



INV22



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European Road Safety Policy: Towards Evidence-Based Decision Making, Especially for Vulnerable Road Users

A quiz on the EU projects **SafetyCube** & **InDev**
Klaus Machata, KfV (Chair)



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Evidence-based road safety in the EU: from Policy to R&I

Ingrid Skogsmo, European Commission - DG RTD

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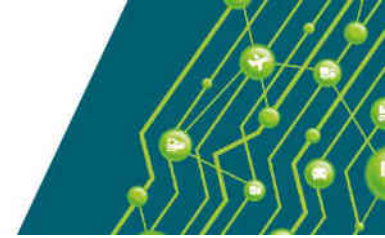
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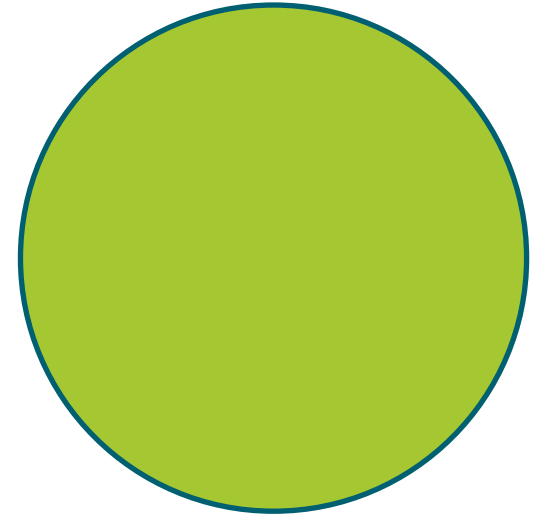
Together with:



Since when does Horizon 2020 include dedicated calls on automated road transport?



- a) That has still to happen
- b) Since 2016
- c) Since 2010



Improve Road Safety – A European policy objective



*...halving road deaths by
2020*

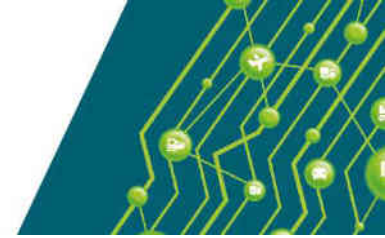
*... move close to zero
deaths and serious injuries
by 2050*





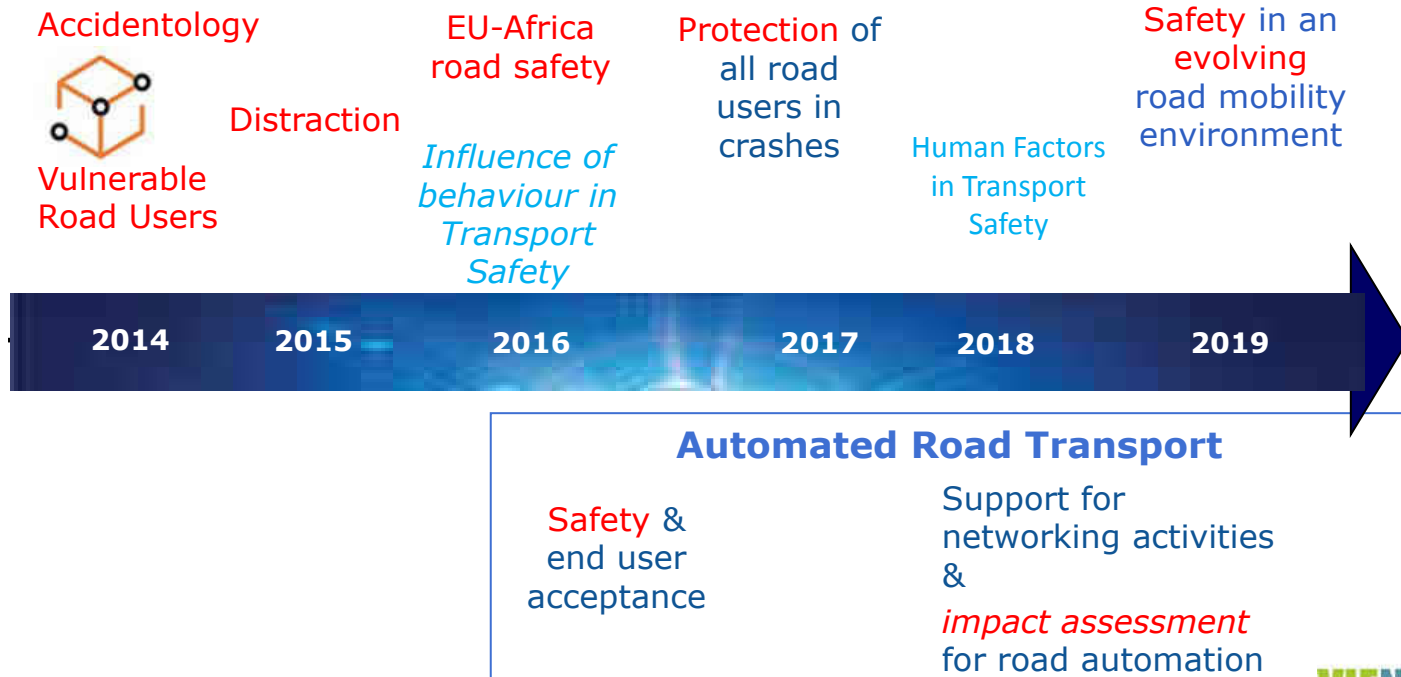
... It is only on the basis of detailed knowledge about the performance of different parts of the system that activity can be focused where it is most effective in reducing deaths and serious injuries...

MG-3.4-2014 - Traffic safety analysis and integrated approach towards the safety of Vulnerable Road Users



- **Developing an in-depth understanding of road accident causation for all road users**, covering all aspects of road safety (vehicle, driver and infrastructure) together with **appropriate actions** for their **prevention and mitigation**. This shall include methods for conducting a **comprehensive assessment of socio-economic costs** related to road accidents, taking into consideration secondary costs related to congestion, material damage, vehicle uptime etc. as a **basis for robust cost-benefit analysis of safety countermeasures** at a transport system level.
- Research will **fill knowledge gaps** at both European and national levels, and take into account **regional differences**. ...
- Expected impact: Research in this area **will contribute to delivering essential knowledge for the design and implementation of an efficient strategy** Overall, research will contribute to the achievement of the European policy objective of halving road deaths by 2020, and, in the longer term, to the Transport White Paper's "Vision Zero" objective.

Road Safety in Horizon 2020



!Data!

methodology

!Data!

**LEARN BY
DOING!**

!Data!

TARGETS!

!Data!

KNOWLEDGE BASE!

KPIs!

evidence based



IMPLEMENTATION!

Safe systems approach!

Indicators!

measurements

KNOWLEDGE SHARING

Management by objectives!

!Data!

IMPACT ASSESSMENT

New ways to address known challenges!!

!Data!

... It is only on the basis of detailed knowledge about the performance of different parts of the system that activity can be focused where it is most effective in reducing deaths and serious injuries...

!Data!



... and the correct answer?

Since when does Horizon 2020 include dedicated calls on automated road transport?



- a) That has still to happen
- b) Since 2016**
- c) Since 2010



Contact

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The potential of road safety performance indicators in road safety management

Rune Elvik, Institute of Transport Economics, Norway

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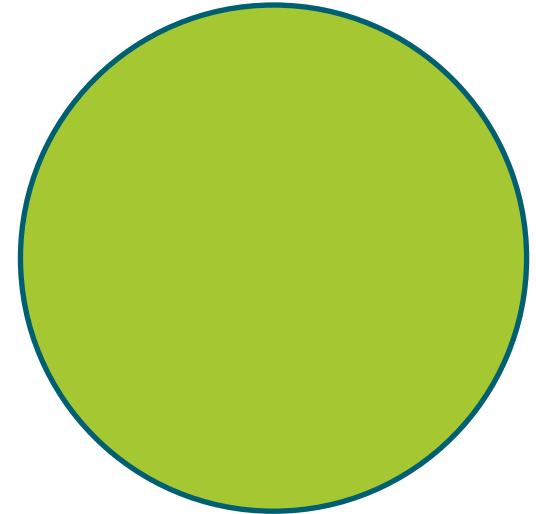
Together with:



What is percentage of motor vehicles complying with speed limits today in Norway?



- a) 48.6 %
- b) 59.9 %
- c) 61.4 %
- d) 41.1 %



The potential of road safety performance indicators in road safety management



- What is a road safety performance indicator?
 - Any risk factor that influences the number and/or severity of crashes and that can be influenced by road safety policy
 - Examples: mean speed, seat belt wearing, drinking and driving
- How can a road safety performance indicator be used in road safety management?
 - Set at a target value for it and use that to determine what actions you must take to reach the target value



... and the correct answer?

An illustration



- By 2022, 70 % of motor vehicles should comply with speed limits (in Norway)
- What is percentage of motor vehicles complying with speed limits today?
 - A) 48.6 % **B) 59.9 %** C) 61.4 % D) 41.1 %



Contact

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New ways in evidence-based decision-making: The SafetyCube project

Prof. Pete Thomas, Loughborough University, UK

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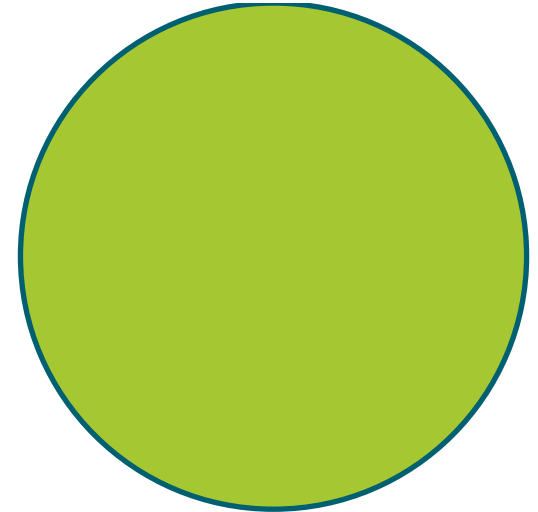


Together with:



What does DSS stand for?

- a) Desperately Silent Statistics
- b) Decision Support System
- c) Dynamic Speed Substitution
- d) Double Standards in Safety



Delivering a long awaited powerful tool

- SafetyCube DSS is the first integrated road safety support system **developed in Europe**
- SafetyCube DSS **offers for the first time** scientific evidence on:
 - risks and not only measures
 - risks and measures not only on infrastructure
 - a very large number of estimates of risks and measures effects
 - links between risks factors and measures
- SafetyCube DSS aims to be **a reference system** for road safety in Europe, constantly improved and enhanced



- ... then use SafetyCube DSS to have the answers



SafetyCube DSS Users

- **Public Authorities**
local, regional, national, European and international
- **Industry**
Infrastructure, Vehicle, Insurance, Technology
- **Research Institutes, Experts**
- **Non Governmental Organisations**
- **Mass Media**
- **Everyone**

The SafetyCube DSS is intended to have **a life well beyond the end of the SafetyCube** research project.



SafetyCube Methodology



1. Consulting **stakeholders** to understand needs
 2. Creating **taxonomies** of risk factors and measures
 3. Exhaustive literature review and rigorous study selection criteria
 4. Use of a template for **coding studies**, to be introduced in the DSS back-end database
 5. Carrying out **meta-analyses** to estimate the effects of risk factors / measures.
 6. Drafting **Synopses** summarising results of risk factors / measures.
- **Systems approach: links** between infrastructure, user and vehicle risks & measures
 - Emphasis on risk factors and measures of **priority issues** (VRUs, ADAS, speed management, distraction, etc.)
 - Rigorous assessment of the **quality of the data / study methods**





... and the correct answer?

What does DSS stand for?

- a) Desperately Silent Statistics
- b) Decision Support System**
- c) Dynamic Speed Substitution
- d) Double Standards in Safety





Contact

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Economic evaluation of road safety measures

Wouter Van den Berghe, VIAS, Belgium

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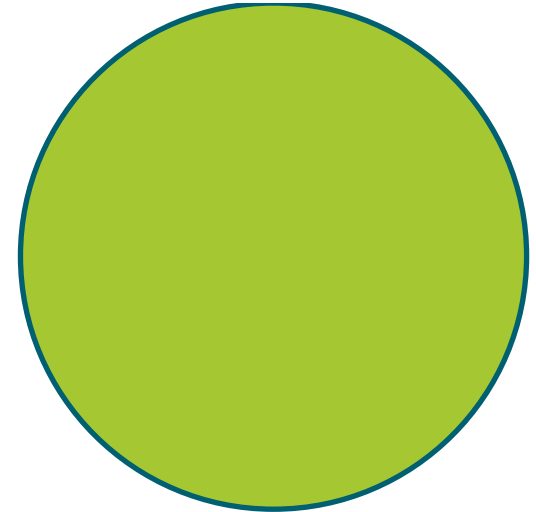
Together with:



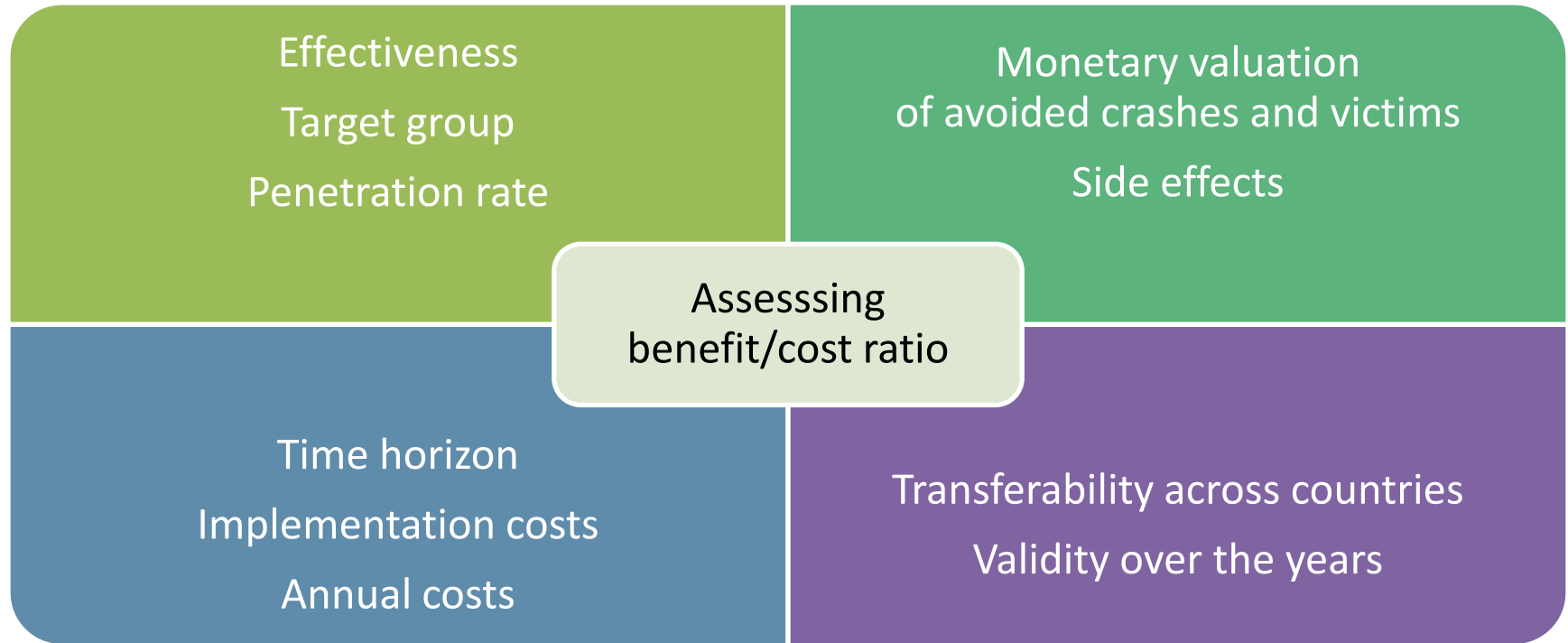
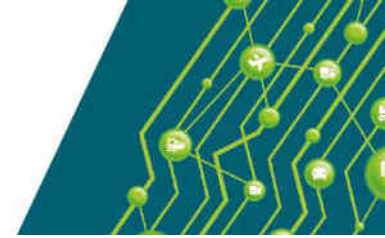
Which of the following 4 measures in road safety has the highest benefit-to-cost ratio?



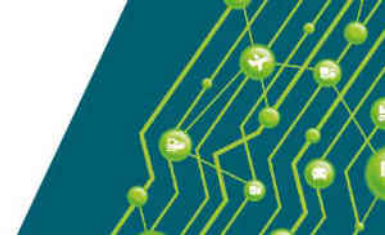
- ☐ Section control
- ☐ Alcohol interlock program
- ☐ Dynamic speed limits
- ☐ Autonomous Emergency Breaking



Some of the issues to be considered...



The SafetyCube approach



- Development of an algorithm and system that
 - can be used for all kinds of measures
 - takes into account all factors
 - can use different types of effectiveness data
 - can be used across countries
 - uses standardized crash costs data for all EU countries

- Use the E³ (*Economic Efficiency Evaluation*) calculator on the DSS website
 - <https://www.roadsafety-dss.eu> → Tab “**Calculator**”
 - get guidance on the methodology
 - read existing worked-out examples (over 36 already available)
 - adapt existing examples or make a CBA from scratch !

User interface

Input

MY MEASURE SELECT A SAFETY/USE EXAMPLE

My Measure:

Description Description:

Country Select a Country

Measure

Horizon (period of analysis) Horizon (period of analysis)

Reduction in terms of casualties or crashes ☐ Casualties ☐ Crashes

Number of units implemented Number of units implemented

Cost-Benefit Analysis

Costs (present values)

One-time investment costs	EUR
Recurrent costs	EUR
Total costs excluding side-effects	EUR
Side-effects	EUR
Total costs including side-effects	EUR

Benefits

Prevented Crashes EUR

Socio-economic return excluding side-effects

Net present value EUR

Cost-benefit ratio EUR

Socio-economic return including side-effects

Net present value EUR

Explanation

CBA: Road lighting

Annelies Schoeters, Vias Institute, October 2017

ABSTRACT

An exemplary cost-benefit analysis for the installation of road lighting was conducted by Heye (2014), Heye et al. (2017) and Perkins et al. (2015). The SafetyCube Economic Efficiency Evaluation (E) Calculator was used. The resulting best estimate of the benefit-to-cost ratio (BCR) was 0.7. The BCR is sensitive to changes in assumptions as it is shown by the sensitivity analysis.

INPUT INFORMATION

Case studied: The effectiveness estimate for the installation of road lighting on unit from the meta-analysis by Heye (2014). In this study the estimated effect of road crashes during darkness, is a reduction of 25% (95% CI [-38%, -12%]). The effect during darkness is a reduction of 25% (95% CI [-38%, -12%]).

Crash costs: The updated SafetyCube estimates for 2015 for Europe were used (Deliverable 3.2).

Measure Costs: In the Handbook of Road Safety Measures by Heye et al. (2017) installation of road lighting is given per kilometre. There is a distinction between a motorway. Since the number of affected cases could only be retrieved from a site 2015 in which the type of road is not specified, we will use the costs of road lighting. The implementation costs are 450,000 NOK (2009) per kilometre and the annual 2,000 NOK (2009). Correcting for inflation by the factor 1.18 (from 2009 to 2015) NOK implementation costs and 2,360 NOK. Correcting for the exchange rate and the factor 0.08 (from Norway to EU-18) results in 42,480 EUR implementation cost annual recurrent costs.

Time horizon: In accordance with most infrastructure-related measures, the applied measure is set at 15 years.

Area/Unit of Implementation: The costs and the target group are defined per kilo road that was unit and where road lighting is installed.

Number of cases affected: The affected number of casualties was retrieved from P. The study evaluated the effect of reduced street lighting on road traffic injuries in 6 in England and Wales. Data on the number of casualties during darkness on unit is very limited. As a proxy we use the number of crashes that occurred on the road lighting was switched off. The road lighting was switched off on 36 kilometre years. In this period 298 casualties were registered. This results in an average of 0.8 per kilometre.

No side effects were taken into account.

RESULTS

Table 1 provides the input values and the resulting estimated benefit-to-cost ratio of road lighting. It shows a BCR ratio of 0.7. This means that the costs exceed the

CBA Autonomous Emergency Br (city, inter-urban)

Reakia Krishnamoorti, CESAR, September 2017

ABSTRACT

(Grover et al. 2018) conducted a Cost – Benefit – Analysis (CBA) of the Autonomous Braking System. The SafetyCube Economic Efficiency Evaluation (E) Calculator was used. The resulting best estimate of the benefit-to-cost ratio (BCR) is 0.6 which means costs outweigh the benefits. The BCR is sensitive to changes in the underlying assumptions shown by the sensitivity analysis.

INPUT INFORMATION

Case studied: (Grover et al. 2018) reported reductions of fatalities and serious injuries rear shunt accidents (MVs where front car collides with any vehicle rear) between 25% reduction of sight injury accidents between 0% and 50%.

Crash costs: The updated SafetyCube estimates for 2015 for Europe were used (see Deliverable 3.2).

Measure Costs: The costs of the AEB system reported in the study (NHTSA 2017) were present paper. The estimated prices vary between 250 and 300 US dollars (2017 price) were converted in euros by multiplying 2015 exchange rate (0.93), after we used applying the inflation conversion value (1.08) and then the values were converted to EU multiplying with the PPP conversion value (1.067).

$$\begin{aligned} \text{Min } 250 \times 0.93 \times 1.08 \times 1.067 &= 293 \text{ euros} \\ \text{Max } 300 \times 0.93 \times 1.08 \times 1.067 &= 310 \text{ euros} \end{aligned}$$

Time horizon: The applied time horizon for the measure is 8 years.

Area/Unit of implementation: All costs and effects are expressed per vehicle equipped system. The vehicle stock considered in EU-15 is about 210 million vehicles (M).

Number of cases affected: The affected number of casualties was retrieved from (Grover). The study contains an estimate number of the effect of the system separately for each: serious injury, slight injury and fatal injury. The number of PDO crashes is derived SafetyCube calculator. It assumed that the AEB effectiveness for PDO crashes is equal effectiveness for slight injury accidents.

Side effects: (Grover et al. 2018) considered the congestion benefit by avoiding accident reducing the severity. In the study congestion benefit cost was provided for Germany cost was updated to 2015 value by applying the inflation conversion value of 1.15 and then converted to EU averages by multiplying with the PPP conversion value of 1.03.

$$\text{Side effects cost in 2015} = 36,476,670 \times 1.15 \times 1.03 = 41,076,886 \text{ euros}$$

¹ This inflation rate is taken from SafetyCube estimates (see SafetyCube Deliverable 3.2).
SafetyCube | CBA AEB system | W16 | 1

Cost-benefit analysis Red light cameras

Charles Goldenbald, SWOV, and Stijn Daniels, Vias Institute, September 2017

ABSTRACT

To perform a cost-benefit analysis (CBA) on red light cameras, safety estimates from an international red light camera studies (Heye, 2017) were used, and information operating a red light cameras (i.e. costs of purchase, installation, maintenance of administrative and judicial processing of red light offenders) were obtained from B. The SafetyCube Economic Efficiency Evaluation (E) Calculator was used. The result of the benefit-to-cost ratio (BCR) of red light cameras is 2.3. This means that in a (the expected) benefits exceed the costs with a ratio of 2.3 to 1.

The first sensitivity analysis checked the effects of two scenarios in which the cost the recurrent annual costs were either much lower or much higher than the author measure costs were only 50% of the estimated ones, the BCR would increase to 7.1; costs were twice as high as the estimated ones, the BCR would decrease to 1.8 which means the benefits exceed the costs.

An additional sensitivity analysis was done by using the effect estimates of a European meta-analysis by Heye (2013) as it could be argued that the latter is mainly red US and Australian studies. Using the results of De Pauw et al. (2014) yielded slight with an estimated BCR of 4.2.

INPUT INFORMATION

Case studied: It was decided to use Belgium as a case for the safety effect of red light was expected (and confirmed) that Belgian authorities were able to deliver reliable of red light camera operations. There were two 'good' studies available on the safety cameras. A general meta-analysis on international red light camera studies by Heye analysis restricted to 233 intersections in Belgium by De Pauw et al. (2014). Table 1 characteristics, strengths and weaknesses and main effect estimates of the two studies.

Table 1. Effect estimates that can be used for the cost-benefit analysis.

Study	Study type	Study scope	Relevance for Europe	Strength/Weakness
De Pauw et al., 2014	Meta-analysis	233 intersections; period 2008-2012	High relevance; study conducted in Belgium	1. Large scale study 233 intersections with > 2 years before and after period. No: No good separate estimate for fatal crashes or serious crashes. No correction for regression to the mean.
Heye, 2013	Meta-analysis	29 before-after studies for specific effect	Moderate relevance; most studies EU/Australia, 1 European	3. Estimates corrected for regression to the mean. No: No good separate estimate

SafetyCube | CBA on red light cameras | W16 | 1

Cost-benefit analysis Alcohol Interlock Program

Annelies Schoeters, Vias Institute, September 2017

ABSTRACT

An existing cost-benefit analysis on the effect of an alcohol interlock program in the Netherlands (SWOV, 2009) is revisited. The SafetyCube Economic Efficiency Evaluation (E) Calculator was used. The resulting best estimate of the benefit-to-cost ratio (BCR) is 10.9 which means that the benefits substantially exceed the costs. The sensitivity analysis shows that while the BCR is sensitive to changes in the underlying assumptions, the ratio remains higher than 1, which means that the measure remains economically efficient.

INPUT INFORMATION

Case studied: The cost-benefit analysis by SWOV (2009) provides an estimate of the effect of a compulsory alcohol interlock program for various offenders on the number of fatalities. The alcohol interlock program that was examined is a program which lasts minimally 2 years, with the possibility of extending the program one time for 6 months. With the current inclusion criteria, it is calculated that 4,500 serious offenders would participate each year. Two approaches are used to calculate the number of prevented fatalities. The first approach uses the size of the population of serious offenders; the second approach uses the percentage of recidivists. Since a SafetyCube synopsis (Nieuwenkamp et al., 2017) provides us with a meta-analysis estimate for the effect of alcohol interlocks on the reduction of recidivism, we chose to use the second approach. This approach predicts a prevention of 2.8 fatalities of the Dutch population.

Crash costs: The updated SafetyCube estimates for 2015 for the EU were used (see SafetyCube Deliverable 3.2).

Measure Costs: The cost-benefit analysis by SWOV (2009) contained information on the measure costs. These were estimated at 4,600 annually recurrent costs (4,000: supervision, installation & removal, 200 administrative costs, 400: mentoring). The implementation costs are included in the annually recurrent costs. Updating the costs to 2015 and correcting for Purchasing Power Parities¹ (PPP) results in an annually recurrent cost of 45,026.

Time horizon: The applied time horizon for the measure is 2 years and 3 months. The minimal compulsory period is two years. It is estimated that half of the participants will extend the program for six months.

Area/Unit of Implementation: Participation of a serious offender in an alcohol interlock program.

Number of cases affected: The affected number of casualties was retrieved from SWOV (2009). It was estimated that alcohol-related accidents in which the driver had a Blood Alcohol Concentration (BAC) exceeding 1.3 g/l resulted in 130 road fatalities. In total 100,000 serious offenders are responsible for these accidents. Depending on the number of offenders that participate in an alcohol interlock program, the effectiveness in terms of prevented fatalities increases. There are no effectiveness estimates given for serious injuries, slight injuries or Property Damage Only (PDO) crashes. Assuming that drink-driving with a BAC exceeding 1 g/l has the same effect on fatalities, serious injuries, slight injuries and PDO crashes, we can calculate the number of prevented

¹ Purchasing Power Parities are the ratios of currency conversion that equalize the purchasing power of different countries; they are price relatives that show the ratio of the prices in national currencies of the same good or service in different countries (BLOK, 2013).

SafetyCube | CBA on Alcohol Interlock program | W16 | 1

<https://www.roadsafety-dss.eu/#/calculator>



Getting back to the basic facts



	Costs	Effects
<input type="checkbox"/> Section control	€€€	++++
<input type="checkbox"/> Alcohol interlock programme	€€	+++
<input type="checkbox"/> Dynamic speed limits	€€€€	+++
<input type="checkbox"/> Autonomous Emergency Breaking	€	+



... and the correct answer?

Which of the following 4 measures in road safety has the highest benefit-to-cost ratio?



	B/C ratio
<input type="checkbox"/> Section control	19.5
<input type="checkbox"/> Alcohol interlock program	10.9
<input type="checkbox"/> Dynamic speed limits	1.1
<input type="checkbox"/> Autonomous Emergency Breaking	1.2



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Measuring the Road User

The challenges of quantifying human related risk factors and measures

Susanne Kaiser, Austrian Road Safety Board (KFV), Austria

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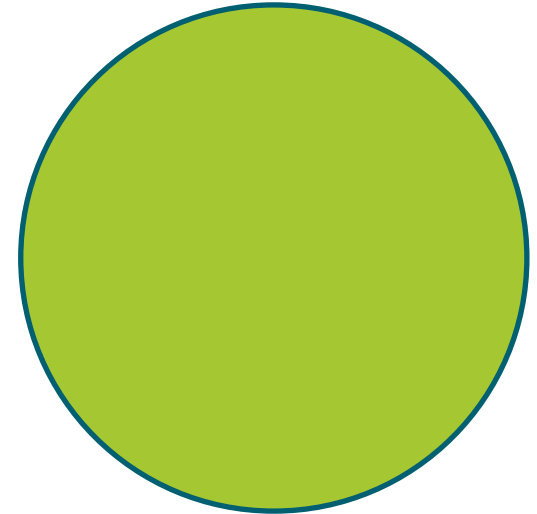


Together with:



Which of the following road user related risk factors was prioritized by stakeholders as pressing issue to tackle?

- A) Tailgating
- B) Fatigue
- C) ADHD



Common objective



Estimating safety effects of risk factors and measures related to

- Road users
- Road infrastructure
- Vehicles



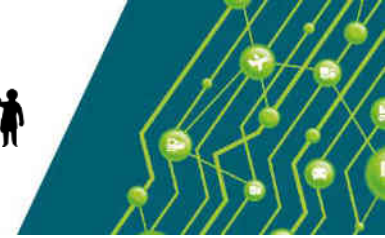
Risks and measures in the DSS



Risk Factors		Measures	
Behavior		Behavior	
★ Speed choice		★ Law and enforcement	
★ Driving under the influence of alcohol	Insufficient skills	★ Education and voluntary training or programmes	
★ Driving under the influence of drugs	Insufficient knowledge	Driver training and licensing	
Risk taking	★ Emotions and stress	★ Fitness to drive assessment and rehabilitation	
★ Fatigue	Misjudgement and observation errors	★ Awareness raising and campaigns	
★ Distraction and inattention	Traffic rule violations		
★ Functional impairment	Personal factors		
	★ Age		
	Diseases and disorders		

- **450+** considered individual studies
- **~50 synopses** on human related risk factors and measures

Challenges involved



- Observation vs. inference of risk factors
- Confounding and interacting risk factors
- Actual contribution to accidents occurrence of risks and measures



To be considered



Importance of

- alternative safety performance indicators (SPI)
- contextual information provided in synopses
- further research and development of valid and reliable SPI

Awareness raising and campaigns – Driving under the influence

Please refer to this document as follows: Eichhorn, A., Kaiser, S. (2017), Awareness raising and campaigns – Driving under the influence, European Road Safety Decision Support System, developed by the Haezo project SafetyCube. Retrieved from www.roadasafety-dss.eu on DD.MM.YYYY



Please note: The studies included in systematic literature search of speed reduction of studies in this synopsis estimate, preferably on the number known to be related to the occurs qualitative information might not

1 Summary

Eichhorn, A., Kaiser, S., Aichele, J.

4.4 COLOUR CODE: LIGHT GREEN

There is some indication that drink-driving campaigns have a positive impact on attitudes towards drink-driving and even on the related accident occurrence. There is less evidence of the effectiveness of designated driver programmes.

4.1 KEY WORDS

Campaign, evaluation, impact, effectiveness, awareness raising, driving under the influence, drink-driving, drink-driving, impaired driving, drugged-driving, alcohol, designated driver, heroin, LSD, ketamine, cocaine, ecstasy, cannabis.

4.2 ABSTRACT

The main purpose of DUI (Driving Under the Influence) campaigns is to raise awareness regarding impaired driving as well as to promote sober driving. Results provide some indication that drink-driving campaigns can have positive effects on road safety. One out of two meta-analyses showed an association with crash reduction. A further meta-analysis and other individual studies showed indirect outcome measures showed mixed results. While self-reported drink-driving behaviour did not considerably change, attitudes towards drink-driving were generally influenced to some extent. Designated driver programmes (assigning someone to not drink and drive and to being others home safely) seem to have lower potential to prevent drink-driving, however, most of the other individual studies focus on young drivers and to some extent on passengers aged up to 25 years. Thus, conclusions can only be drawn regarding this age group. Furthermore, it should be noted that some analysed DUI campaigns were accompanied by enforcement activities. Therefore, it is not clear to what extent the effects are attributable to the campaign itself.

4.4 BACKGROUND

This synopsis focuses on the effectiveness of campaigns addressing specifically driving under the influence. For more detailed information on campaigns and awareness raising in general, please also see the synthesis "Effectiveness of road safety campaigns".

How is "campaign" as a road safety measure defined?
The EU project CASI¹ provides the following definition of campaigns in the field of road safety: "Road safety communication campaigns can be defined as purposeful attempts to inform, persuade, or motivate people in view of changing their beliefs and/or behaviour in order to improve road safety as a whole or in a specific, well-defined target audience, typically within a given time period by means of organized communication activities involving specific media channels often combined with interpersonal support and/or supportive actions such as enforcement, education, legislation, enhancing personal commitment, rewards, etc." (Delfort, 1999; Roe & Atkin, 1999; Vloeberghs et al., 2008; How do campaigns affect road safety?)



... and the correct answer?

Which of the following road user related risk factors was prioritized by stakeholders as pressing issue to tackle?



A) Tailgating

B) Fatigue

C) ADHD



Contact

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- # The SafetyCube European Road Safety Decision Support System

Prof. George Yannis, NTUA, Greece

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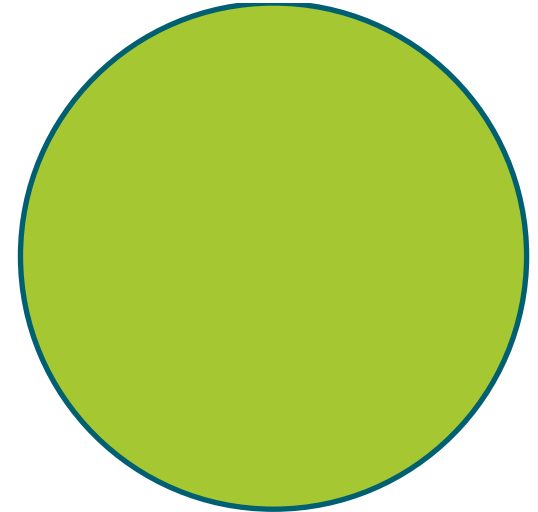


Together with:



How many studies have been coded in the DSS?

- a) approx. 150
- b) approx. 500
- c) approx. 850
- d) approx. 1300



SafetyCube DSS Knowledge Wealth

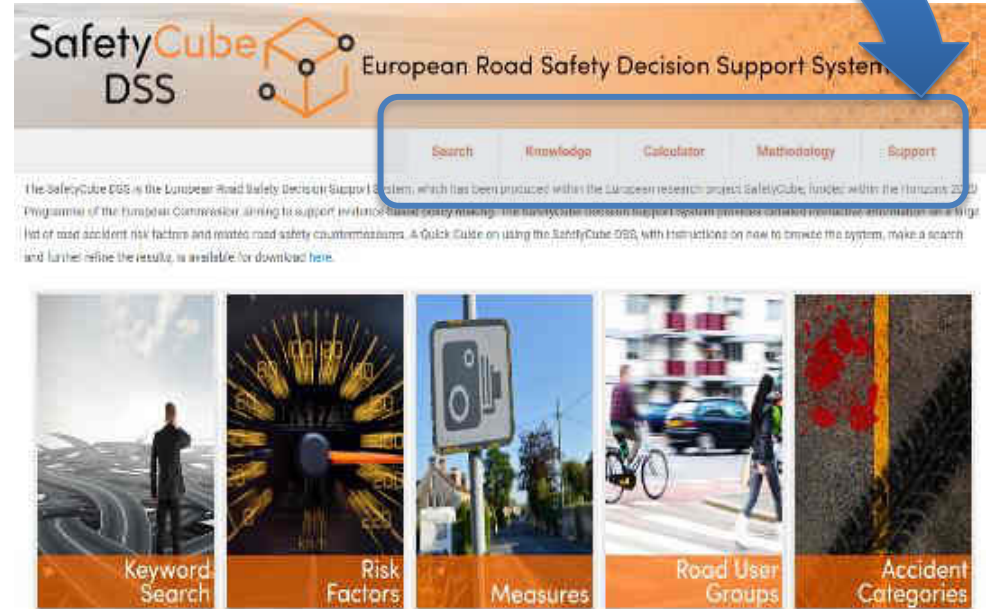
SafetyCube DSS will eventually include
by April 2018:

- more than **1,250 studies**,
- with more than **7,500 estimates** of risks/measures effects on:
 - behaviour,
 - infrastructure,
 - vehicle, and
 - post impact care
- **211 Synopses**
- **36 cost-benefit analyses**



SafetyCube DSS Menu

- **Search**
Risk Factors & Measures
- **Knowledge**
211 Synopses, Serious Injuries, Accident Scenarios
- **Calculator**
Economic Efficiency Evaluation
- **Methodology**
System documentation
- **Support**
Contact, help, feedback





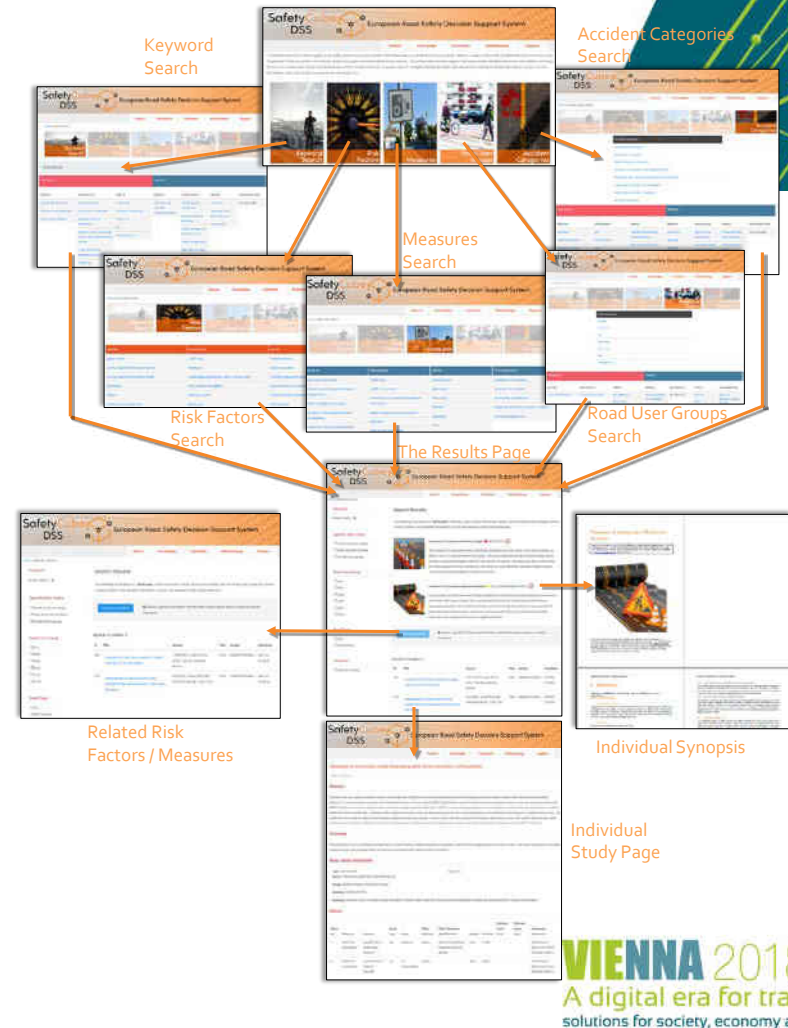
- **Keyword** search
(all database keywords)

- **Measures** search (taxonomy)



The Search Structure

- **Search**
(5 entry points)
- **Results pages**
(Introduction, Colour codes, Synopses, Coded studies)
- Individual **Studies** pages
(Disaggregate level, detailed effects listed, some studies not in synopses)
- **Links** between Risk Factors
Information about which risks can be remedied by which types of measures



SafetyCube DSS Results Pages



Refine risk factor

Level of risk

Synopsis pdf

Link to measures

Individual studies

The screenshot shows the SafetyCube DSS web interface. The header includes the logo and the text 'European Road Safety Decision Support System'. Below the header, there are navigation tabs: 'Search', 'Knowledge', 'Guidance', 'Methodology', and 'Support'. The main content area is divided into two columns. The left column contains filters for 'Specify Risk Factor' (with checkboxes for 'workzone length', 'workzone location', and 'road type'), 'Road Type' (with checkboxes for 'A1', 'A2', and 'motorway'), and 'Country' (with a dropdown menu). The right column displays 'Search Results' for 'Work zone length'. It includes a synopsis of the problem, a list of measures, and a table of results. The table has columns for 'ID', 'Name', 'Source', 'Type', 'Status', and 'Location'. The first row shows a measure for 'Work zone length' with ID 100, Name 'Work zone length', Source 'TRA', Type 'Measure', Status 'Active', and Location 'Austria'.

ID	Name	Source	Type	Status	Location
100	Work zone length	TRA	Measure	Active	Austria
101	Work zone length	TRA	Measure	Active	Austria

SafetyCube Synopses

211 Syntheses on risk factors / measures

Summary (2 pages)

- Effect of risk factor / measure and ranking (colour code)
- Risk / safety effect mechanisms
- Risk / safety effects size, transferability of effects

Scientific overview (4-5 pages)

- Comparative analysis of available studies
- Analysis results:
Meta-analysis/Vote-count analysis/Qualitative analysis

Supporting document (3-10 pages)

- Literature search strategy and study selection criteria
- Detailed analyses

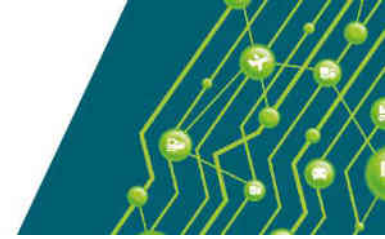




... and the correct answer?

How many studies have been coded in the DSS?

- a) approx. 150
- b) approx. 500
- c) approx. 850
- d) **approx. 1300**





Contact

George Yannis, geyannis@central.ntua.gr



Surrogate safety measures - theory, application, examples

Aliaksei Laureshyn
Lund University (Sweden)



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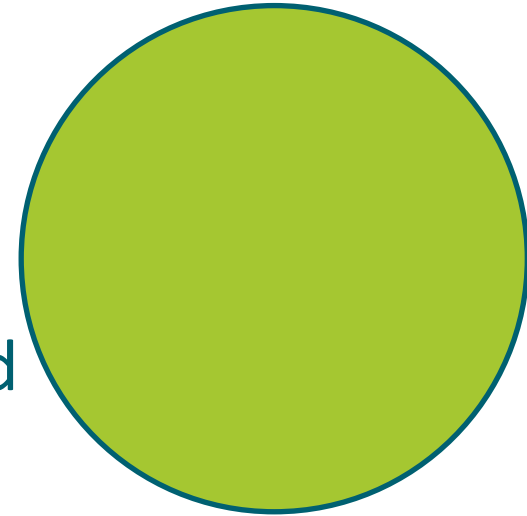
Together with:



Why is it so difficult to make safety analysis based only on accidents?



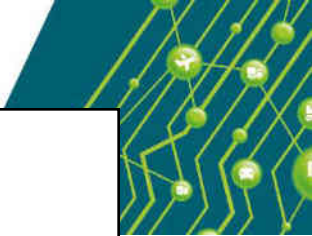
- a. Accidents are rare and random
- b. Accidents are under-reported
- c. Accidents are not properly documented
- d. All above-mentioned is true

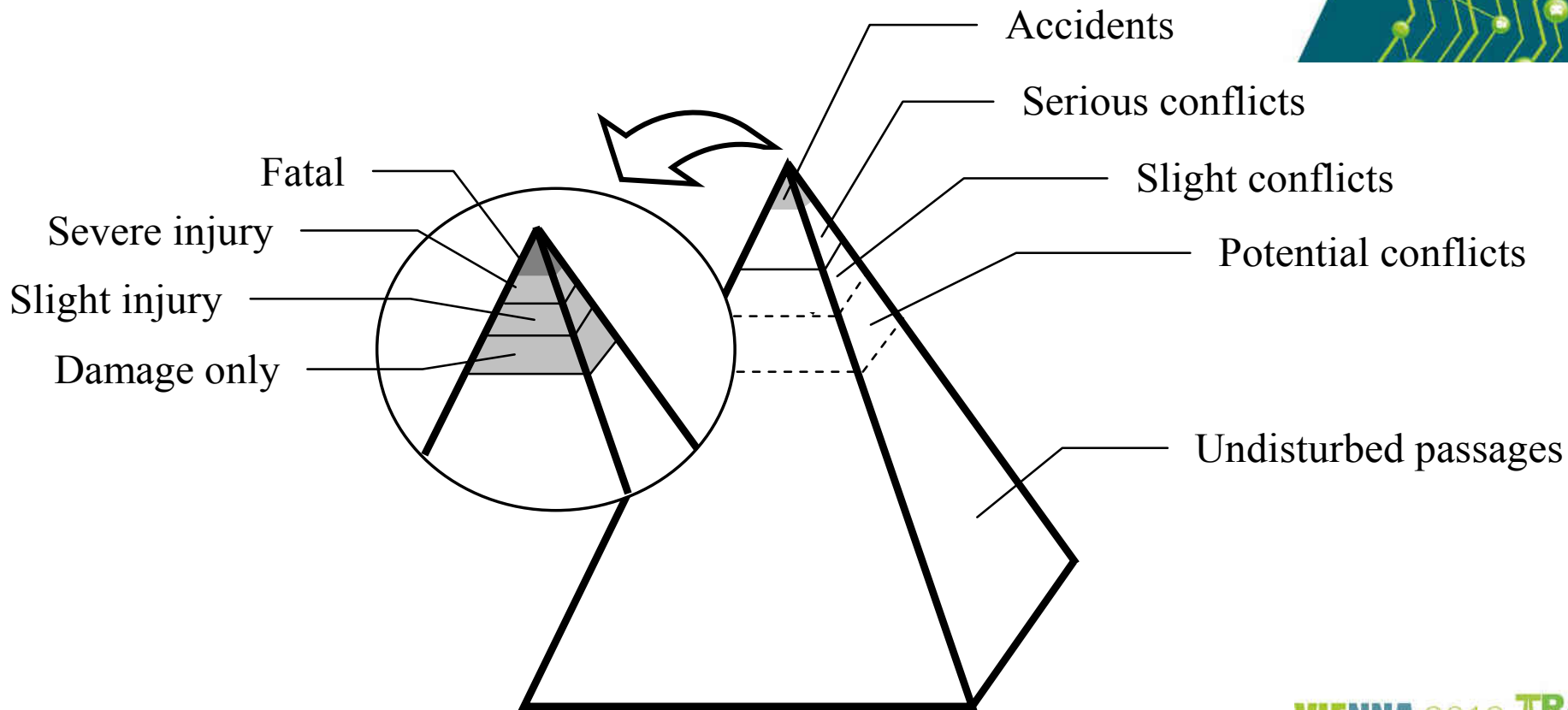




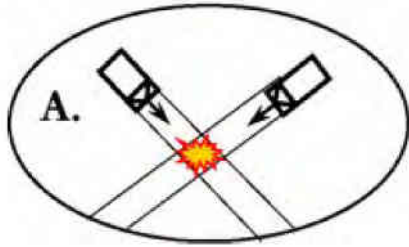
**We don't have
enough evidence
this is unsafe**

**Let's wait for some
more planes to crash...**





How???



Time-to-Collision (TTC)

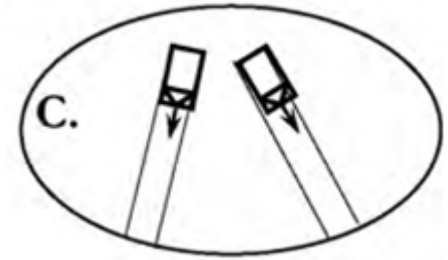
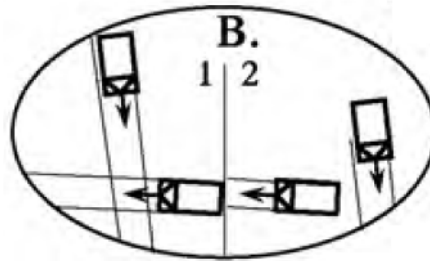
Time-to-Accident (TA)

TTC_{min}

Post-Encroachment Time (PET)

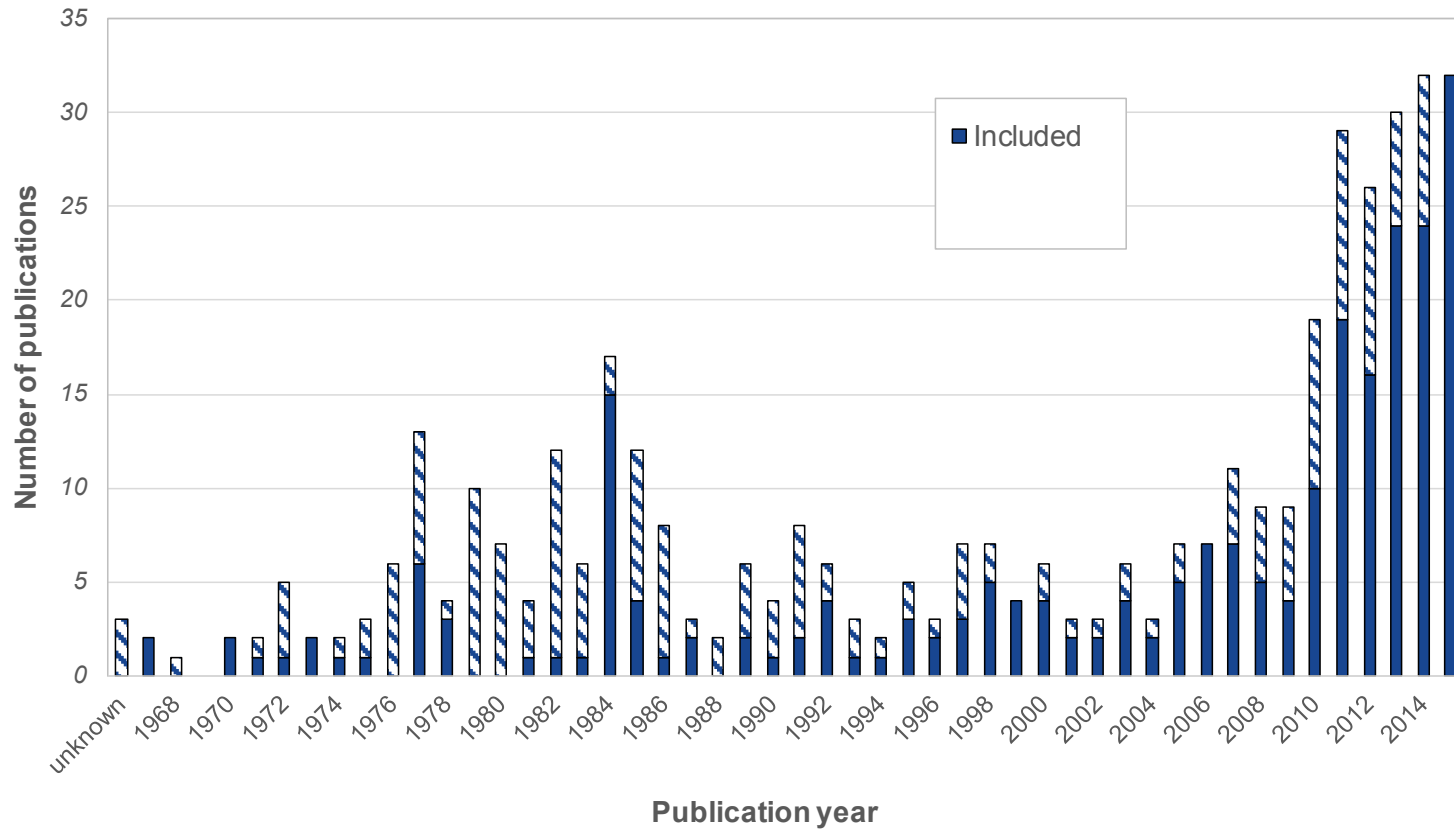
Time Advantage (TA)

T_2



Evasive action-based

SSM publications





... and the correct answer?

Answer D is correct!!!

- a. Accidents are rare and random
- b. Accidents are under-reported
- c. Accidents are not properly documented
- d. All above-mentioned is true**

*Accidents are rare, random, under-reported
and not properly documented!*





Contact

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A digital era for transport

solutions for society, economy and environment

TECHNICAL TOOLS FOR SAFETY DATA COLLECTION

Niels Agerholm

Aalborg University (Denmark)



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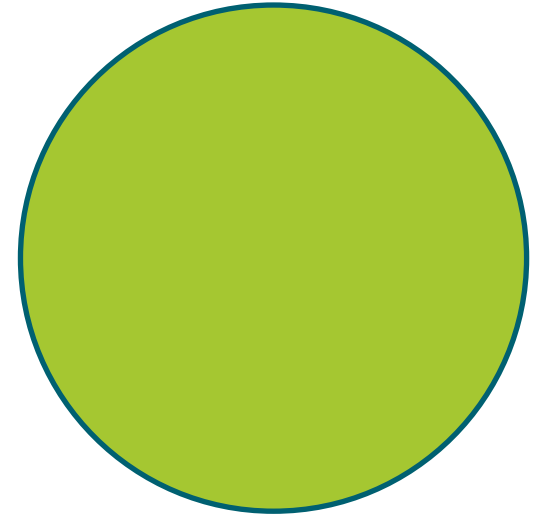
Together with:



How often, on average, can you see a serious traffic conflict at an intersection in a “normal” European city?



- a) Every hour
- b) Once per day
- c) Once per week
- d) 1-2 times per months



RUBA

- Watchdog = Very simple but efficient
- Operates by defining region-specific detectors and rules



T-Analyst

- Conflicts and encounters
 - Cyclist/vehicle
 - Pedestrian/vehicle
- Trajectories
 - Time-based values

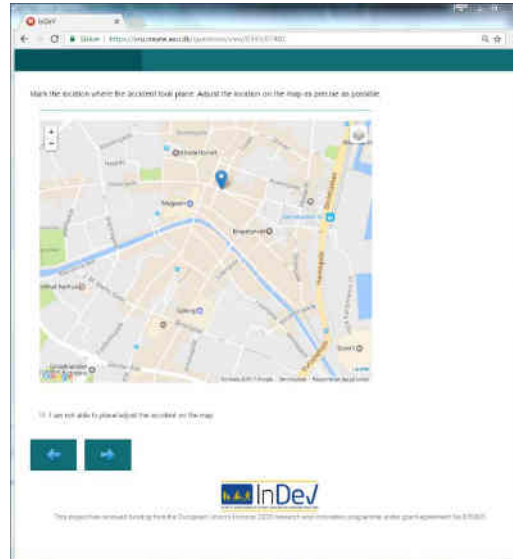


Naturalistic data from VRUs

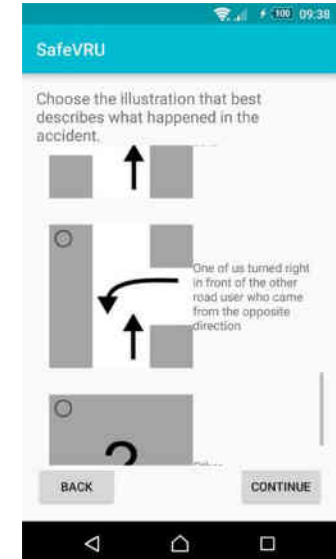
○ Questionnaires

- Tool to generate questionnaires
- Self-reporting of accidents via questionnaire (app & web)

Web



App (Android)

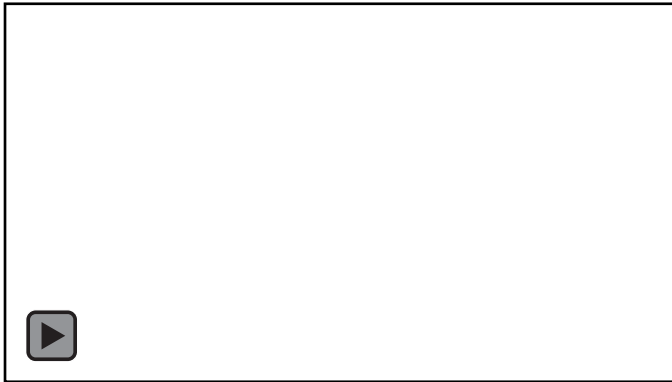


Naturalistic data from VRUs

○ Automatic detections of accidents

- Simulated accidents
 - Dummy and stuntman
- Rule-based
 - Acceleration, jerks, rotation

	Detected	Not detected
Stuntman	23	12
Dummy	14	0



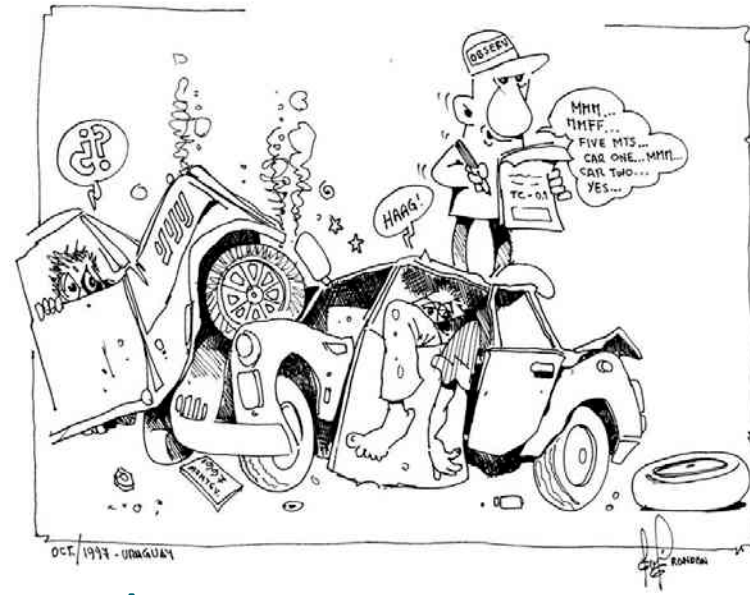


... and the correct answer?

Answer b) is correct!!!

1-2 conflicts per day.

Of course, it depends on the location, but nowadays conflicts are quite rare, too, and it is no longer possible to use human observers as in 1980s...





Contact

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VRU and Accident Costs

Anatolij Kasnatscheew
BASt, Germany



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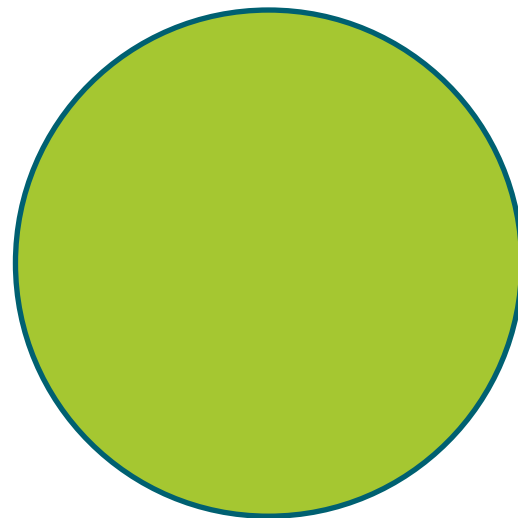
Together with:



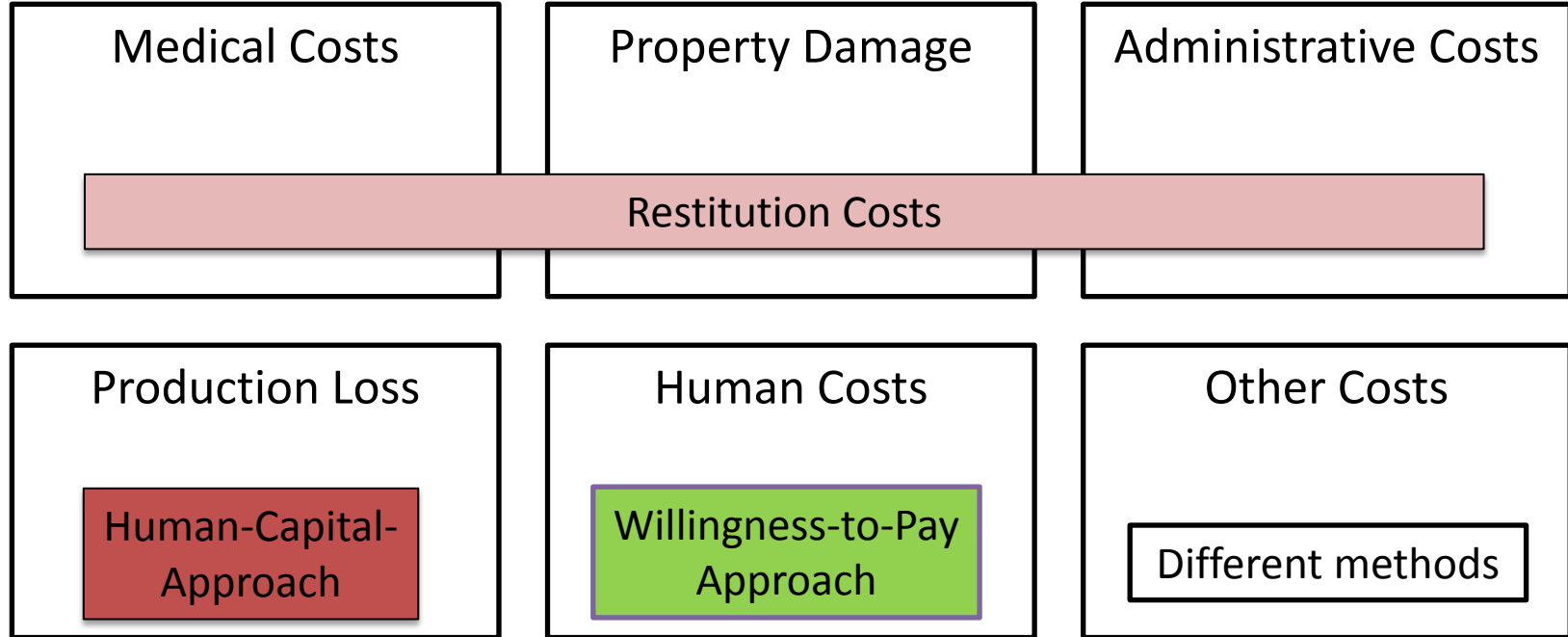
In how many countries is the specific value 'accident costs per VRU' calculated?



- a) None
- b) 2
- c) 15
- d) All countries



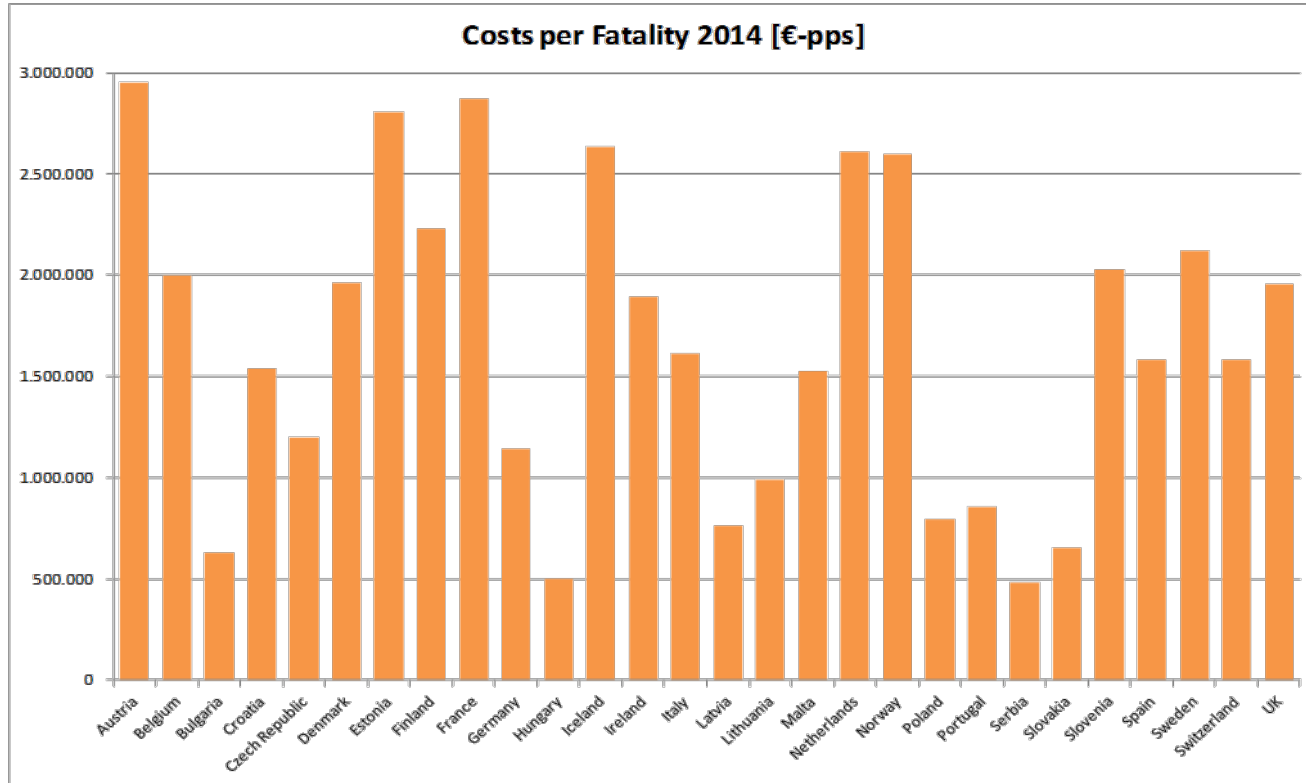
Components... and according methods



Accident cost calculation in EU countries

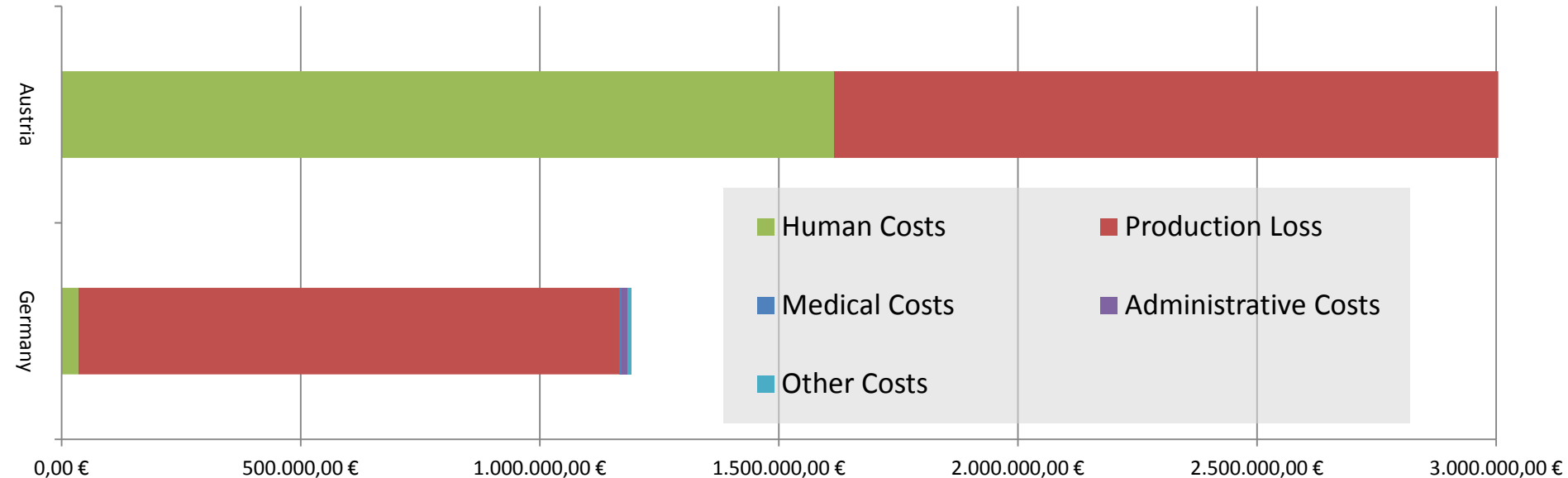


Sources:
InDev Deliverable 5.1 (2016)
(www.indev-project.eu);
SafetyCube Deliverable 3.2 (2017)
(www.safetycube-project.eu).

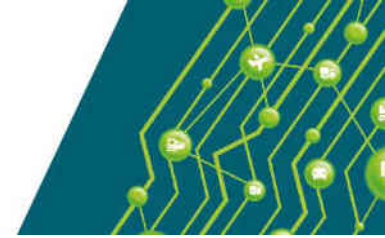


Methodologies in Austria and Germany

Accident costs per fatality



Are VRU considered in Accident Costs?



○ Poland

Category	Unit costs (PLN), year 2014	
	General unit costs	VRU unit costs (pedestrians)
Fatality	1,913,909	1,308,473
Seriously injured	2,291,214	1,803,897
Slightly injured	27,107	31,889
Damage only	39,722	20,029
Average unit costs	993,934	795,540

○ Sweden

Per serious injury	SEK 4,700,000
<i>Per single <u>bicycle</u> accident (CBA guidelines)</i>	<i>SEK 600,000</i>
<i>Per single <u>pedestrian</u> accident (CBA guidelines)</i>	<i>SEK 400,000</i>
Per slight injury	SEK 230,000
Per property damage only	SEK 15,000

Source: InDeV Deliverable 5.1 (2016)
(www.indev-project.eu).



... and the correct answer?

In how many countries is the specific value 'accident costs per VRU' calculated?



- a) None
- b) 2**
- c) 15
- d) All countries



Contact

■ M.Sc. Anatolij Kasnatscheew
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kasnatscheew@bast.de, www.bast.de
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A digital era for transport

solutions for society, economy and environment

Handbook of VRU study methods

Prof. Dr. Brijs, Kris
Hasselt University (Belgium)



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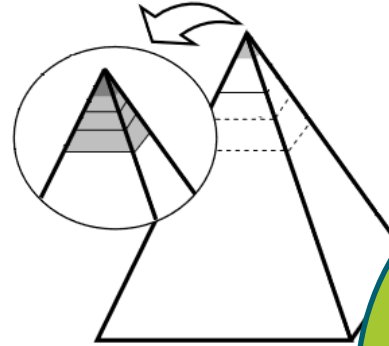


What is the pyramid of Hydén?

A)



B)

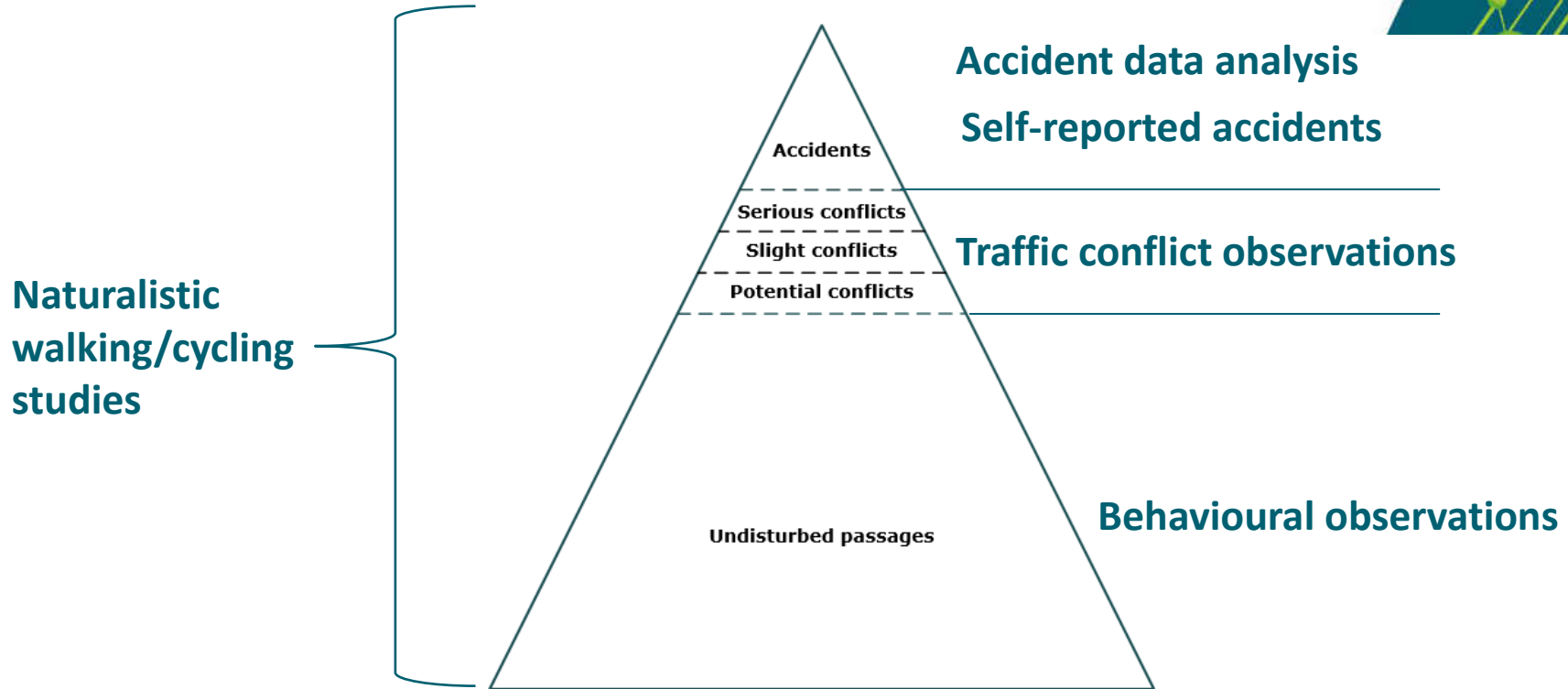


C)



D)







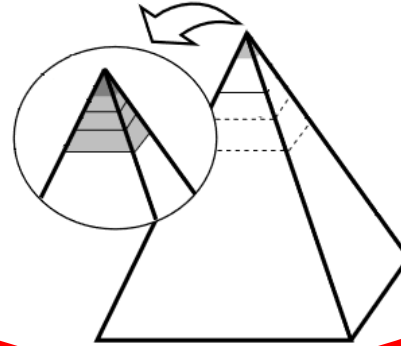
... and the correct answer?

Answer B is correct!

A)



B)



C)



D)





Prof. Dr. Kris Brijs

kris.brijs@uhasselt.be



... please add up your correct
answers!



And the winner is ...