INSTITUTE FOR
ROAD SAFETY RESEARCH

Road Safety in a European perspective

Trafikdage Aalborg
27 August 2007

Fred Wegman
SWOV Institute for Road Safety Research

Three questions to be addressed

- How do we measure progress in road safety?
- Which progress have we accomplished and why?
- Which next steps can be set?
  - Dutch answer: Advancing Sustainable Safety

Which indicator to use to measure progress?

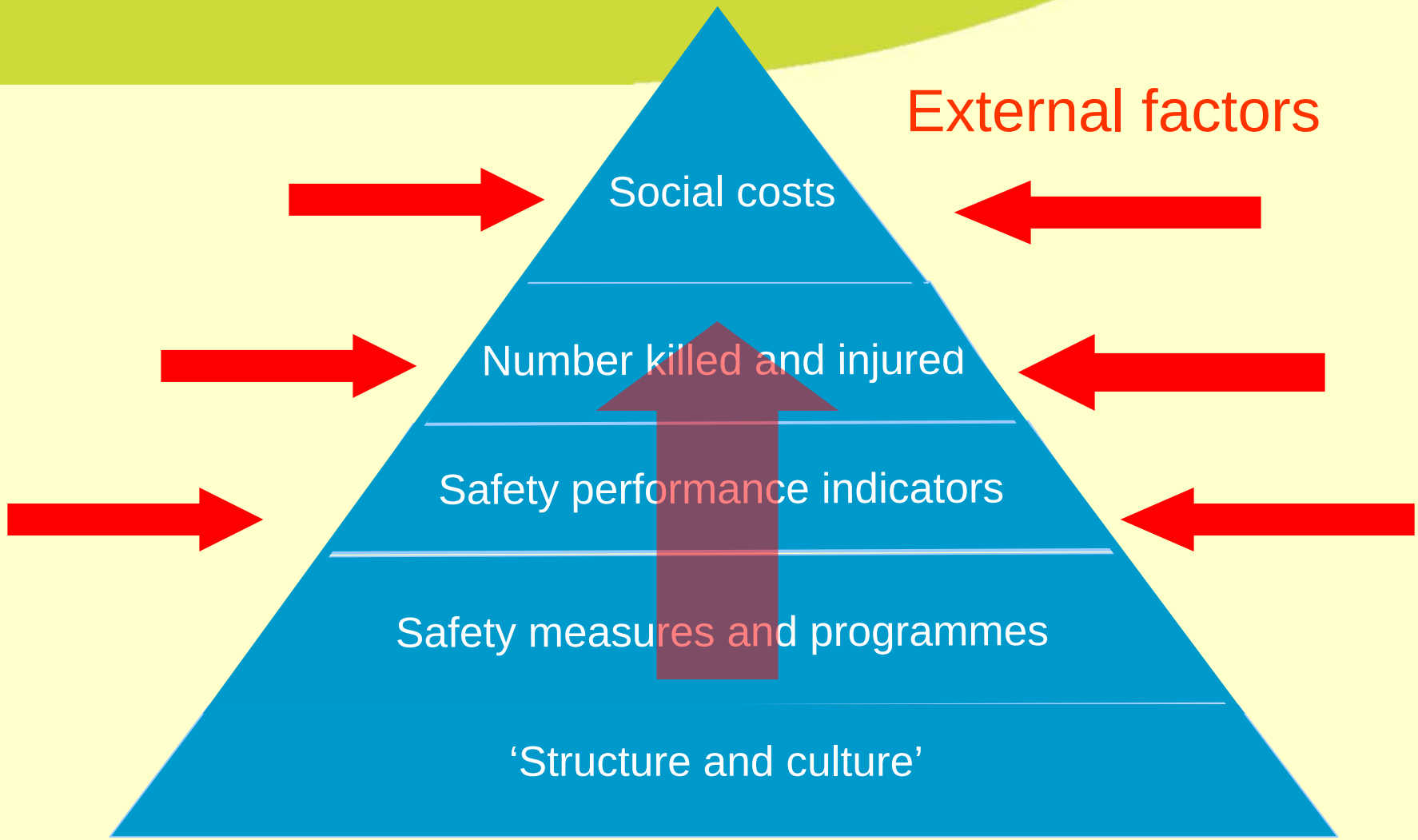
INSTITUTE FOR ROAD SAFETY RESEARCH

- Number of casualties: fatalities and injuries (e.g. KSI)
- Costs (all costs to society)

- Personal risk (casualties/inhabitants): public health indicator
- Traffic risk (casualties/exposure): indicating safety quality of road transport system

- A choice for an indicator is a political/policy choice

SUNflower target hierarchy



Road safety data

- Data should be:
  - complete (underreporting!)
  - reliable
  - comparable, if not internationally harmonized
- Examples:
  - IRTAD (International Traffic Safety Data and Analysis Group)
  - SUNflower (EU project comparing Sweden, UK, NL); SUNflower+6 (SUN, Central, South)
  - SafetyNet (European Road Safety Observatory)
- Data should reflect a road safety paradigm/policy concept/road safety vision/strategy:
  - See history of ‘causes of crashes’

Road safety ‘causes’ as seen over time underpinning policy concepts

INSTITUTE FOR ROAD SAFETY RESEARCH

Period	Characteristic
1900 - 1920	Crashes as chance phenomenon
1920 - 1950	Crashes caused by the crash-prone
1940 - 1960	Crashes are mono-causal
1950 - 1980	A combination of crash causes fitting within a ‘system approach’
1980 - 2000	The road user is the weak link: more behavioural influence
2000 -	- Better implementation of existing policies - Systems management perspective, such as ‘Sustainably Safety' in the Netherlands and ‘Vision Zero’ in Sweden

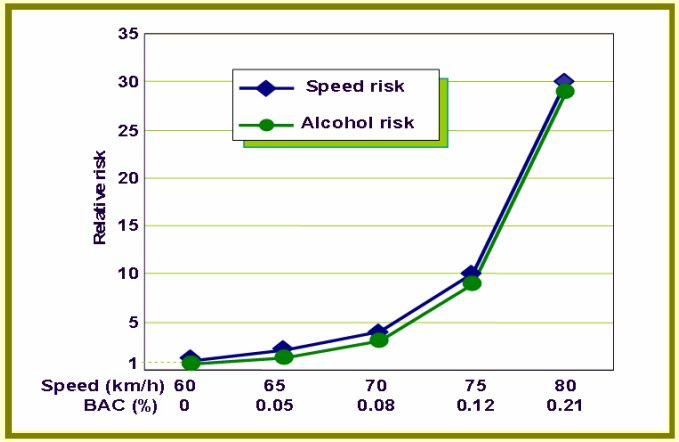
(derived from OECD, 1997)

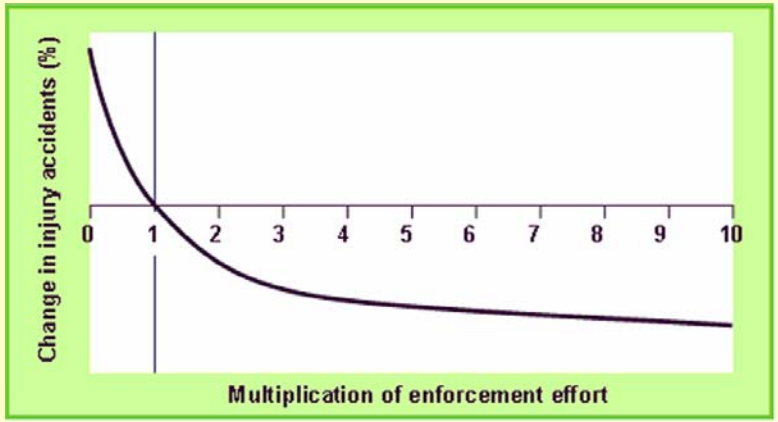
Road safety data + knowledge

INSTITUTE FOR ROAD SAFETY RESEARCH

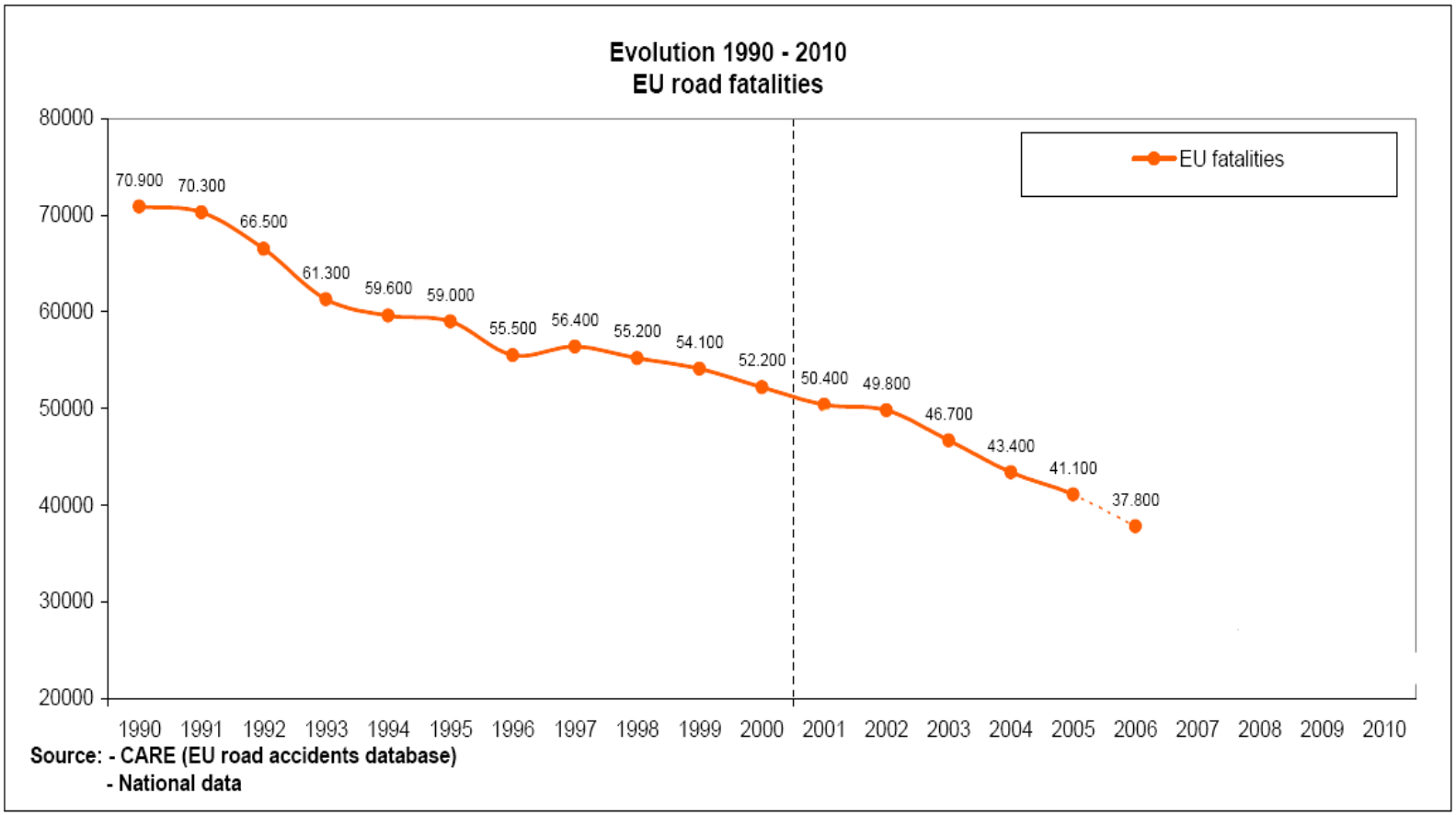
Knowledge about relationships between different layers of the pyramid

- Safety Performance Indicator (SPI) and safety outcome
- Policy performance and SPI
- Policy performance and safety outcome



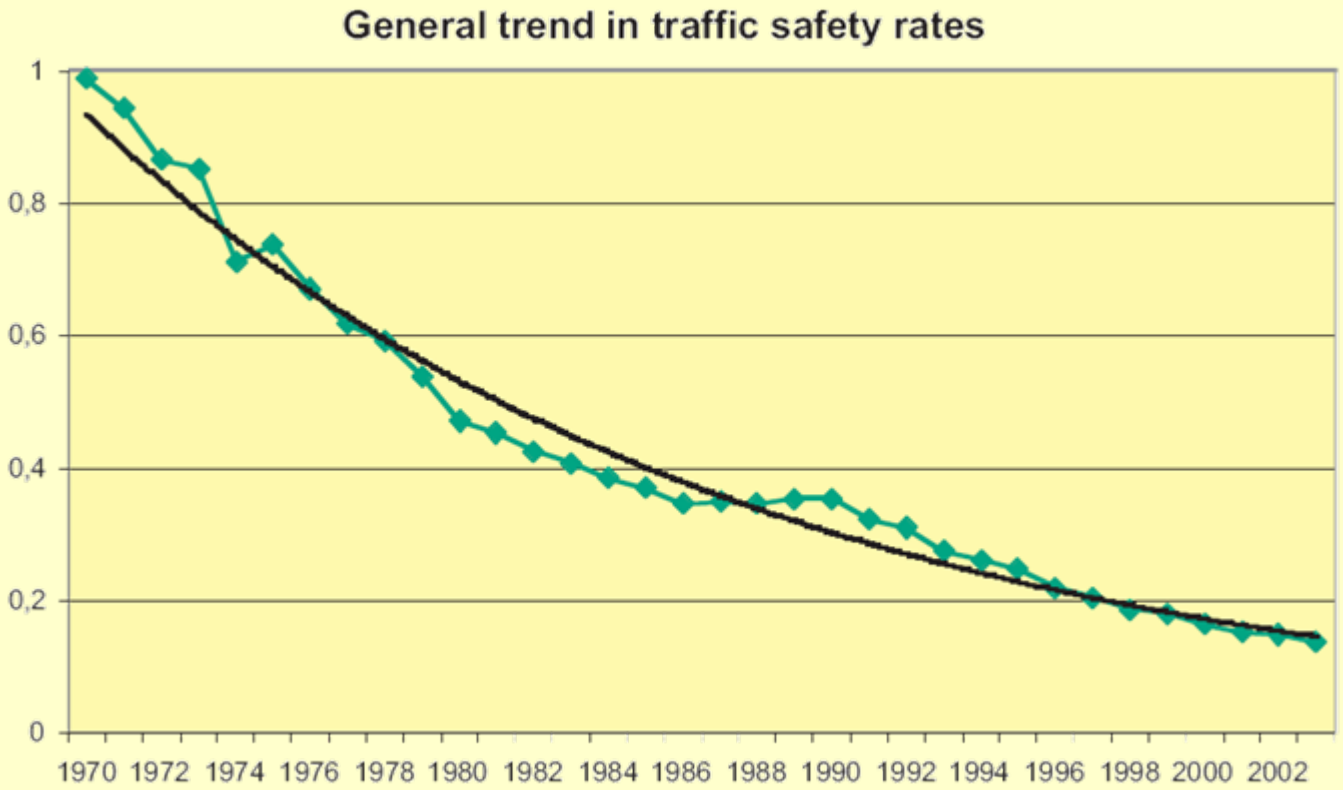


Fatalities in the European Union (25)

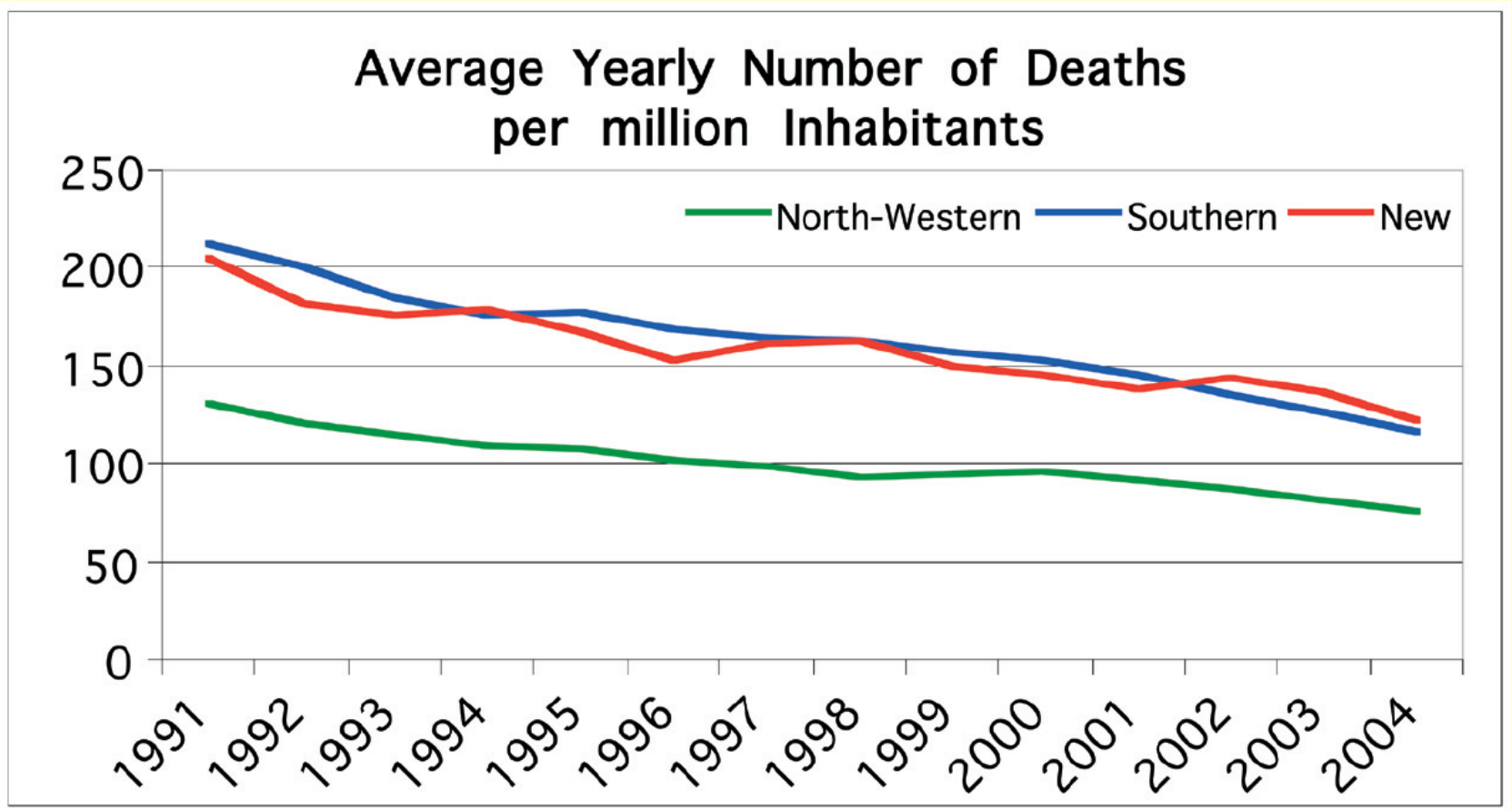


Development of traffic safety rates in SUNflower+6 countries

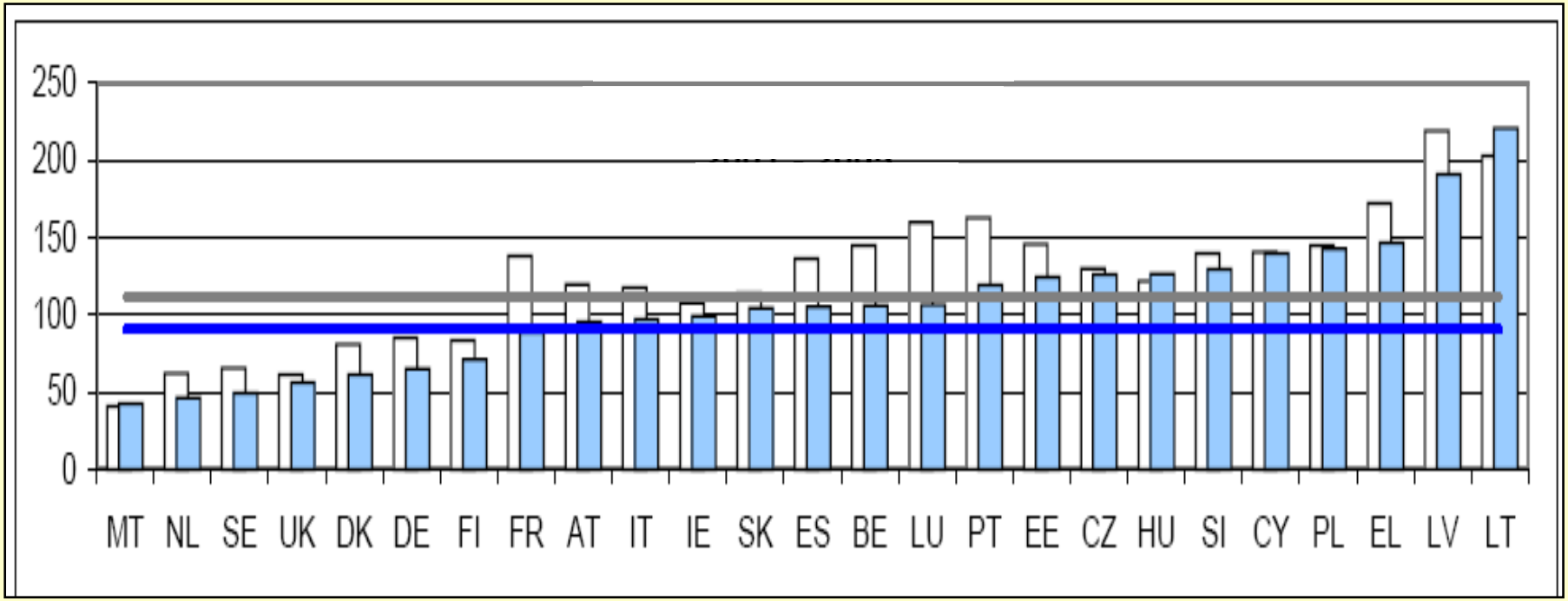
INSTITUTE FOR ROAD SAFETY RESEARCH



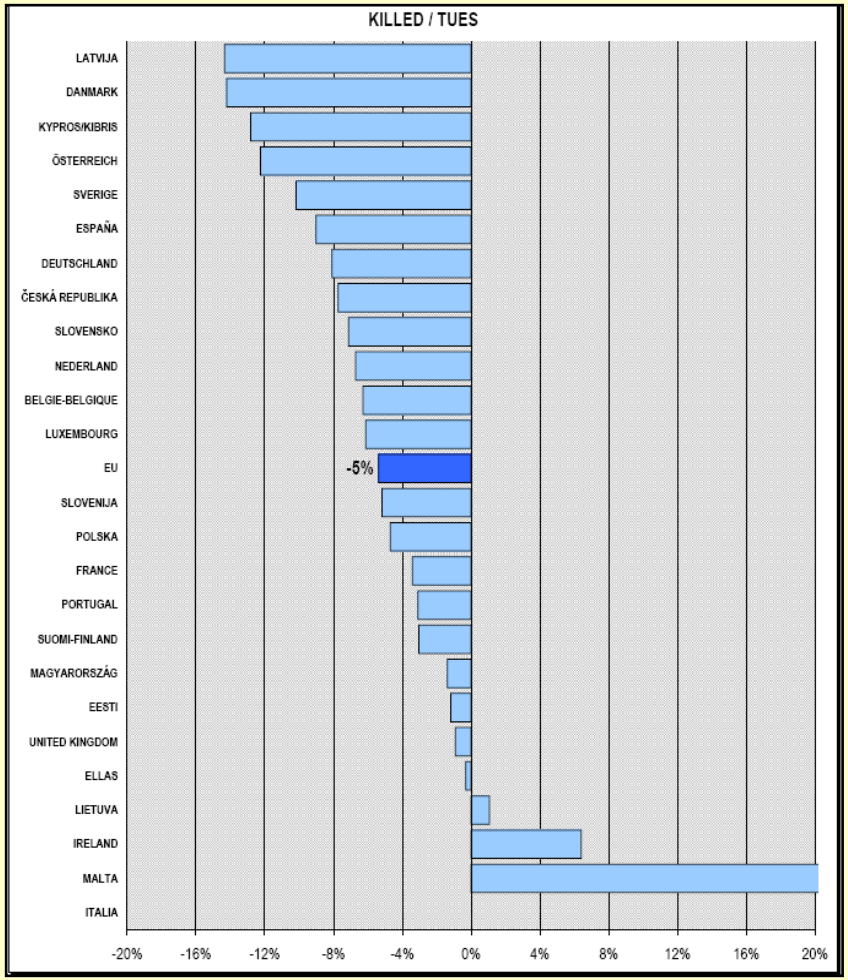
Development of personal safety rates in Europe



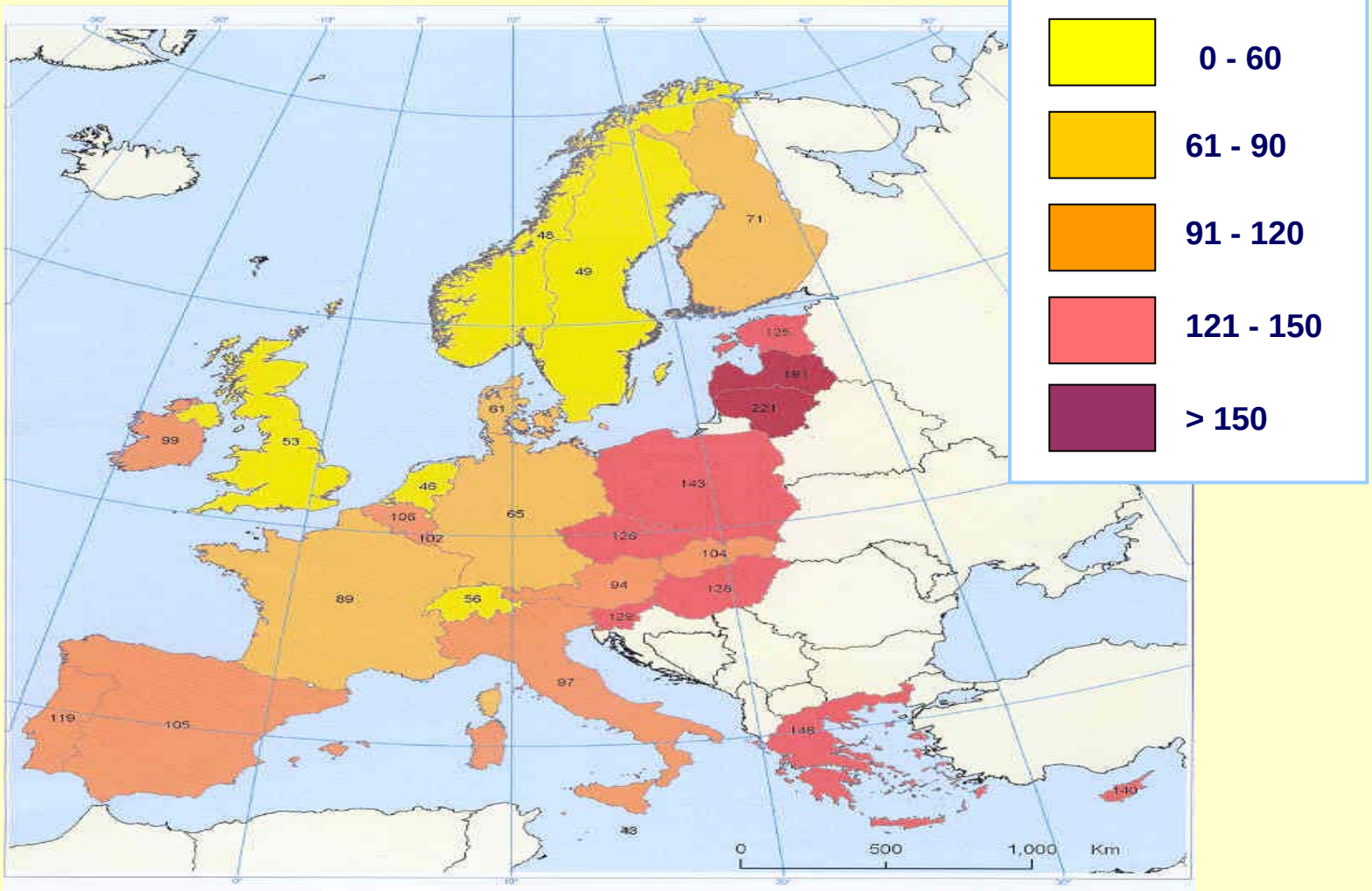
Fatalities by population



Percentage change 2005 on 2004: number of fatalities



Mortality rates in Europe (2005)



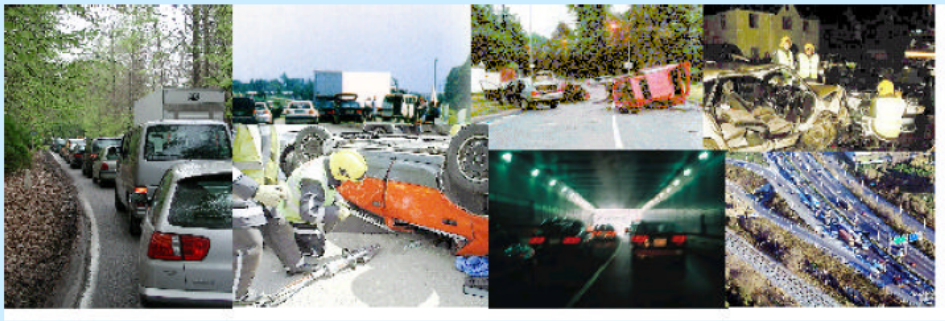
Road Safety in Europe

- Halving road deaths over the next ten years
- 2001 – 2010: from 40,000 to 20,000 (EU 15)
- 2001 - 2010: from 50,000 to 25,000 (EU 25)

European Road Safety Action Plan (I)

INSTITUTE FOR ROAD SAFETY RESEARCH

Saving 20,000 lives on our roads



The European Road Safety Action Programme

A shared responsibility

Directorate general for Energy and Transport Information and communication

European Road Safety Action Plan (II)

The EU instruments

- Legislation (only when necessary)
- Best practice guidelines
  - Technical guidelines accepted by experts drafted by professionals for the use of professionals
- Research and development
  - Studies
  - Framework programme research
- Financial support
- Road accident data and information

Directorate general for Energy and Transport Information and communication 8

Evidence based European activities

INSTITUTE FOR ROAD SAFETY RESEARCH

EuroRAP
EUROPEAN ROAD ASSESSMENT PROGRAMME

EURO NCAP

Enormous increase in our knowledge: scientific research, e.g.:

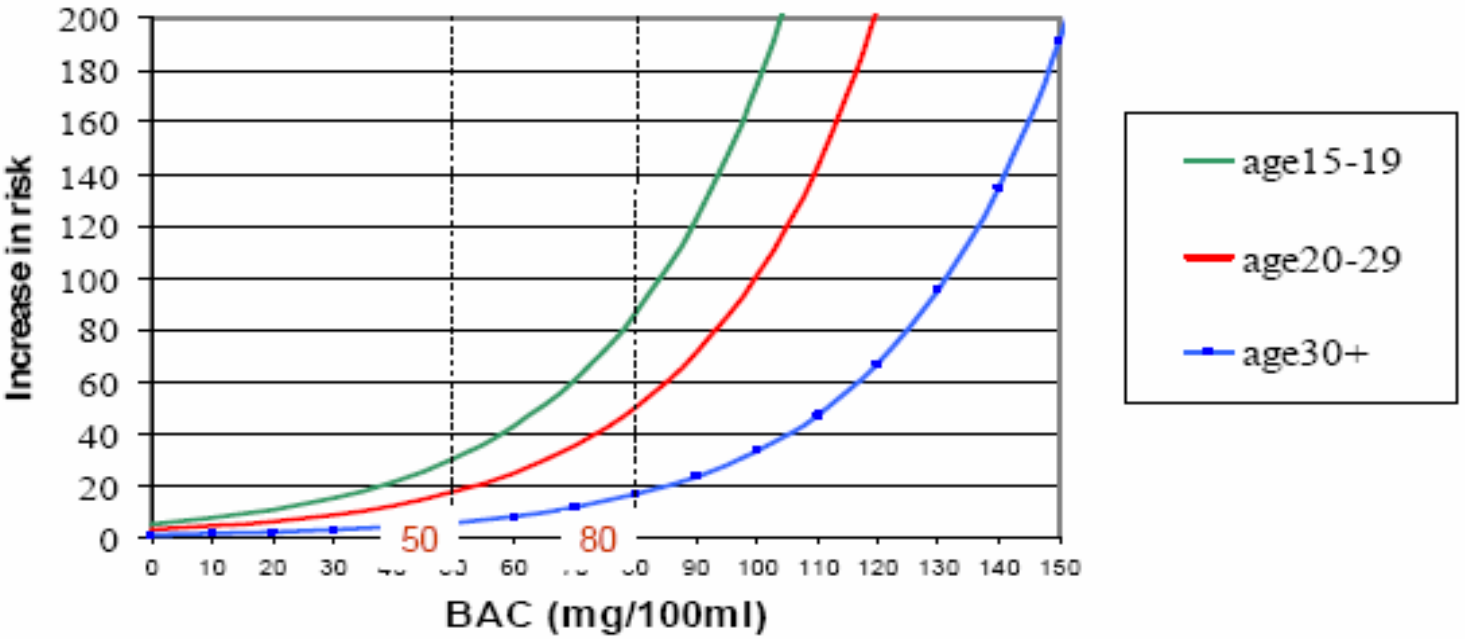
- The effect of roundabout design features on cyclist accident rate
  Accident Analysis & Prevention, *Volume 39, Issue 2*, *March 2007*, *Pages 300-307*
  Tove Hels and Ivanka Orozova-Bekkevold
  SummaryPlus | Full Text + Links | PDF (138 K)

Source: Accident Analysis & Prevention

Copyright © 2007 Elsevier Ltd. All rights reserved

Shortcut URL to this page: http://www.sciencedirect.com/science/journal/00014575

Enormous increase in our knowledge: e.g. “Borkenstein-curve” in New Zealand



3rd IRTAD Conference Brno, 26-28 November 2006

Bill Frith
Manager Research and Statistics
Ministry of Transport
NEW ZEALAND

SUPREME European Handbook of ‘best practices’

INSTITUTE FOR ROAD SAFETY RESEARCH

SUPREME

Best practice: Road safety visions
Sustainable Safety in the Netherlands

Source: sutainablesafety.nl

What is it about?
A Sustainable Safe road system aims to prevent crashes and if they still occur, to minimise their consequences. It is based on the idea that people make errors and are physically vulnerable. There are five main principles: functionality, homogeneity, predictability, forgivingness, and state awareness. The Sustainable Safety vision has a large influence on road safety work in practice, and led and still leads to the implementation of effective and sustainable road safety measures. For example, one of the consequences of the principle homogeneity is that motorised traffic and vulnerable road users (pedestrians, cyclists) can only mix if speeds of motorised traffic are low. If speeds cannot be low, separate facilities for vulnerable road users are required. Measures to realise this included a substantial increase in the number and size of 30 km/h zones in built-up areas; the introduction of 60 km/h zones outside built-up areas, and speed reduction at intersections.

Who is involved?
Sustainable Safety has been the leading vision in the road safety policy of the Netherlands since the early nineties. The road authorities at the different levels (national, regional and local) actually implement the Sustainable Safety measures.

What are the effects and costs?
It has been estimated that the sustainable safety approach reduced the number of fatalities and in-patients by 6% nationwide. Costs, in particular those related to reconstruction of roads are high, but can largely join in with regular maintenance work.

More information?
http://www.sustainablesafety.nl

Promising practice example: driver support systems
Fitting of vehicles with Electronic Stability Control (ESC)

Sou

about?
Stability Control first emerged some ten years ago. ESC enhances vehicles' la
by recognising when a skid is starting to happen. In a fraction of a second th
control unit applies the brakes at individual wheels, helping to keep the car under
fore the skid develops. Whether the skid is the result of an emergency avoidance
e or a simple error of judgment, ESC can help a driver maintain control of the

ess?
search suggests that ESC can be highly effective in reducing rollover and other loss-
crashes, thus showing tha
an those which are not. Est
occupants. The number o
increasing. The Euro NC
s in the extent to which th
dels have ESC fitted as sta
option, in others.

s?
alian New Car Assessment
o require ESC as part of its
opean market would certai
adopted the 6th April 2007
tonnes sold in the USA by
g adopting a similar legi
led by the eSafety Aware
raising awareness of ESC.

rmation?
w.esafetyaware.eu/downlo
uropa.eu/enterprise/autom

n.gp.com

Good practice example: enforcement of traffic law
TISPOL, the European Traffic Police Network

Source: TISPOL

What is it about?
TISPOL, the European Traffic Police Network, is an initiative set up in 1996 to provide an opportunity for police officers to share best practice and to highlight and improve road safety across Europe. TISPOL members are police officers from 25 states including 21 EU Member States. Each year, TISPOL organises several large-scale coordinated cross-border enforcement operations linked to large press coverage on speed, non-use of safety restraint, alcohol and the safety of heavy good vehicles.

Next steps?
The network needs to secure funding to be fully effective. In addition, the work undertake by TISPOL is dependant on the effective follow-up with proportionate sanctions by Member States. The police forces would benefit the implementation of a cross border EU-wide mechanism

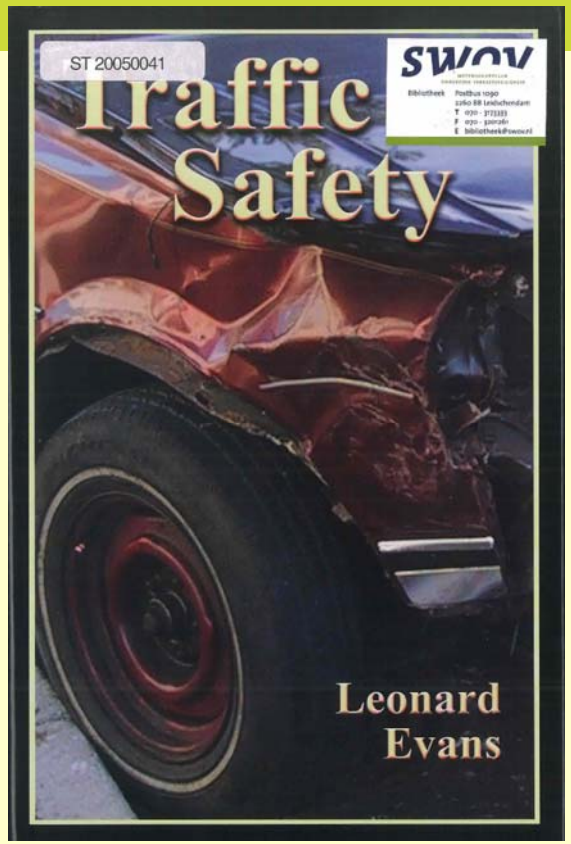
.

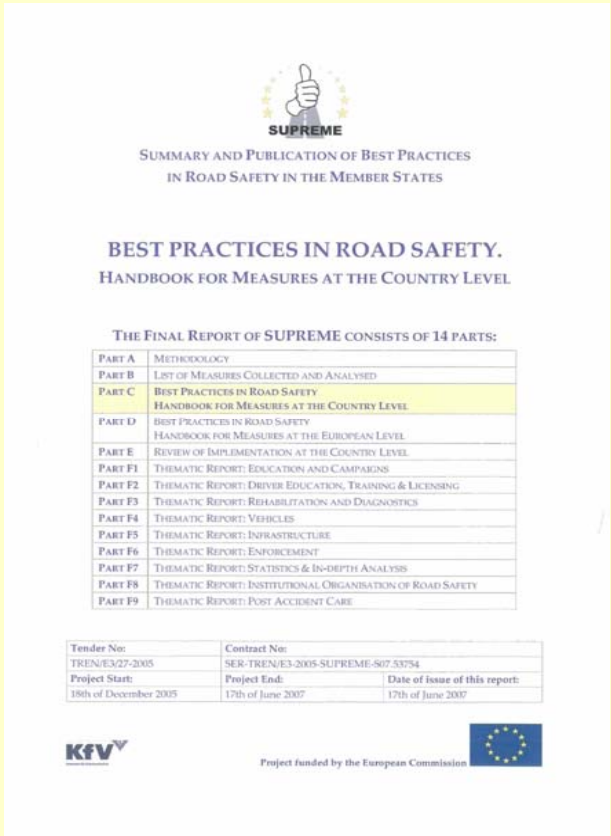
More information?
http://cms.tispol.org/

General conclusions of SUNflower+6

- Improvements can be observed in all nine countries
- Road safety improvements are not just happening, but more the result of continuing, planned efforts
- An increase in the organization of activities and quality improvement of road safety programmes
- Earlier developments in SUN countries; in Central and Southern countries these improvements manifested themselves later
- Policy areas targeted have been similar, measures are of a similar nature but, policies implemented differ
- The pace of improvements differed; good safety record is no reason for poor improvement pace!
- There is room for further improvement in all nine countries

More and more knowledge available




SUPREME

SUMMARY AND PUBLICATION OF BEST PRACTICES IN ROAD SAFETY IN THE MEMBER STATES

BEST PRACTICES IN ROAD SAFETY.
HANDBOOK FOR MEASURES AT THE COUNTRY LEVEL

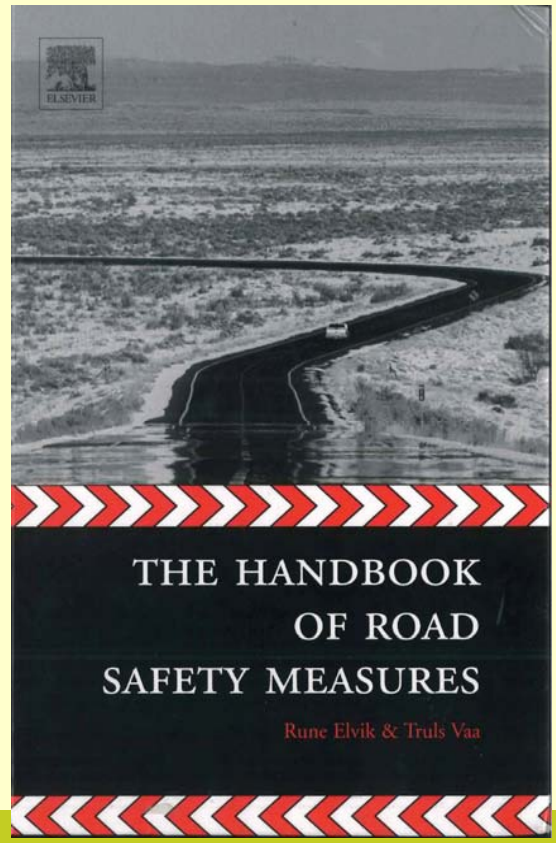
THE FINAL REPORT OF SUPREME CONSISTS OF 14 PARTS:

PART A	METHODOLOGY
PART B	LIST OF MEASURES COLLECTED AND ANALYSED
PART C	BEST PRACTICES IN ROAD SAFETY HANDBOOK FOR MEASURES AT THE COUNTRY LEVEL
PART D	BEST PRACTICES IN ROAD SAFETY HANDBOOK FOR MEASURES AT THE EUROPEAN LEVEL
PART E	REVIEW OF IMPLEMENTATION AT THE COUNTRY LEVEL
PART F1	THEMATIC REPORT: EDUCATION AND CAMPAIGNS
PART F2	THEMATIC REPORT: DRIVER EDUCATION, TRAINING & LICENSING
PART F3	THEMATIC REPORT: REHABILITATION AND DIAGNOSTICS
PART F4	THEMATIC REPORT: VEHICLES
PART F5	THEMATIC REPORT: INFRASTRUCTURE
PART F6	THEMATIC REPORT: ENFORCEMENT
PART F7	THEMATIC REPORT: STATISTICS & IN-DEPTH ANALYSIS
PART F8	THEMATIC REPORT: INSTITUTIONAL ORGANISATION OF ROAD SAFETY
PART F9	THEMATIC REPORT: POST ACCIDENT CARE

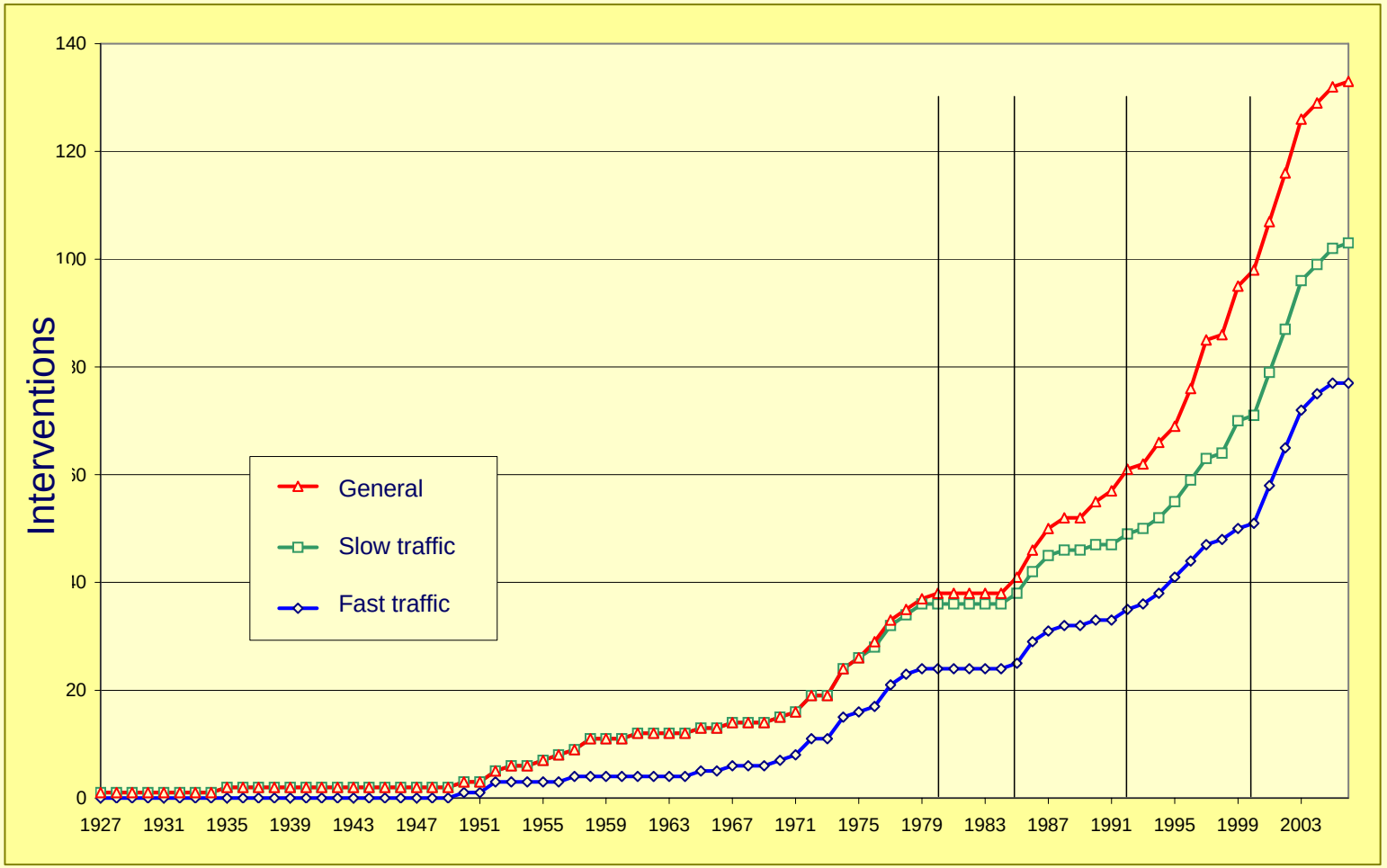
Tender No:	Contract No:	
TREN/E3/27-2005	SER-TREN/E3-2005-SUPREME-S07.53754	
Project Start:	Project End:	Date of issue of this report:
18th of December 2005	17th of June 2007	17th of June 2007

KfV

Project funded by the European Commission

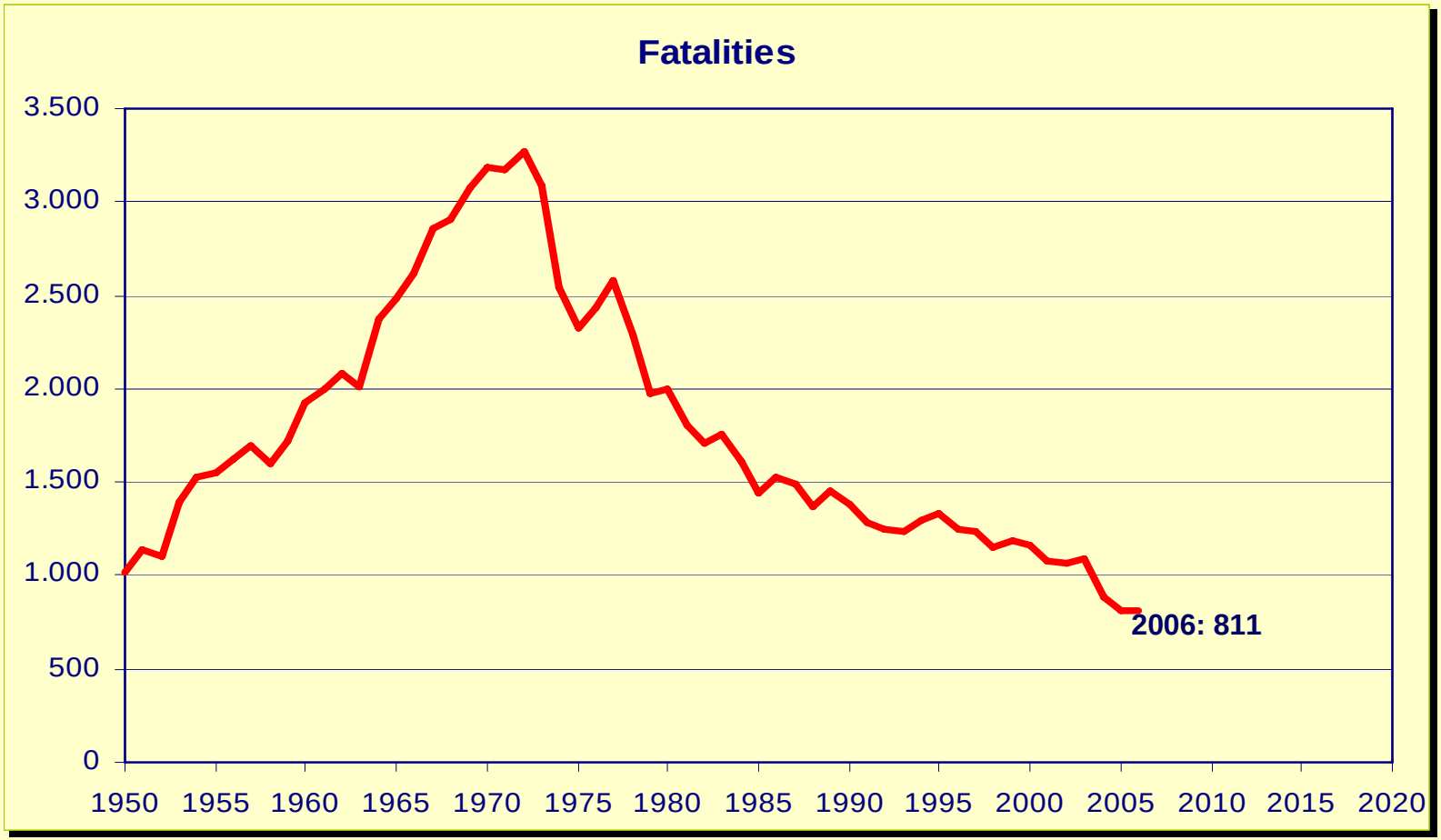


Road safety interventions over the years



Road fatalities in the Netherlands since 1950

INSTITUTE FOR ROAD SAFETY RESEARCH



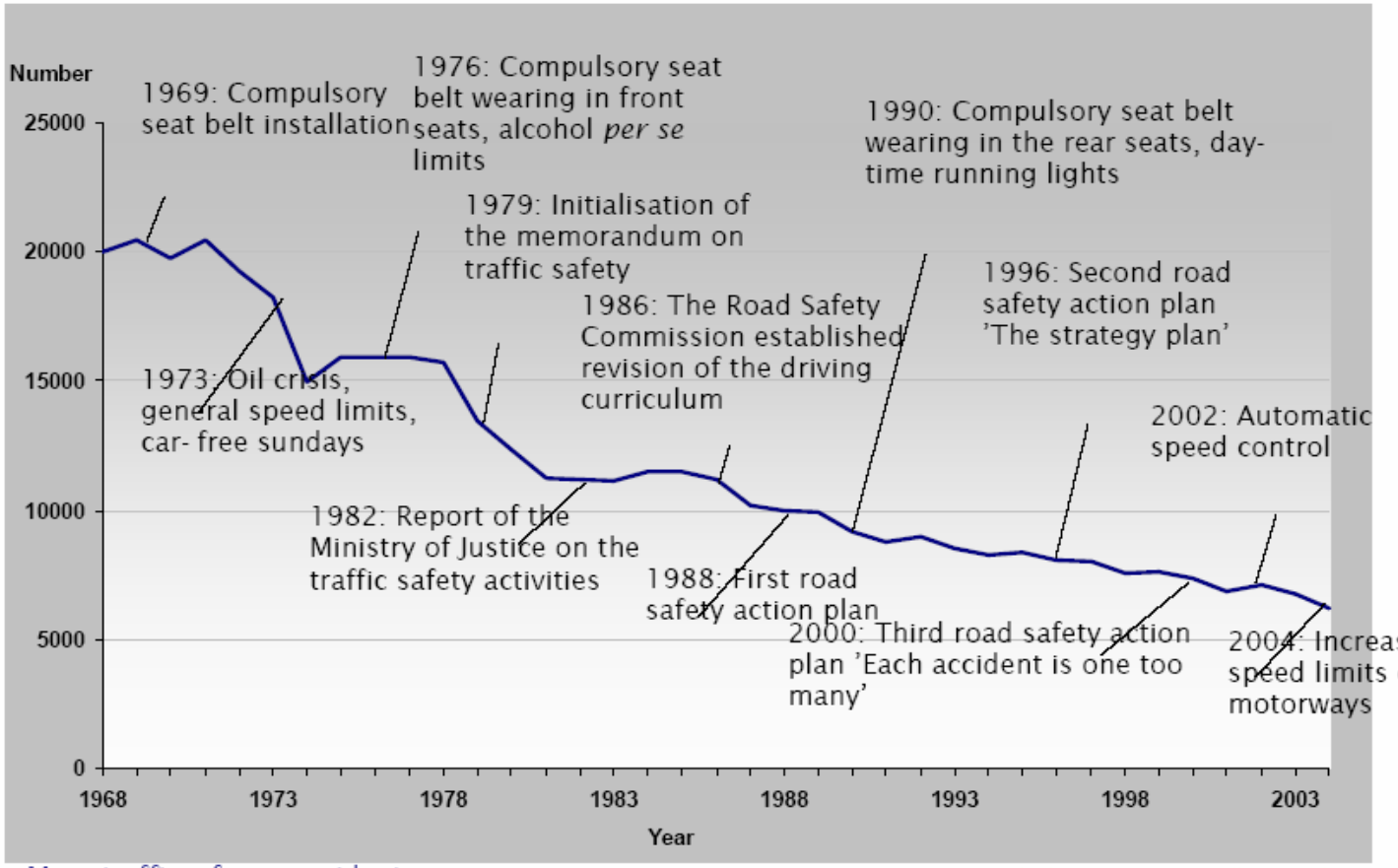
Road safety in the Netherlands

INSTITUTE FOR ROAD SAFETY RESEARCH

- Well developed system of safety legislation and (massive) enforcement
- Good safety quality of roads, especially for vulnerable road users, incl. traffic calming, high quality of motorway network
- We follow UN ECE vehicle regulations and are an active member of EuroNCAP
- Good system of post-crash care
- We carry out: road safety education, road safety campaigns, driver examination
- Etc.

- What next? How to deal with last few percent on non-seat belt wearers, dwi's, speed violators?

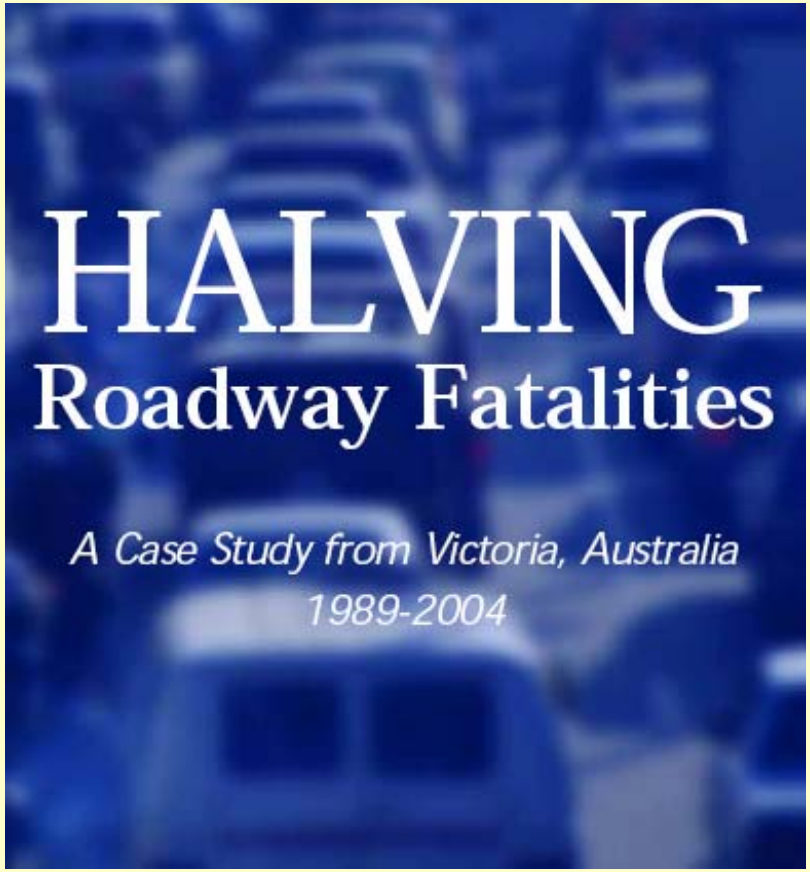
Progress: number of injury accidents and major road safety events in Denmark



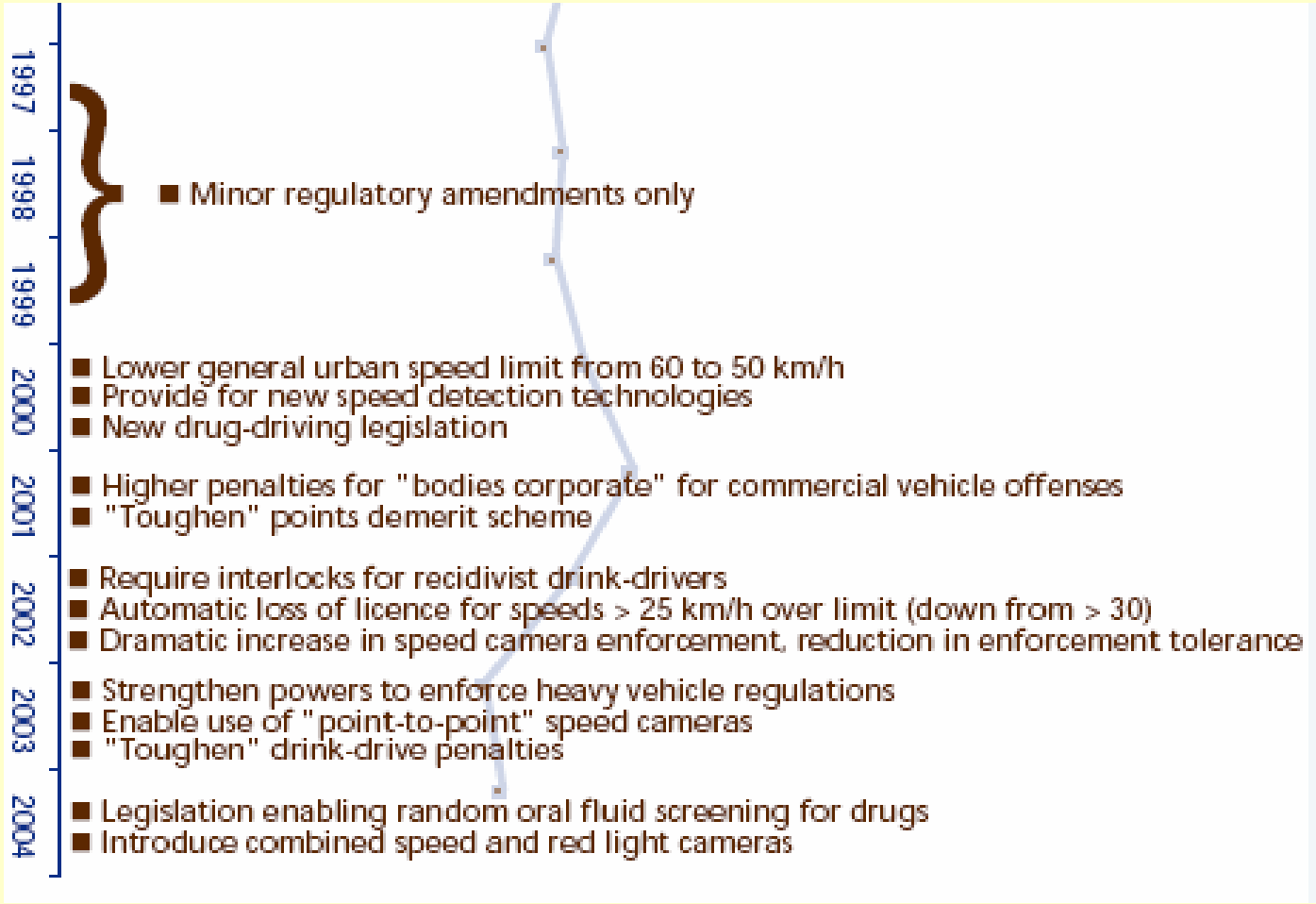
More traffic – fewer accidents
Ivanka Orozova- Bekkevold and Tove Hels
IRTAD November 2006

DANMARKS TRANSPORTFORSKNING

Major regulatory and enforcement initiatives taken in Victoria (1989-2004)



Major regulatory and enforcement initiatives taken in Victoria (1989-2004)



Effects in SUN countries: 1980-2000

INSTITUTE FOR ROAD SAFETY RESEARCH

	Saving in fatalities between 1980-2000 attributed to each source		
	Sweden	Britain	Netherlands
Vehicle safety, seat belts, drinking and driving	48%	54%	46%
Local road engineering	4%	10%	5%
Other vulnerable road users-related measures	38%	29%	31%
Other car occupant measures	10%	7%	18%
Total	**100%**	**100%**	**100%**

Explanations for progress?

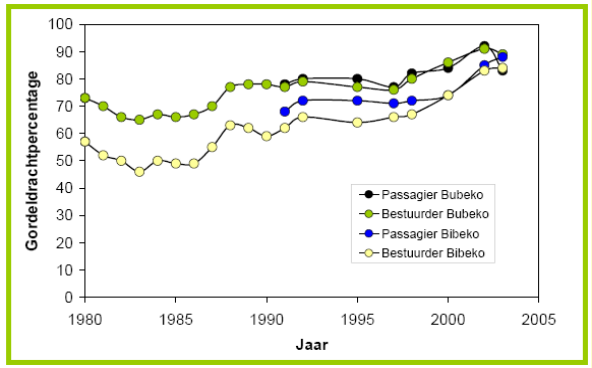
- Sound methodology to establish impacts of interventions!
- Pay attention to influencing (exposure) and disturbing/confounding factors
- Major positive effects came from engineering measures (roads and passive safety in vehicles) and road safety legislation + enforcement/campaigns (alcohol, seat belts, helmets, speed management)

Progress in the Netherlands: seat belt wearing, drinking and driving, 30 km-zones

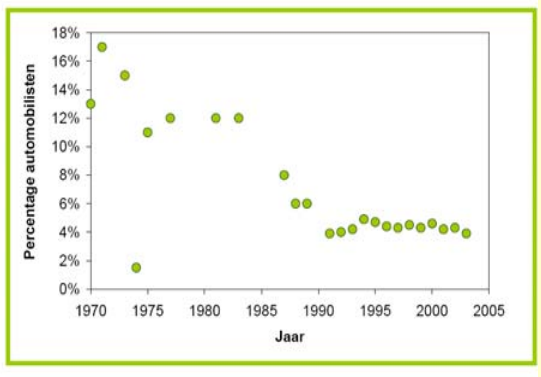
INSTITUTE FOR ROAD SAFETY RESEARCH

- On safety performance indicators (SPI's), e.g.

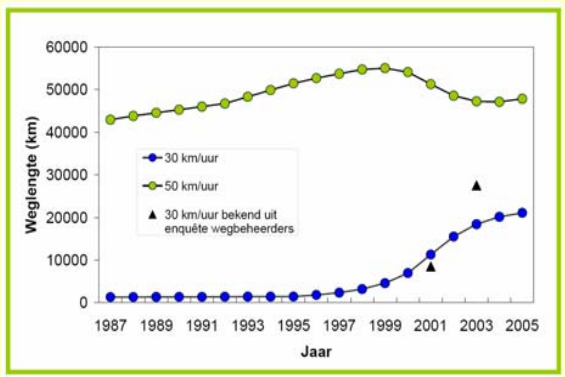
Seat belts



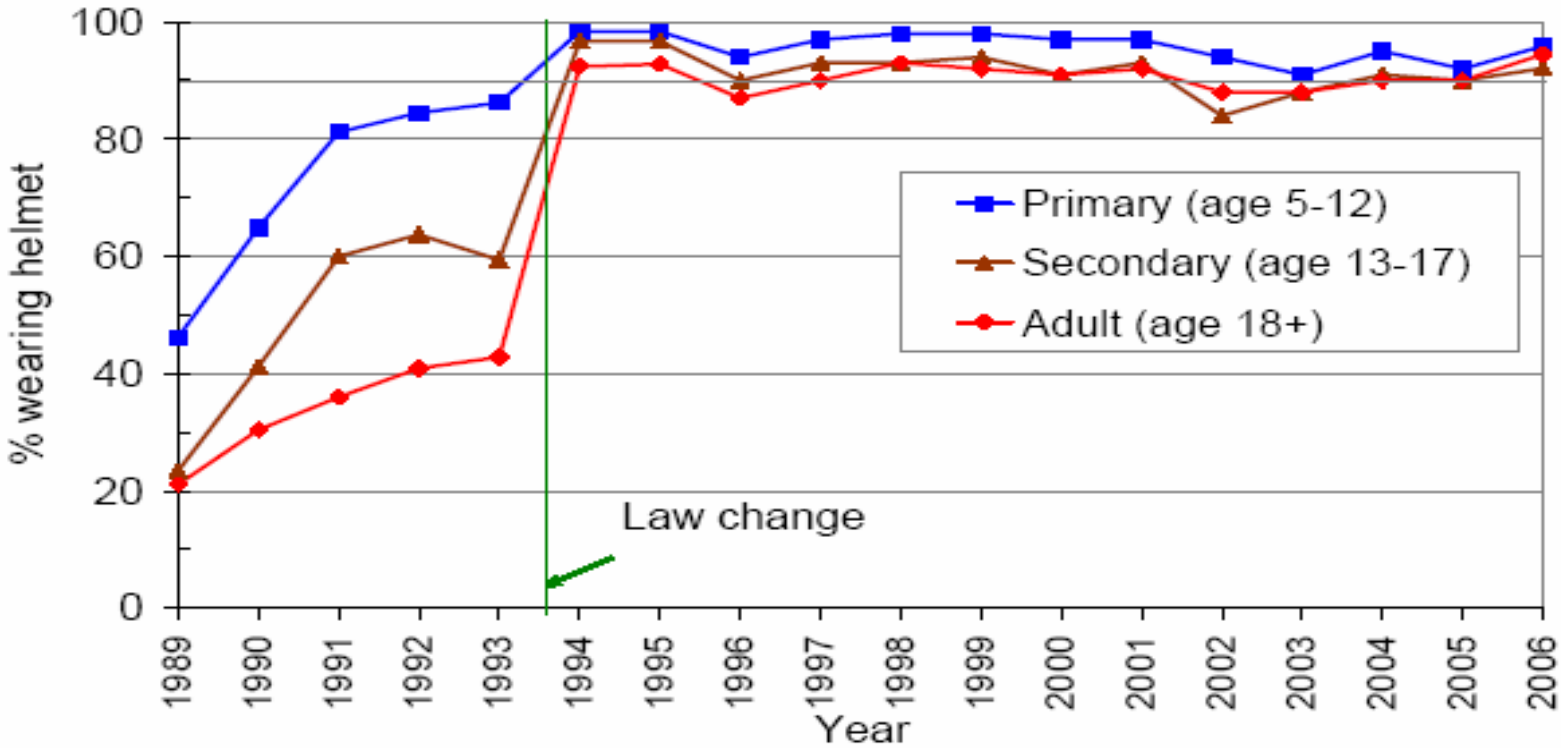
Drink driving



Speed management



Progress in New Zealand: cycle helmet wearing rates



3rd IRTAD Conference Brno, 26-28 November 2006

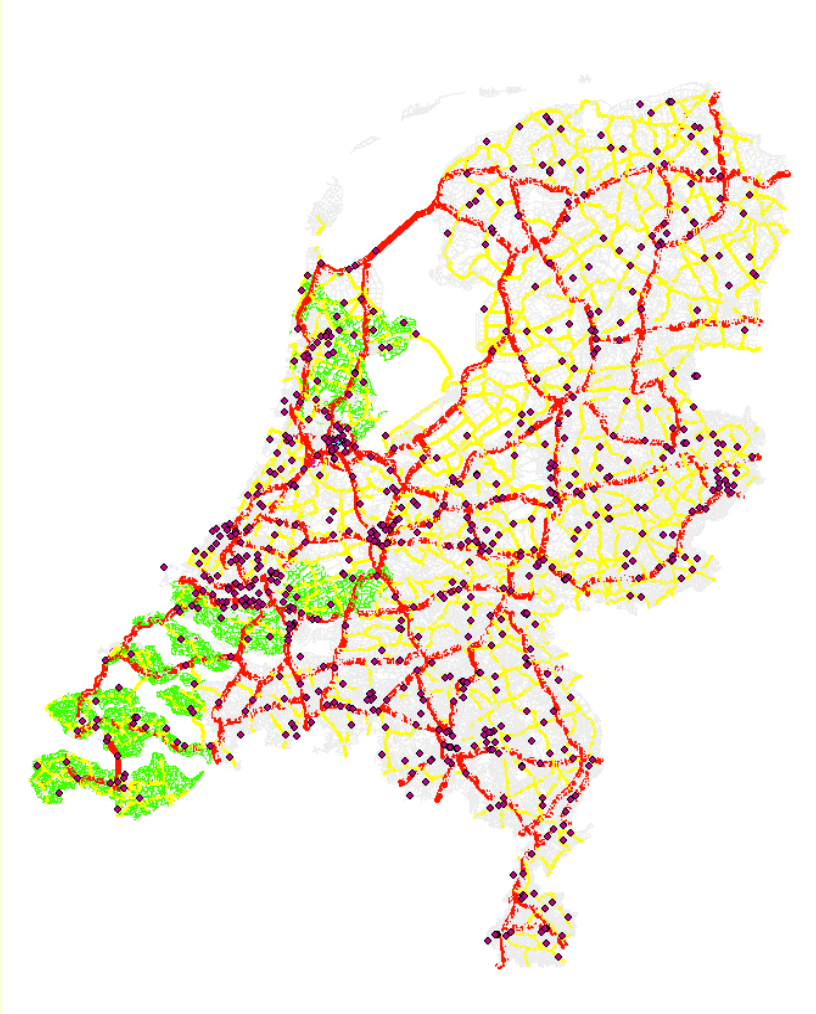
Bill Frith
Manager Research and Statistics
Ministry of Transport
NEW ZEALAND

What next? Traditional approach

- Treat high risk groups and take cost-effective countermeasures, e.g.
  - Young novice drivers
  - Black spots
  - Vehicle inspection
  - Violators, recidivism

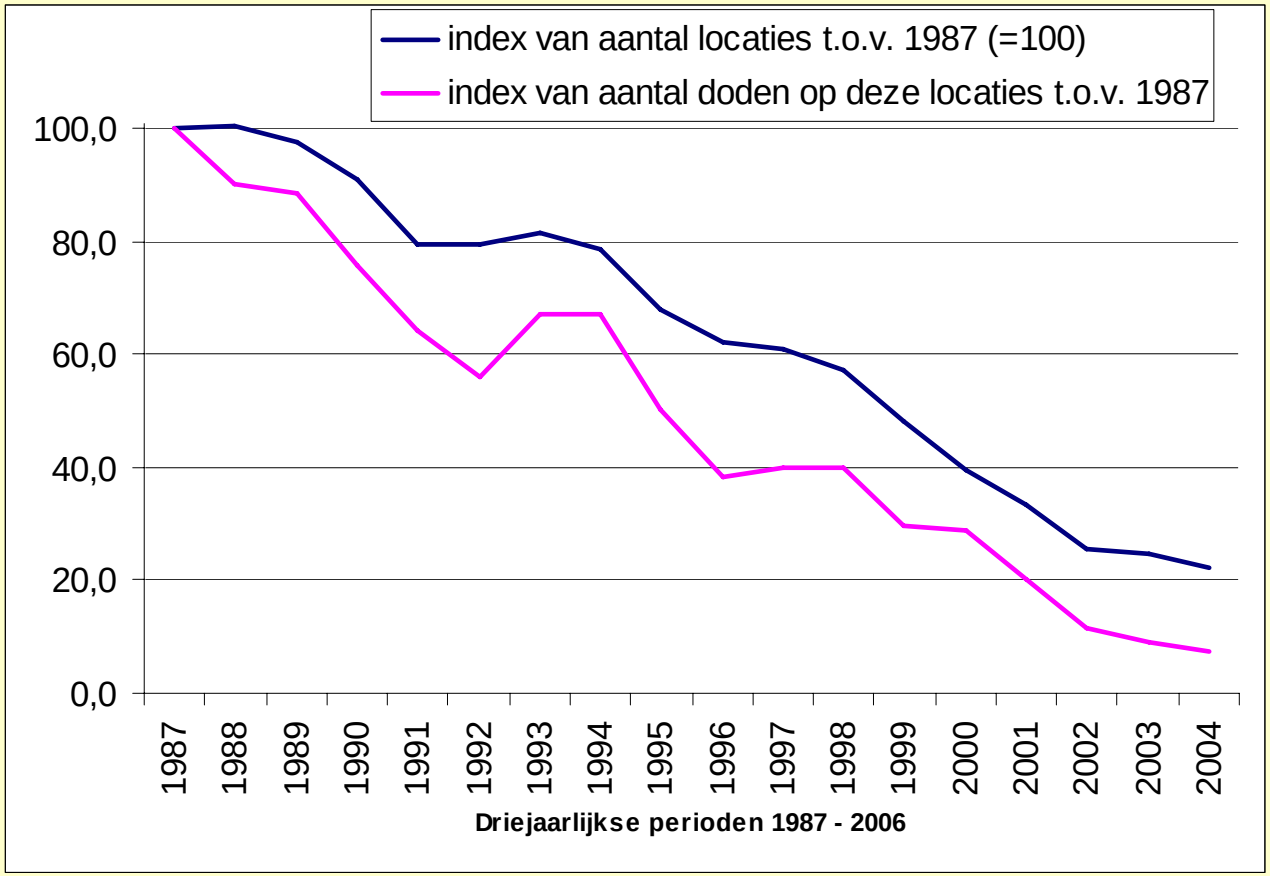
- Certainly progress can be made, but we reach(ed) a stage that this will be less effective/efficient

Fatal crashes in the Netherlands (2006)



Development of fatalities on Dutch black spots (1987-2006)

- Almost no fatalities on black spots anymore: 1.8%



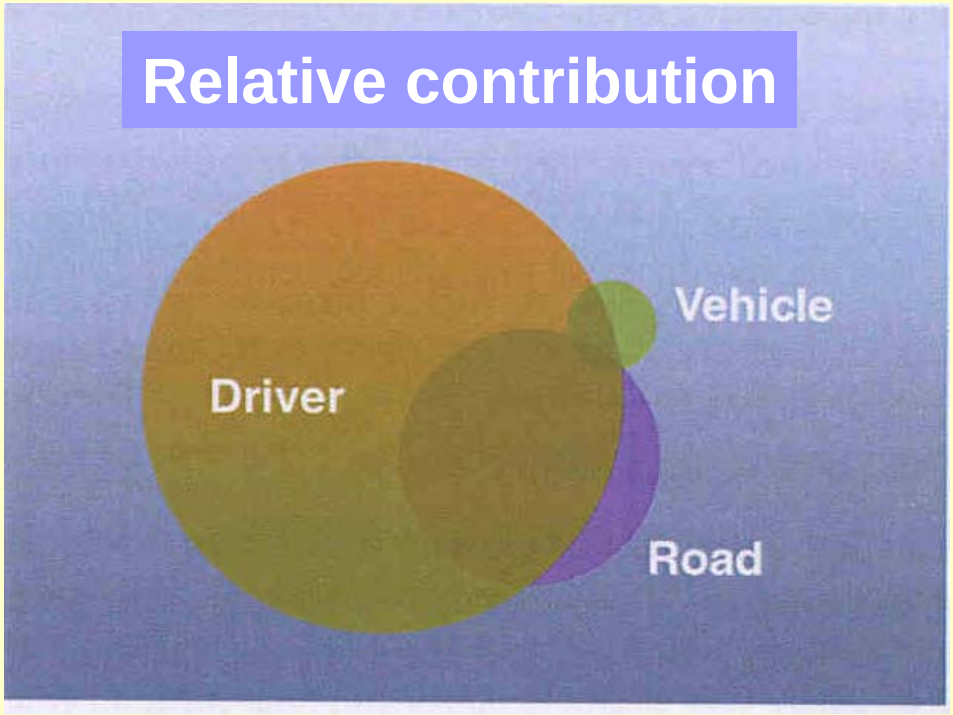
But,

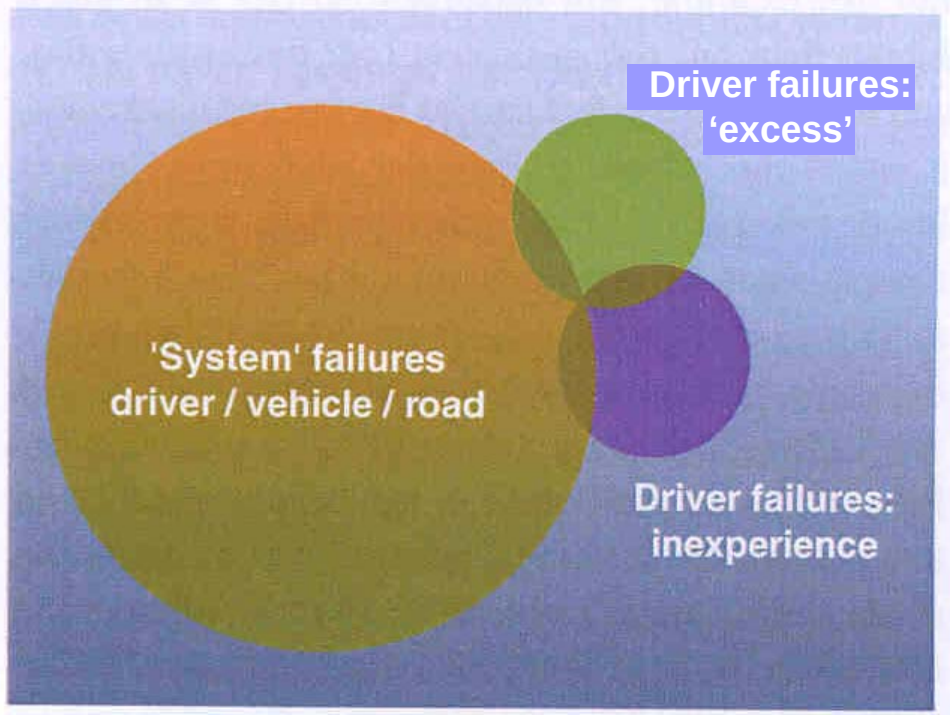
- We still wish to improve road safety, because
  - Economical costs (12 billion euro per year) are substantial
  - Societies don't want to live with *preventable crashes*: we know the causes, we know what to do with cost beneficial investments
- Formulation of road safety targets (for 2010 and 2020) is a political statements to express this wish;

However,

- Results in the past are no guarantee for the future!!
- Next steps?
- A paradigm shift is needed.

Discussion on a paradigm shift





Rod Kimber TRL (2003)

Our fundamental road safety problem

INSTITUTE FOR ROAD SAFETY RESEARCH

- Today's road traffic is *inherently* unsafe
- The road system of today has not been designed with safety in mind, as is the case with air transport or rail transport
- Which means we are almost fully dependent on whether a road user makes a mistake or error in preventing a crash
- The Dutch approach to a solution: *Sustainable Safety*

Sustainable Safety

- *Sustainable* means: we don't want to hand over a road system to our children which, inevitably, results in the number of road crashes as of today

- Inspired by the UN Brundtland-report on sustainable development

Sustainable Safety fundamentals

INSTITUTE FOR ROAD SAFETY RESEARCH

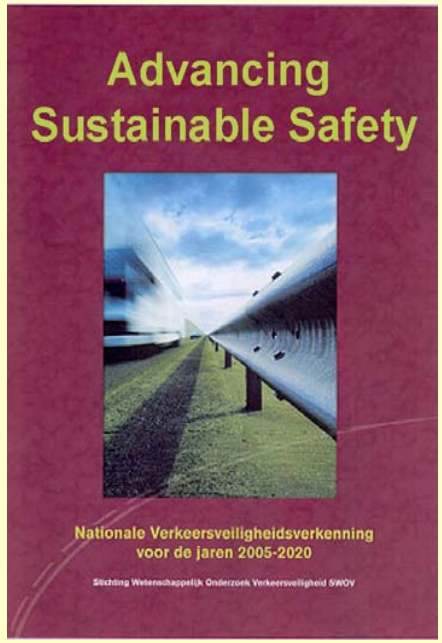
- *User oriented system approach*
- *Brings knowledge from different fields together:* transportation planning, traffic engineering, social sciences, biomechanics, management, economics
- It is a safe system for *everyone*

Sustainable Safety:
the Dutch approach

INSTITUTE FOR ROAD SAFETY RESEARCH

- 1992: the Sustainable Safety vision
- 2005: updated by ‘Advancing Sustainable Safety’

- *Aims of Sustainable Safety*:
  - to prevent crashes in advance
  - and, if impossible to reduce crash severity (serious injuries virtually excluded)



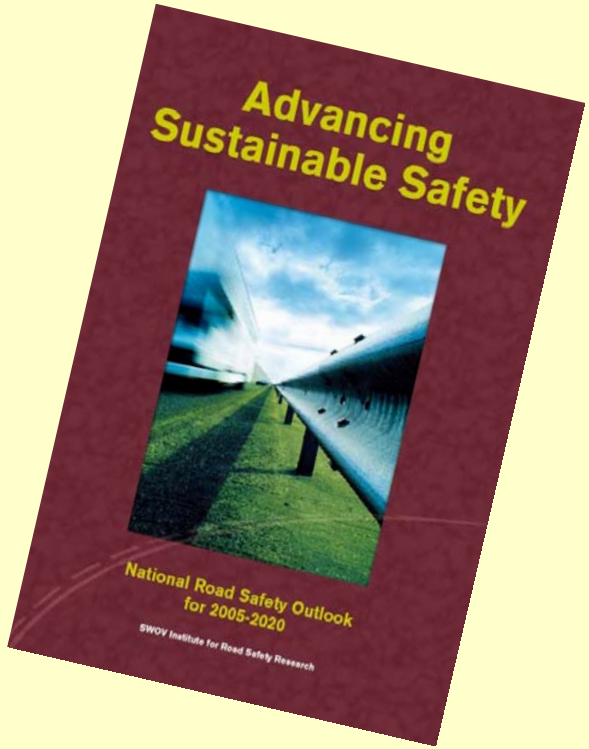
Sustainable Safety

- Philosophy developed in early nineties by SWOV
- Basis for the Dutch road safety policy
- Implementation since mid nineties
- Update in 2005

English version published in November 2006

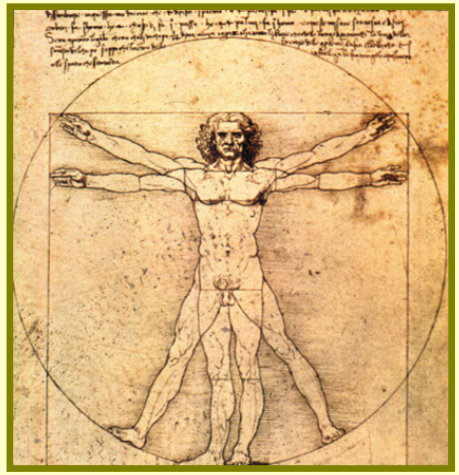
Copies free downloadable from

www.sustainablesafety.nl



Man is the measure of all things

- Physical properties
  - Humans are vulnerable
- Psychological properties
  - Humans are error prone
  - Humans do not always obey rules



Proactive approach

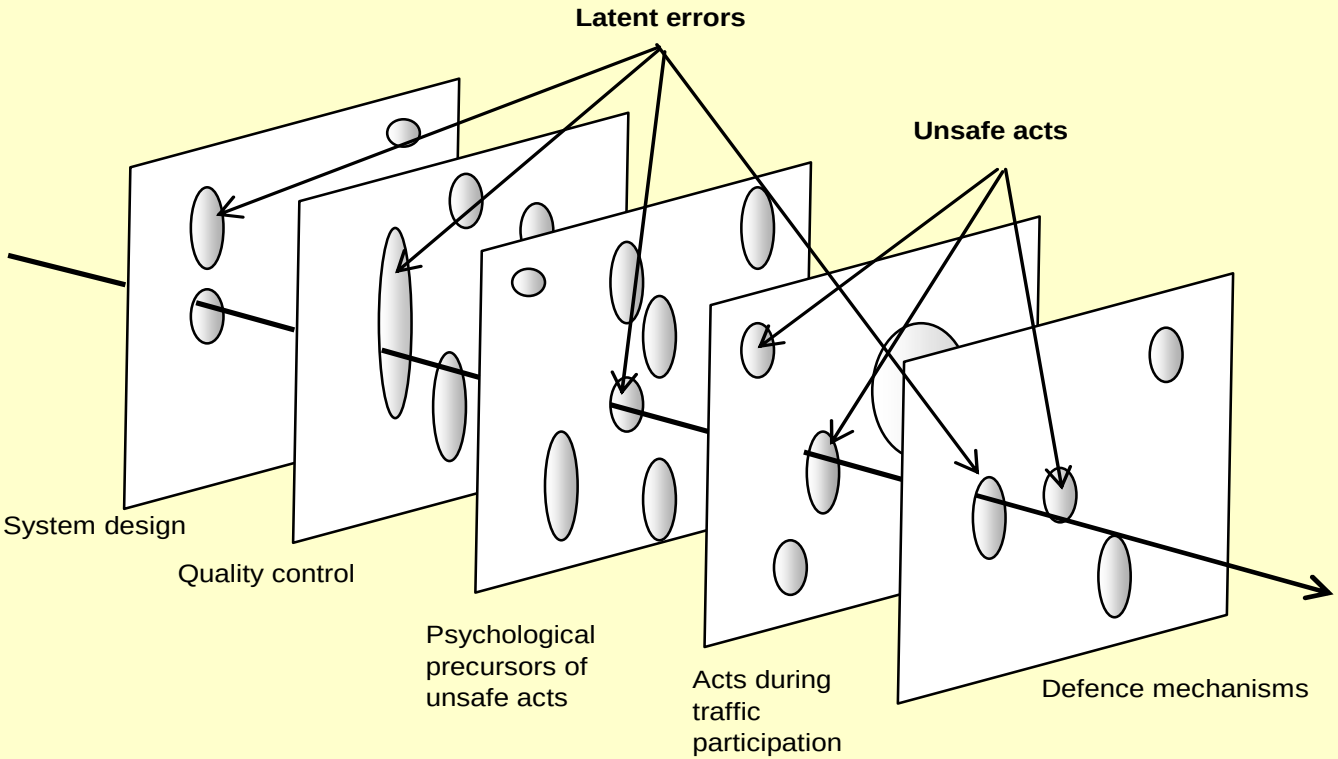
- Proactive: preventing system gaps
  - Intervening in chain of ‘system design’ to ‘traffic behaviour’ as early as possible

How could this happen?

~~**Who or what to blame for the crash?**~~

Proactive approach

- Systems approach: prevention of latent/hidden errors
  - Intervene as early in chain as possible
  - Make unsafe acts less dependent from choices of individual road users

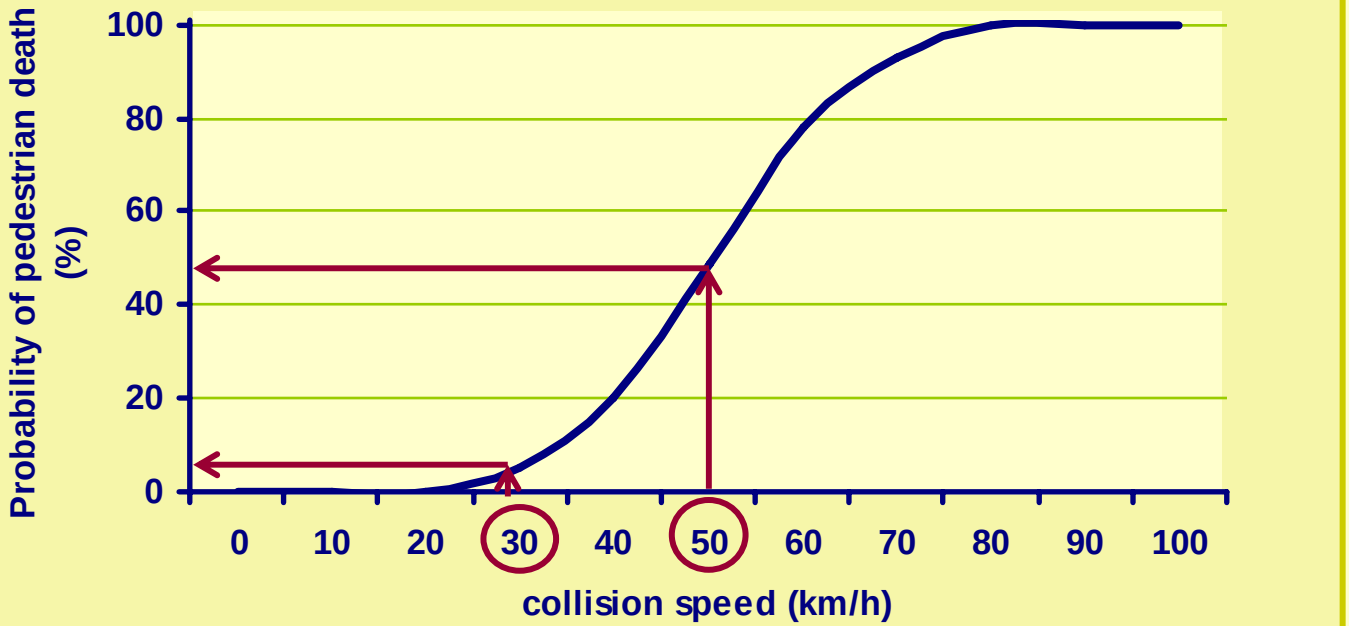


Principles in the advanced vision

INSTITUTE FOR ROAD SAFETY RESEARCH

Sustainable safety principles
Functionality of roads
Homogeneity of masses and/or speed and direction
Predictability of road course and road user behavior by a recognizable road design
State awareness by the road user
Forgivingness of the environment and of road users

Introduction to Homogeneity & physical Forgivingness:
Car – pedestrian collisions



Reduction of severe injury (I): *HOMOGENEITY*

INSTITUTE FOR ROAD SAFETY RESEARCH

- Prevention of conflicts
  - Separate driving lanes for different types of traffic (speed or mass)
    - Cycle paths and foot paths
  - Opposite driving directions with high speed: physical separation

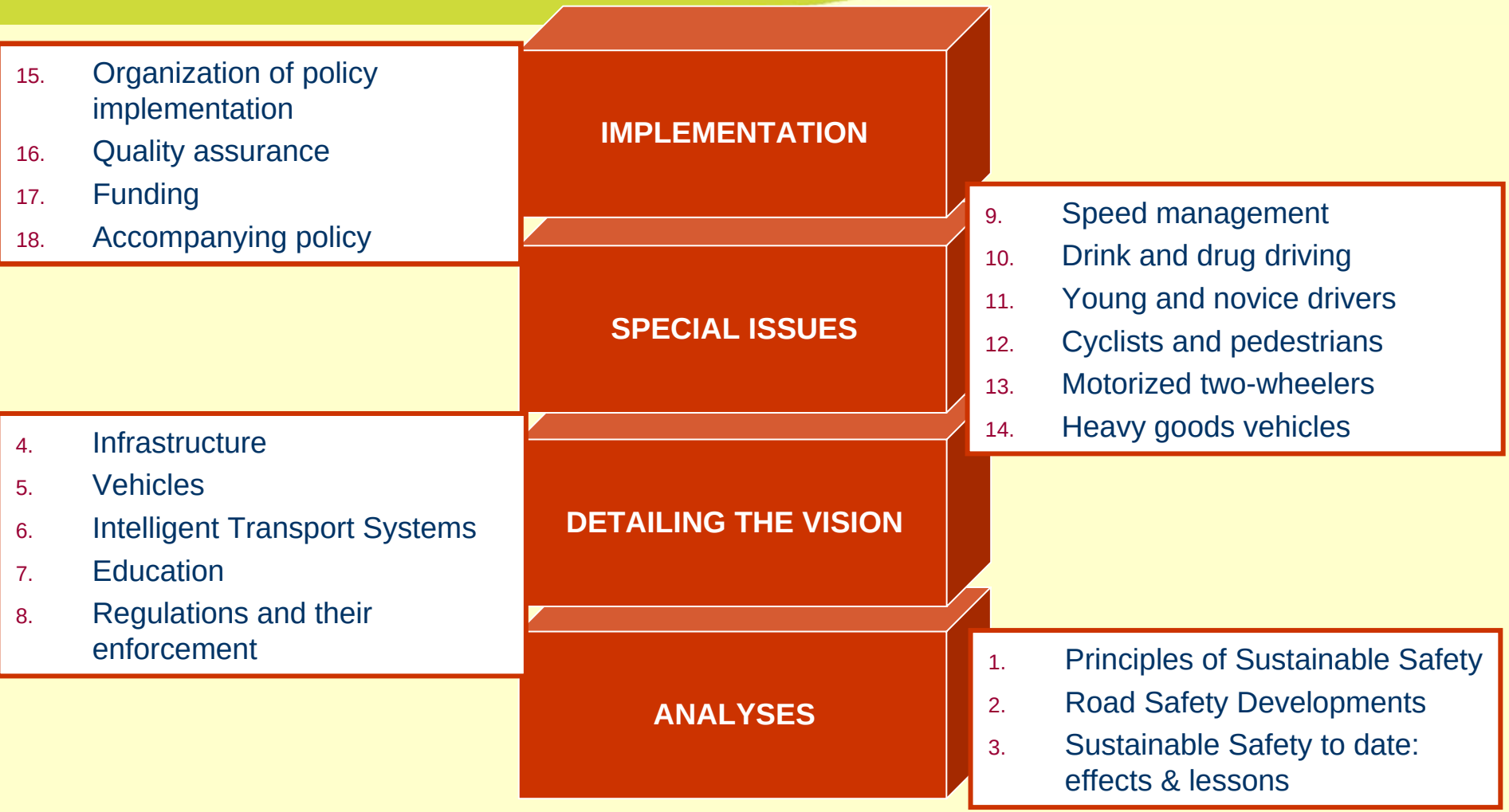
- Conflicts unavoidable? Reduce speed!
  - Lower speed limit
  - Speed reduction at intersections
    - Roundabouts
    - Plateaus

Proposal for safe speeds

Types of infrastructure and traffic	Safe travel speed (km/h)
Locations with possible conflicts between cars and pedestrians	30
Intersections with possible side collisions between cars	50
Roads with possible frontal collisions between cars	70
Roads with no possibility of side or frontal collisions (only collision with structures)	>100

Contents of the book

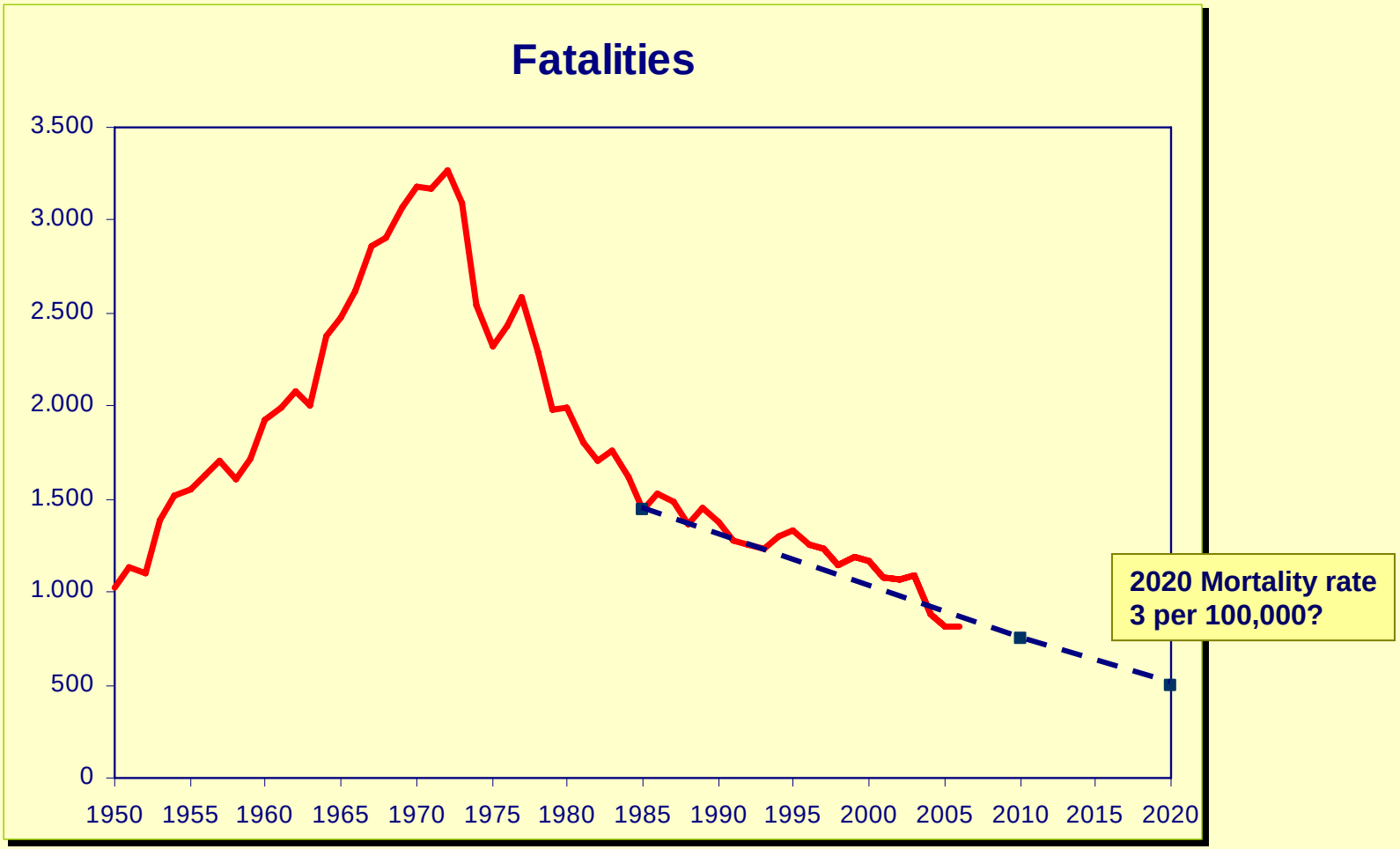
INSTITUTE FOR ROAD SAFETY RESEARCH



Relevance for Denmark?

- Fundamentals are true all over the world
  - Human be makes errors
  - Risk incre re
  - Road tran afe
- Scanning e ons internationally: knowledge
- 'Paradigm - + implementation': differ all ov
- www.sustai

Further progress ??



Conclusions and recommendations

INSTITUTE FOR ROAD SAFETY RESEARCH

- Road safety improved considerably in Europe
- More (motorised) traffic was accompanied by an improvement of the safety quality of the road system
- Societies are not satisfied with safety level of today
- Further improvements are possible, but will have a different nature
- Next steps: user oriented, system wide approach with emphasis on creating a safe environment, preventing errors/violations (safe roads, technology, etc.)
- Key elements: public awareness/acceptance and political will, effective institutional management, more integration with other policy fields