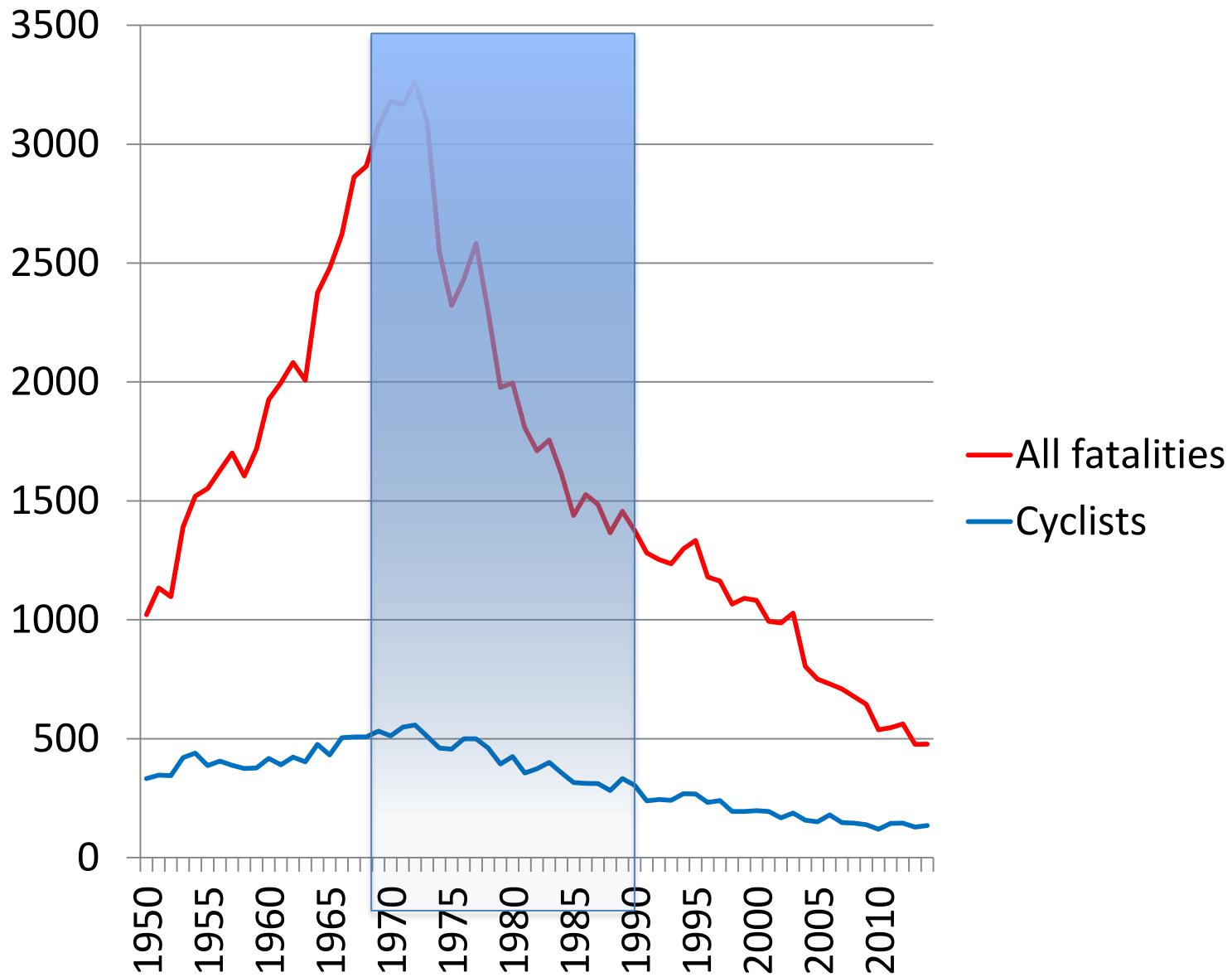
SWOV
WETENSCHAPPELIJK
ONDERZOEK VERKEERSVEILIGHEID

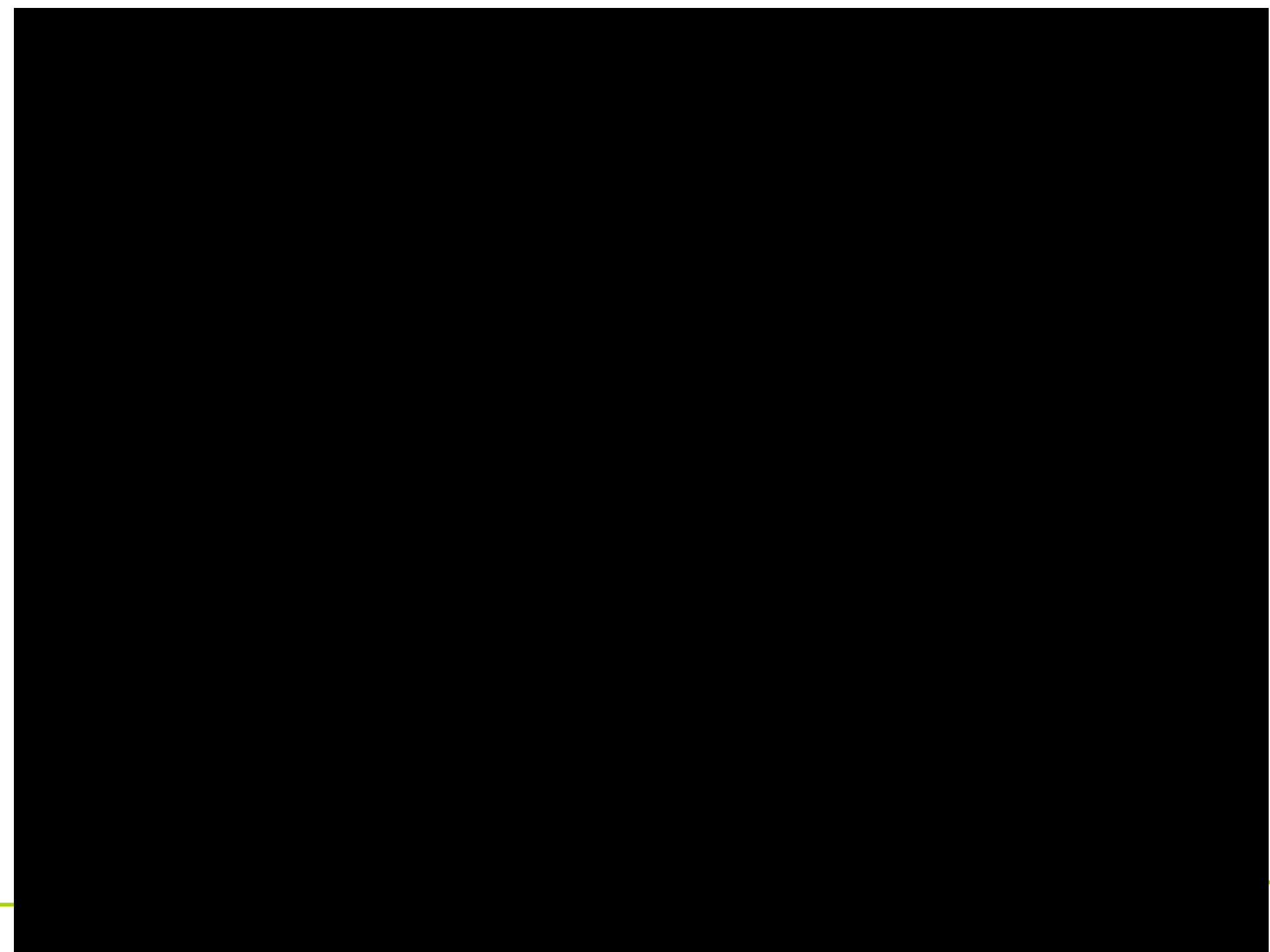
Road deaths in The Netherlands 2006-2015



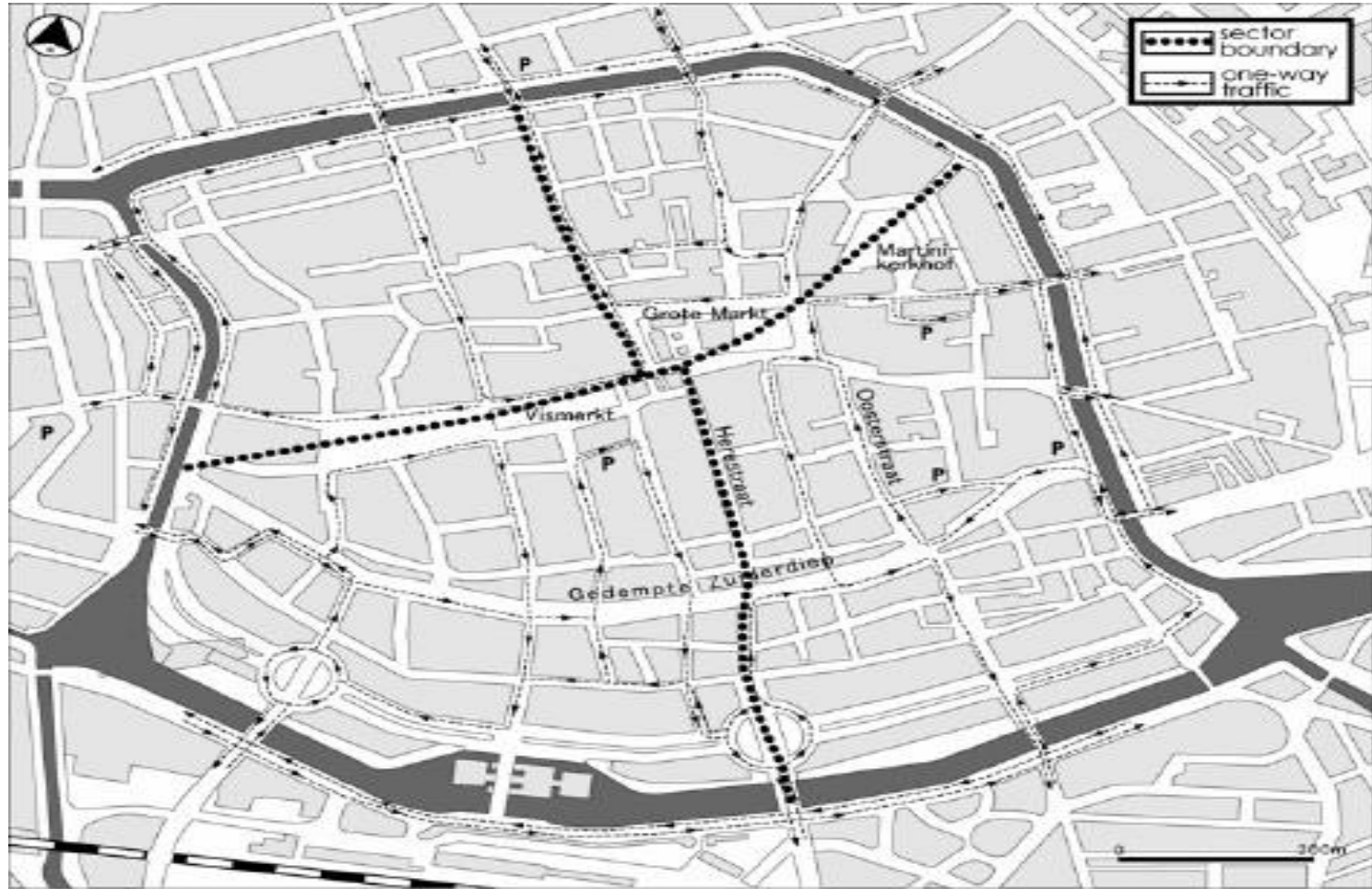
PAST

1. CYCLE FATALITIES
2. THE DUTCH & THEIR CYCLE PATH
3. UNDERSTANDING PREVENTION





A drastic example: the city of Groningen



1960



1970



2014



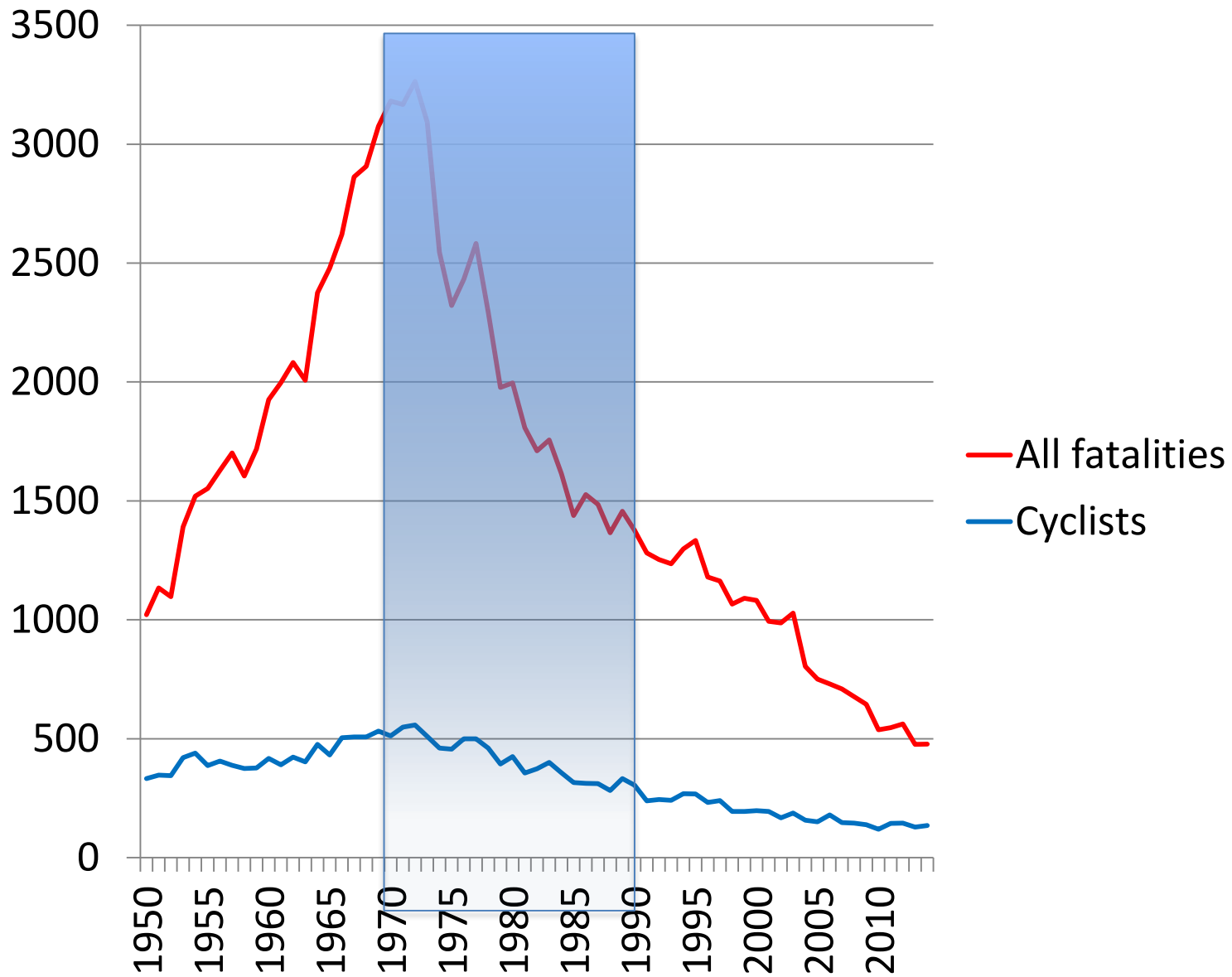
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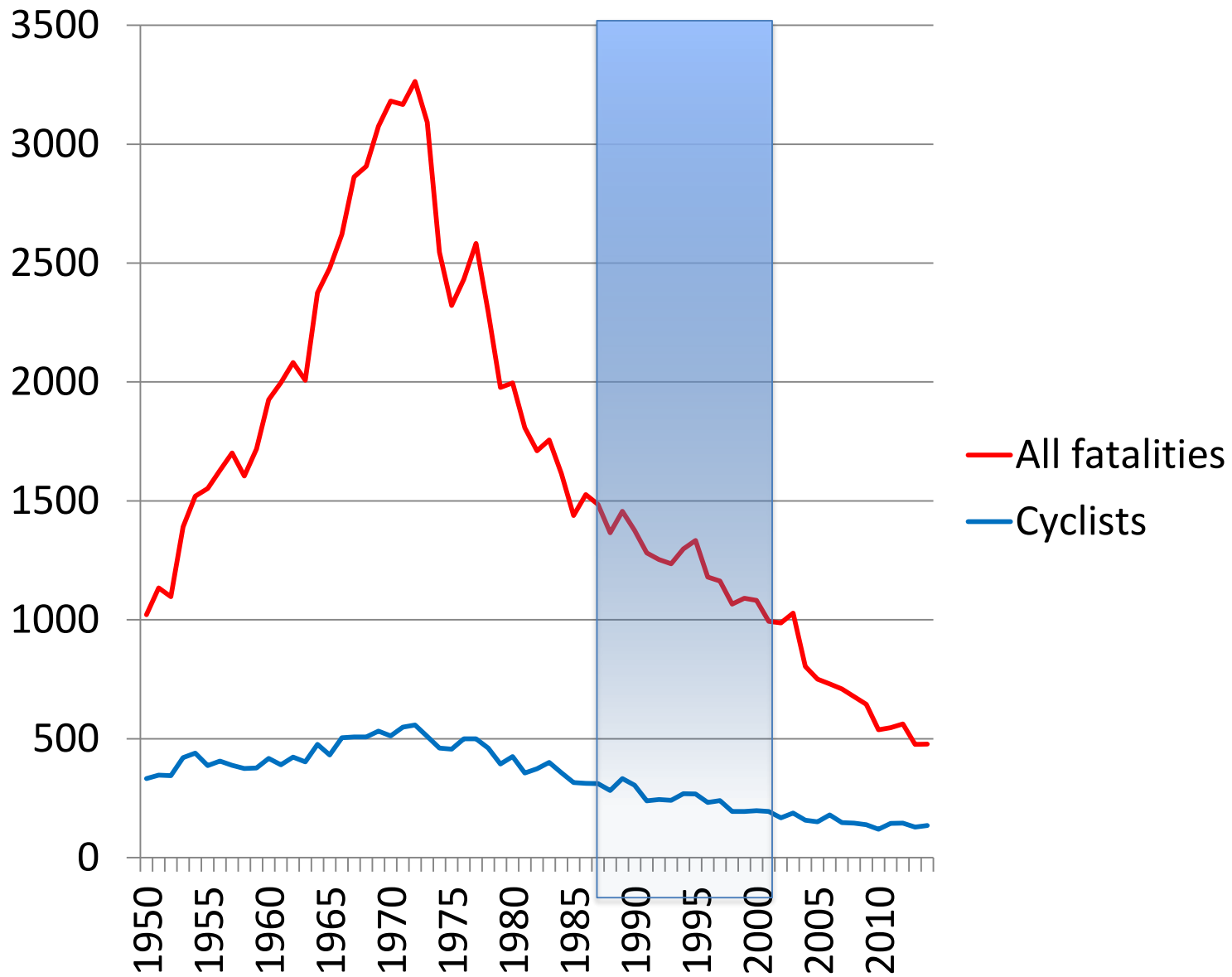




SWOV

WINSTUURFOR
ONROAD SAFETY RESEARCH





Sustainable safety to save lives

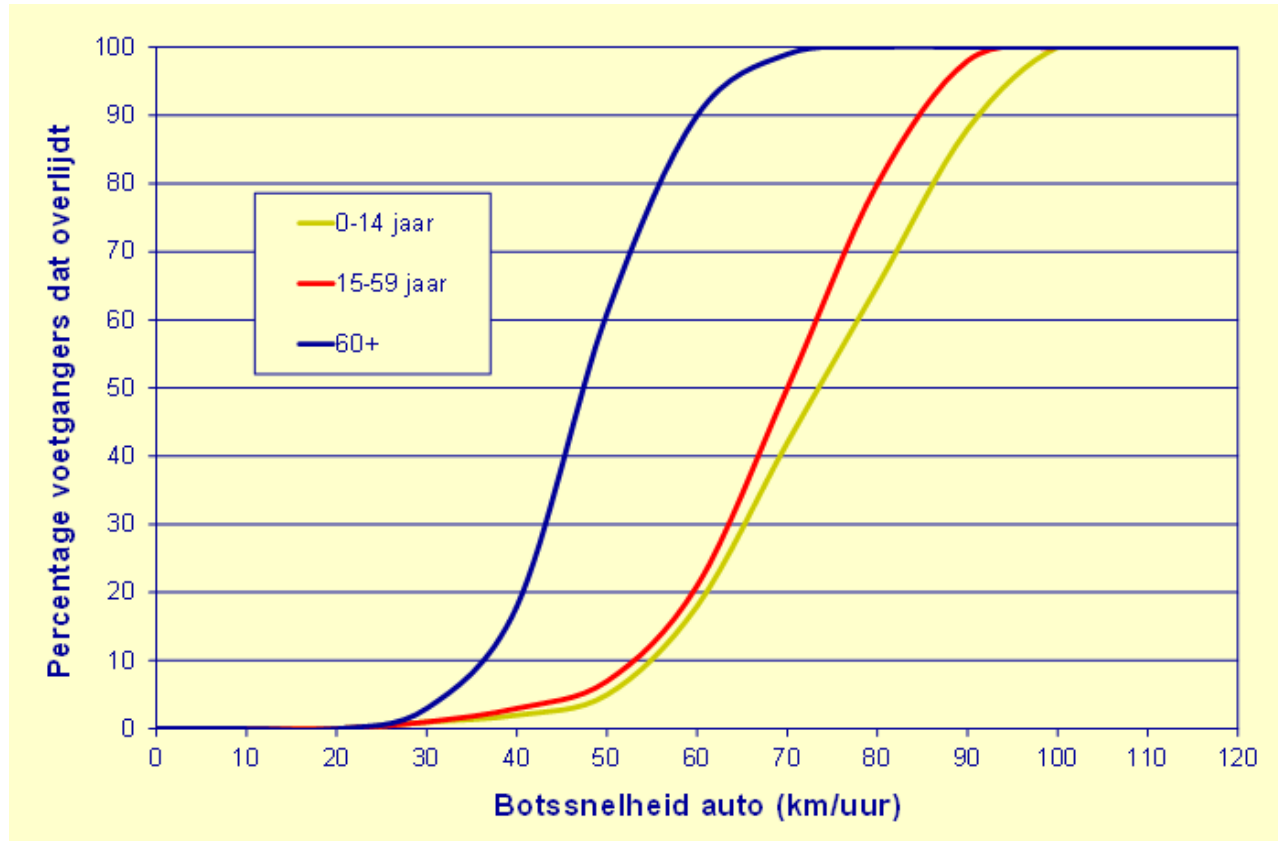
1992: The introduction of sustainable safety

Main principles on infrastructure

- Separate vulnerable road users from fast moving high mass vehicles
- Merge only at low speeds

Tolerance human body and impact speed

Percentage of fatally injured pedestrians



Impact speed (km/hr)

Conclusions on the past

- Political will and future planning improved safety
- A better understanding of human performance

PRESENT (1)

1. CYCLING MOBILITY
2. EFFECTIVE MEASURES

The Netherlands



- 17 million inhabitants
- 22 million bicycles
- 15 billion cycling kilometers annually;
- about 880 kilometer per person

EFFECTIVE MEASURES FATALITIES

Infrastructure Measures that work

- 30 Zones (from 50) - 15 %
- **Cycle path** - **24 %**
- 60 Zones (from 80) - 32 %*
- Roundabout - 30 %*



Cars and Lorries

- Extra mirrors lorries: -40%
- Cycle airbag: - 40%
- Underride protection: - 35%



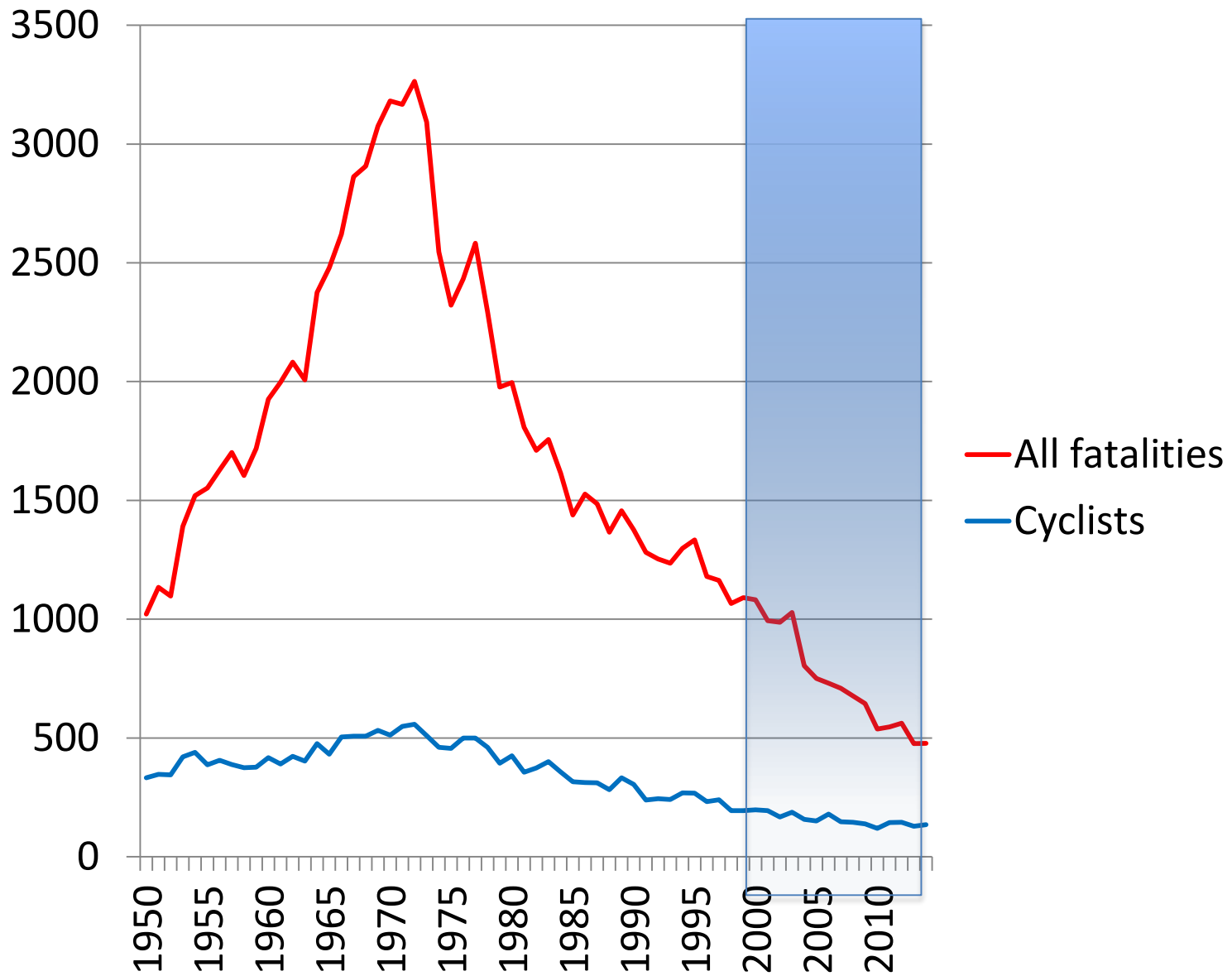
Traffic education in NL

- In primary school compulsory
- No standards or end terms
- Not compulsory in secondary education
- Large budget
- Effects unknown

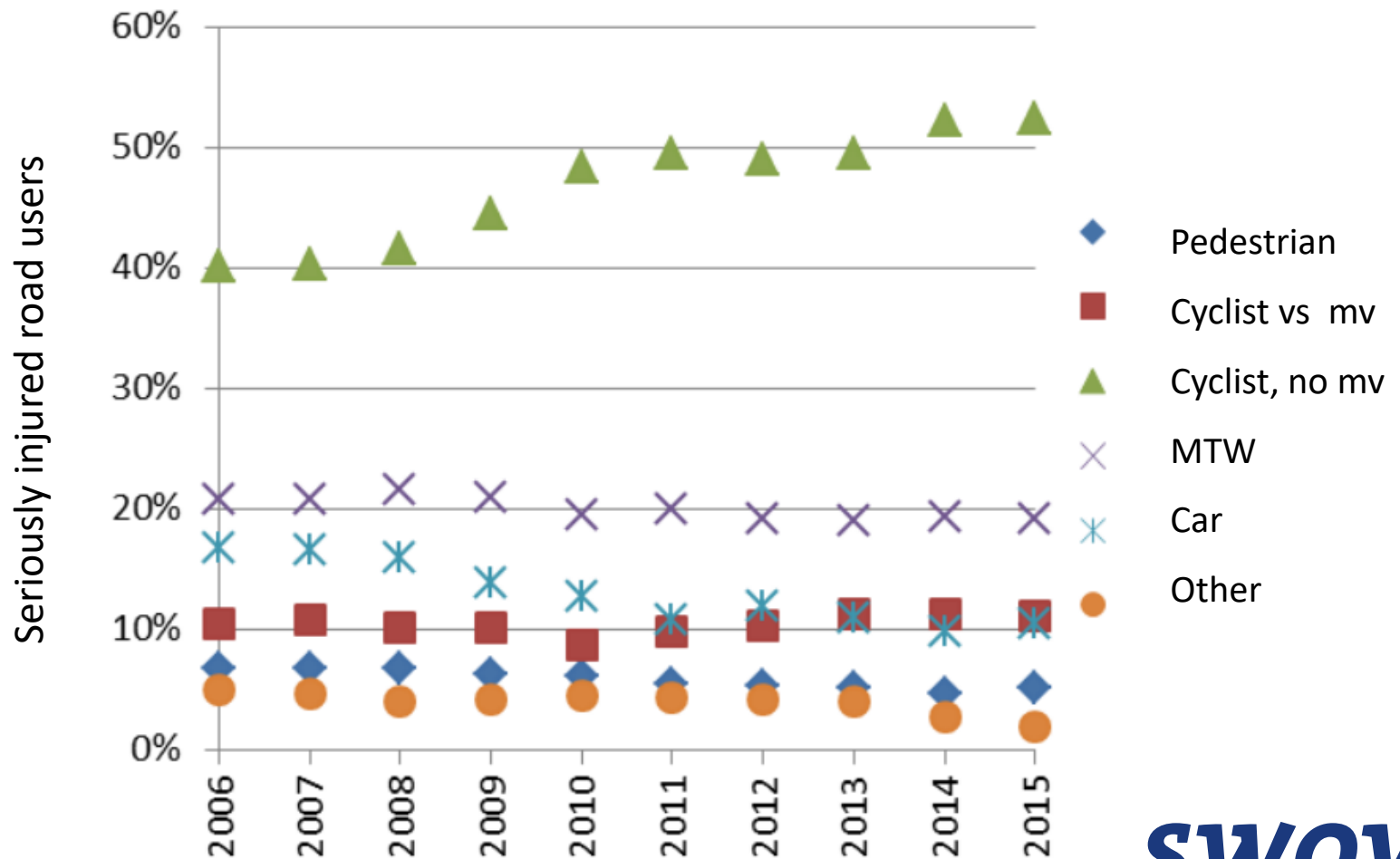


PRESENT (2)

1. INJURIES AND THEIR CAUSES
2. UNDERSTANDING THE NL CYCLIST
3. E-BIKES AND SPEED PEDELECS



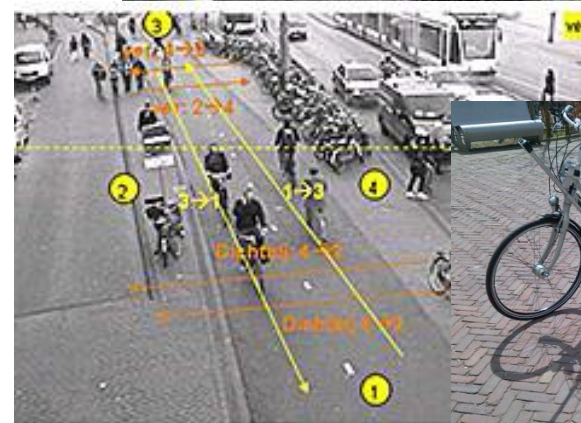
Seriously injured road users



Injuries: mostly because of falls



- Senior cyclists
- Poor infrastructural design
- Poor maintenance
- Too busy on cycle paths
- Electric bicycles
- Alcohol use among cyclists



E-bike & speed pedelecs



Difference

- Electric bicycle
 - 250 kw/h motor
 - **Max 25 km/hr**
 - Only pedal support
- Speed pedelec
 - 350 kw/u motor
 - **Max 45 km/hr**
 - Only pedal support

Legal position:
bicycle

Legally:

Now light moped

01-01-2017 **Moped**

E-bike and speed pedelecs: game changers?

- Great opportunity for cycling
 - In hilly conditions
 - Hot weather or strong winds
 - Longer distances
 - Greater load (carrying children)
 - Also for persons who are less fit
- A possible alternative for cars and/or public transport
- Positive Health impacts
- **But are they also safe?**

FUTURE CHALLENGES

1. NEW DEVELOPMENTS (INFRASTRUCTURE)
2. NEED FOR PRO-ACTIVE APPROACH
3. SELF-DRIVING CARS & SMART INFRA

New developments

- Unbundeling (no facilities along arterial roads)
- Extension 30 km/h to city centers
- Bicycle streets

Bicycle street; car is a guest



Assessment of safety of cycling infrastructure

CycleRAP

Situatie:

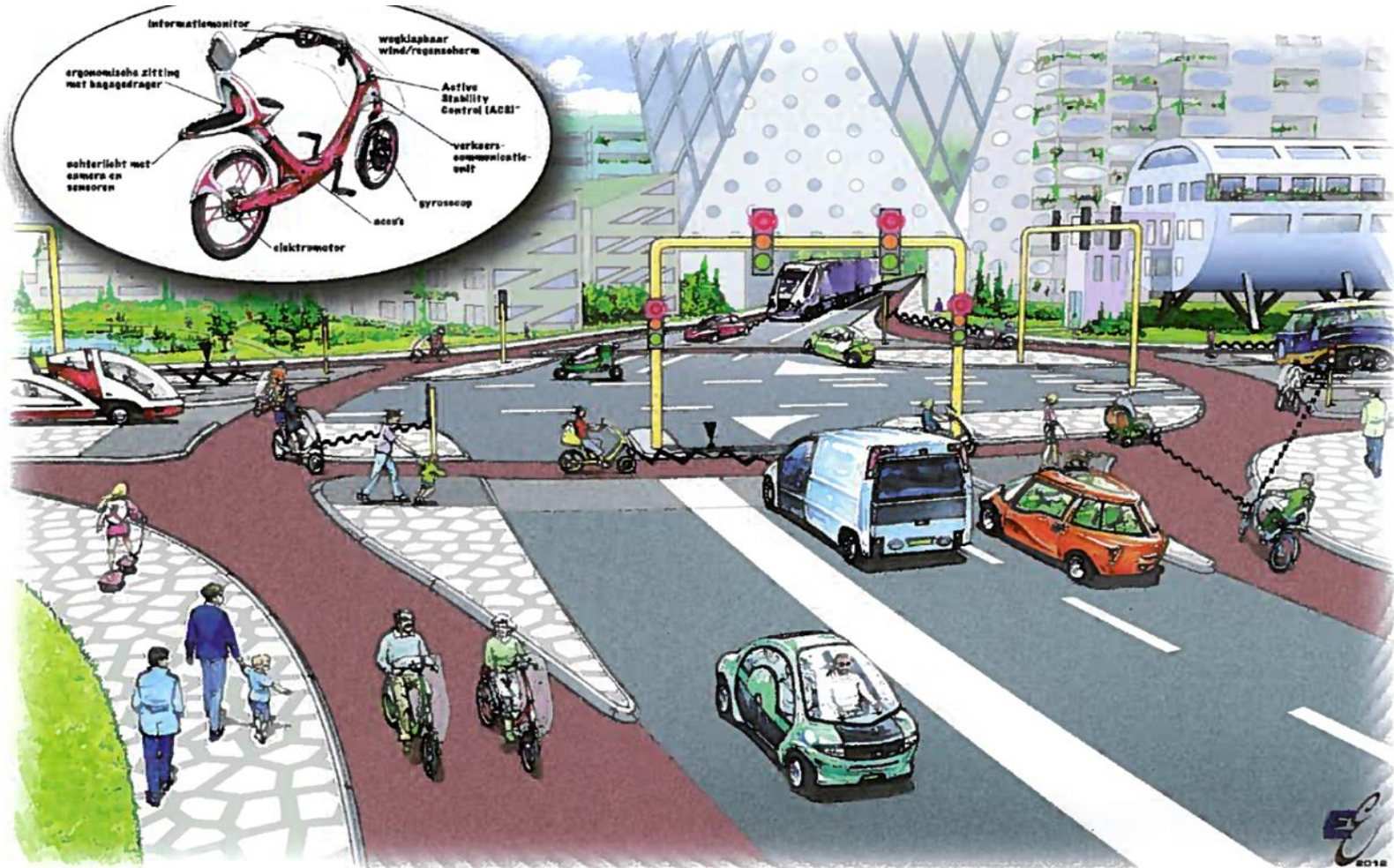


Focus of CycleRAP

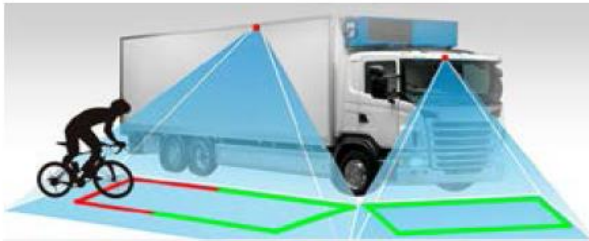
- Quality of infrastructure
- Obstacles
- Aligement



Automation future challenges



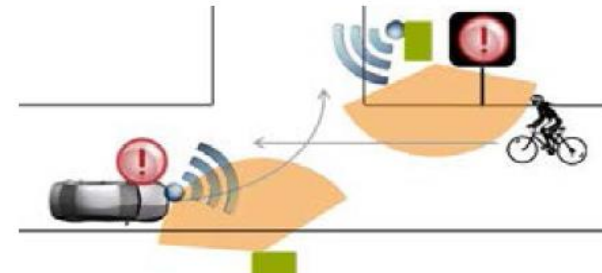
Connectivity



(a) Blind Spot Detection



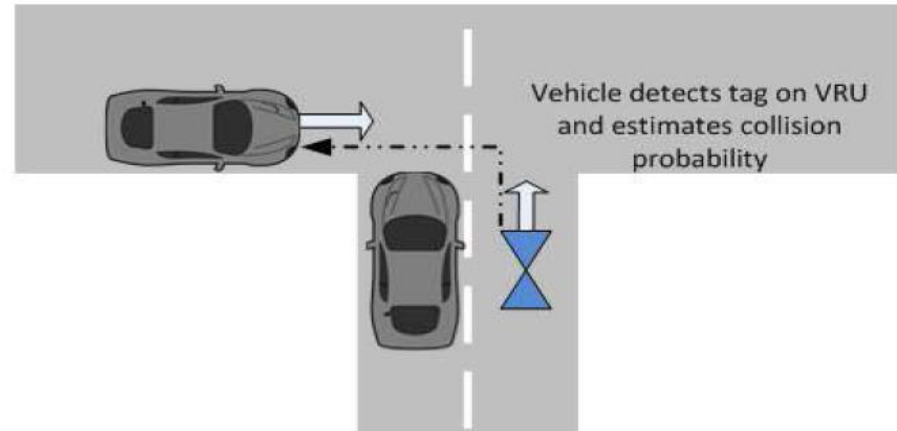
(b) Bicycle to Vehicle Communication



(c) Intersection Safety



(d) Pedestrians and Cyclist Detection + Emergency Braking



(e) VRU Beacon system

Conclusions

1. Cycle safety improved because of political will and future planning
2. Cycle paths not the only effective measure
3. Education for subgroups is a necessity but effective ?
4. Future challenges
 1. Reduce injuries : by a pro active approach
 2. Incorporate speed pedelecs
 3. Design self driving cars interacting safely with vulnerable road users