

**SafetyCube** 

## Analysis of road crash costs in EU countries

### TRB Annual meeting 8-12 Jan 2017

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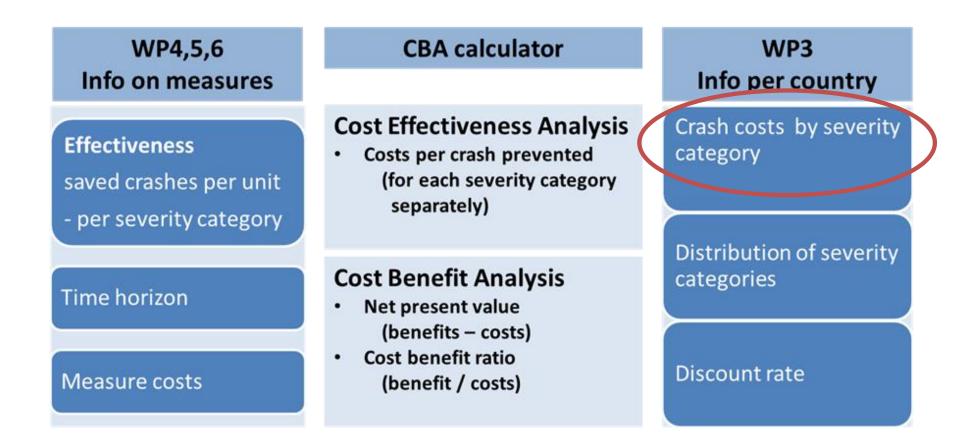
Co-funded by the Horizon 2020 Framework Programme of the European Union

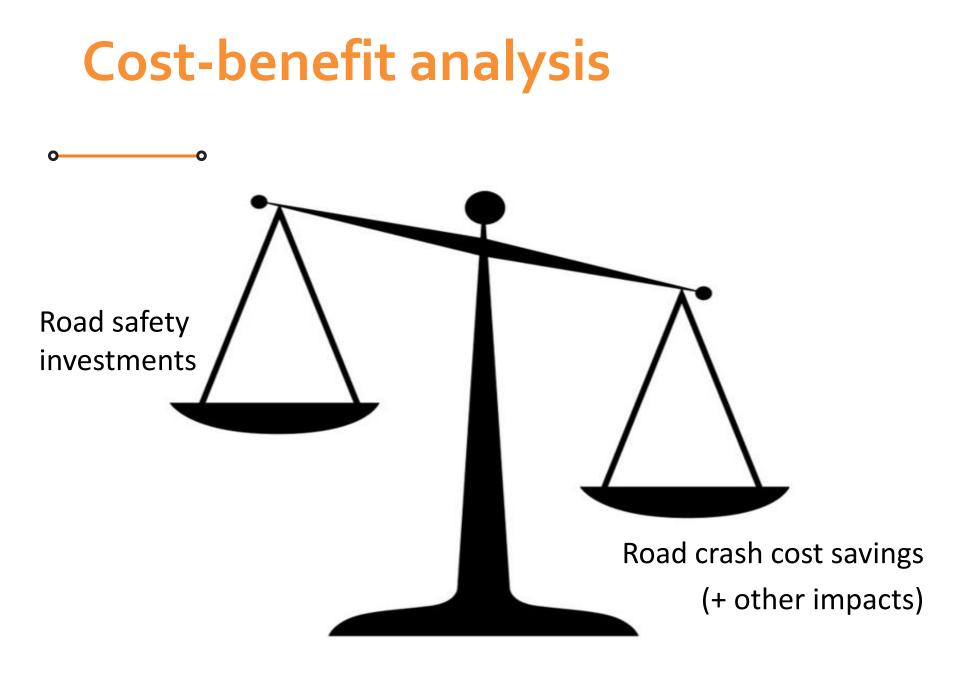
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## SafetyCube

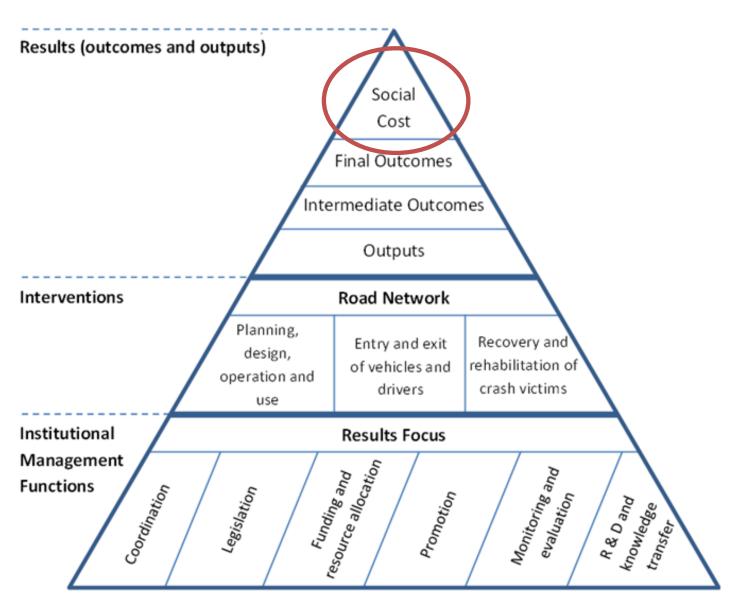
- SafetyCube: Safety CaUsation, Benefits and Efficiency
- A European Commission supported Horizon 2020 project
- Aims at developing an innovative road safety Decision Support System (DSS), helping policy makers to
  - Assess effectiveness of road safety measures
  - Prioritize measures
  - Assess cost-effectiveness of measures
  - Monitor serious injuries and the associated socio-economic costs
- Including an Economic Efficiency Assessment (EEA) tool
  - Cost-benefit analysis
  - Cost-effectiveness analysis

### **Economic Efficiency Assessment tool**





### **Costs as road safety indicator**



## Analysis of road crash costs

- 1. Literature review to identify
  - All relevant cost items
  - Methods
  - Best practices
- 2. Survey among EU countries
- 3. Descriptive analysis
- 4. Further statistical analysis
- 5. Developing standardized EU-values for EEA-tool.

This presentation: descriptive analysis, preliminary results

Data collection in collaboration with H2020 project InDeV

### The SafetyCube-InDeV cost team

SafetyCube partners:

- BRSI
- SWOV
- TOI
- IFSTTAR
- KfV



### **Previous cost reviews**

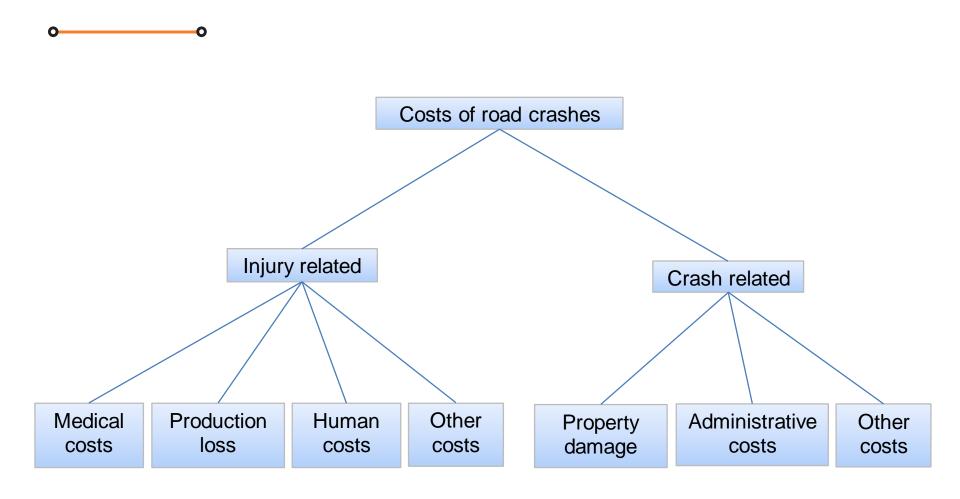
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| Study             | Year | Number of countries | Regions                      |
|-------------------|------|---------------------|------------------------------|
| COST313           | 1994 | 14                  | EU                           |
| Elvik             | 1995 | 20                  | EU (13), other (6)           |
| Elvik             | 2000 | 12                  | EU (6), other (6)            |
| Trawen et al.     | 2002 | 11                  | EU (8), US, AU, NZ           |
| Wijnen & Stipdonk | 2016 | 17                  | Asia (8), EU (6), US, AU, NZ |

## The survey

- Survey among the 28 EU member states + Iceland, Norway, Serbia and Switzerland
- Questionnaires received from 31 countries
- Issues:
  - Which cost items included?
  - Method(s) per cost item
  - Total costs (value, % of GDP)
  - Distribution costs among cost items
  - Costs per casualty and crash
  - Total costs by severity level
- Official values used by national governments

### **Cost components**



### Methods (official figure)

|                   |                            |  |   |   |                       |   | <b>.</b>    |                      |                     |                            |                                      |  |  |  |                   |   |
|-------------------|----------------------------|--|---|---|-----------------------|---|-------------|----------------------|---------------------|----------------------------|--------------------------------------|--|--|--|-------------------|---|
|                   |                            |  | Method  | <u>Database</u>   |                       |   |             |                      | Co                  | st item is i               | ncluded in                           |  |  |  |                   |   |
| Cost<br>component | incl. in<br>crash<br>costs | Cost item  | if <u>'other</u> ' or <u>several</u><br><u>options</u> : specify in<br>'further comments'<br>For explanation see<br><u>blue tab below</u> . | if <u>'other</u> ' or <u>several</u><br><u>options</u> : specify in<br>'further comments'<br>For explanation see<br>blue tab below. | incl. in<br>cost item | Cost element  | fatalities  | seriously<br>injured | slightly<br>injured | property<br>damage<br>only | <u>crashes</u><br>with<br>fatalities | <u>crashes</u><br>with<br>seriously<br>injured | crashes<br>with<br>slightly<br>injured | <u>crashes</u><br>with<br>property<br>damage<br>only | Other<br>injuries | other<br>group,<br>see <u>Cost</u><br><u>per unit</u> |
|                   | V                          | First aid and<br>transportation                      | Restitution (   | Hospitals 🔻   | 니<br>지<br>지<br>지      | ambulance<br>helicopter<br><u>other:</u>  | ٢           | V                    | ۲                   |                            |                                      |  |  |  | •                 |   |
|                   |                            | Emergency department                                 | Restitution cc 💌  | Hospitals 💌   |                       | 1   | M           |                      | ▼                   |                            | -                                    | -  |  |  | <b>X</b>          | Ē   |
|                   | M                          | In-patient hospital<br>treatment<br>(overnight stay) | Restitution cc 💌  | Hospitals 🔻   |                       |   | V           | N                    | V                   |                            |                                      |  |  |  |                   |   |
|                   |                            | Out-patient treatment<br>(no overnight stay)         | Restitution cc 💌  | Hospitals 🔻   |                       |   | -           | V                    | V                   |                            |                                      | -  |  |  |                   | -   |
| Medical costs     | ¥                          | Non-hospital treatment                               | Restitution (   | other 🗨   | হা হা হা              | rehabilitation centres<br>general practitioners<br>physiotherapy<br>home care<br>other: nursing homes | -           | ¥                    | N                   |                            | -                                    | -  | F                                      |  | ¥                 | F   |
|                   | Γ                          | Aids and appliances                                  | other 💌   | other 💌   |                       | 1   |             | Γ                    | Γ                   |                            |                                      |  |  |  | Γ                 | Γ   |
|                   | V                          | other items: medicines                               |   |   |                       |   | M           | ×                    | V                   |                            |                                      |  |  |  |                   |   |
|                   | victims wi                 | no have not been treated                             | at the emergency depa   | artment, national surv  | eys have l            | been used, including hospita<br>been used in addition to hos<br>eneral practitioner do includ         | pital data. | 3. The seve          |                     |                            |                                      |  | -                                      |  |                   |   |
|                   | V                          | Loss of future market production                     | Human capi 🔻  | National st 🔻   |                       | gross production loss (incl.<br>consumption loss)<br>net production loss<br>other:                    | K           | R                    | R                   |                            |                                      |  | -                                      |  |                   |   |
|                   |                            | Friction costs                                       |   | •   |                       | recruiting and training<br>new employees<br>vocational rehabilitation<br>of employee (victim)         |             |                      |                     |                            |                                      |  |  |  |                   |   |
| Production loss   |                            | Loss of non-market<br>production                     | •   | •   |                       | household work<br>taking care of children<br>voluntary work<br><u>other:</u>                          |             |                      |                     |                            |                                      |  |  |  |                   | -   |
|                   | Γ                          | other items:   |   |   |                       |   |             |                      | -                   |                            |                                      |  | -                                      |  | -                 |   |
|                   | Calculatio                 | n of loss of future market                           | production is based o   | n statistics of Statistics  | Netherla              | nds (production data, sick le   | ave and ina | bility to wo         | ork) and N          | letherland                 | ls Bureau f                          | or Econom                                      | ic Policy A                            | nalysis (CF  | PB), which a      | are   |

based on national surveys

### Costs per component

#### More detailed information

Do you have more detailed information on the crash costs **<u>per cost component</u>** and <u>per casualty</u>? If so, please fill those in here. If you only have data on total costs, please choose the right tick box.

Is the information below given in costs per casualty or in total costs?

Costs per casualty (preferred)

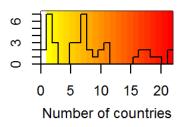
Total costs

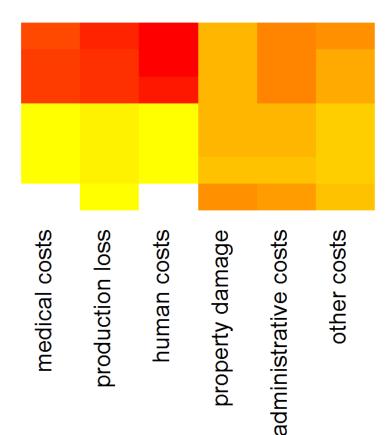
Currency in which the official information is provided (EUR/Pound/etc.):

EUR

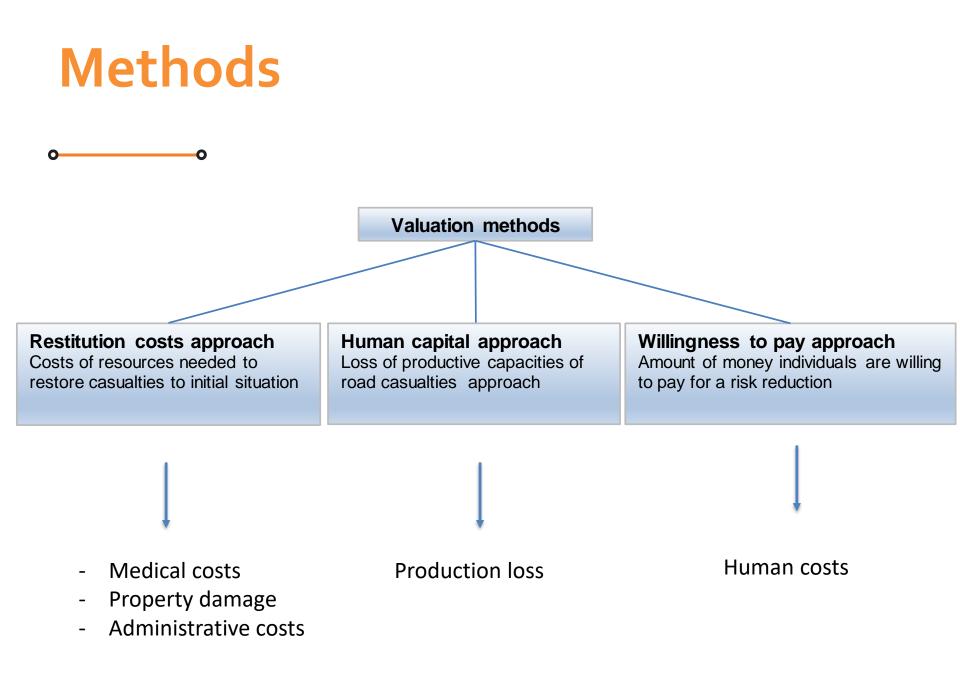
| Official figure   | Medical costs  | Production loss | Human costs | Property<br>damage | Administrative costs | Other costs |  |  |
|---|--|-----------------|-------------|--------------------|----------------------|-------------|--|--|
| fatalities  | 9.904  | 576.679         | 1.991.083   | 10.805             | 17.462               | 5.566       |  |  |
| serious injuries  | 10.229   | 20.859          | 232.957     | 10.498             | 5.667                | 431         |  |  |
| slight injuries   | 1.036  | 1.122           | -           | 4.323              | 1.747                | 405         |  |  |
| fatal crashes   |  |                 |             |                    |                      |             |  |  |
| serious injury crashes  |  |                 |             |                    |                      |             |  |  |
| slight injury crashes   |  |                 |             |                    |                      |             |  |  |
| property damage only (PDO) crashes                                    |  |                 |             |                    |                      |             |  |  |
|   |  |                 |             |                    |                      |             |  |  |
| Other injuries  | 222  | -               | -           | 3.060              | 965                  | 623         |  |  |
| [other groups]<br>(your definition from tab <b>'Costs per unit</b> ') |  |                 |             |                    |                      |             |  |  |
|   |  |                 |             |                    |                      |             |  |  |
| Total crashes   |  |                 |             |                    |                      |             |  |  |
| Further notes:  | Further notes:<br>Costs of house adaptions and visiting people in hospital are included in medical costs |                 |             |                    |                      |             |  |  |

### **Cost components included**

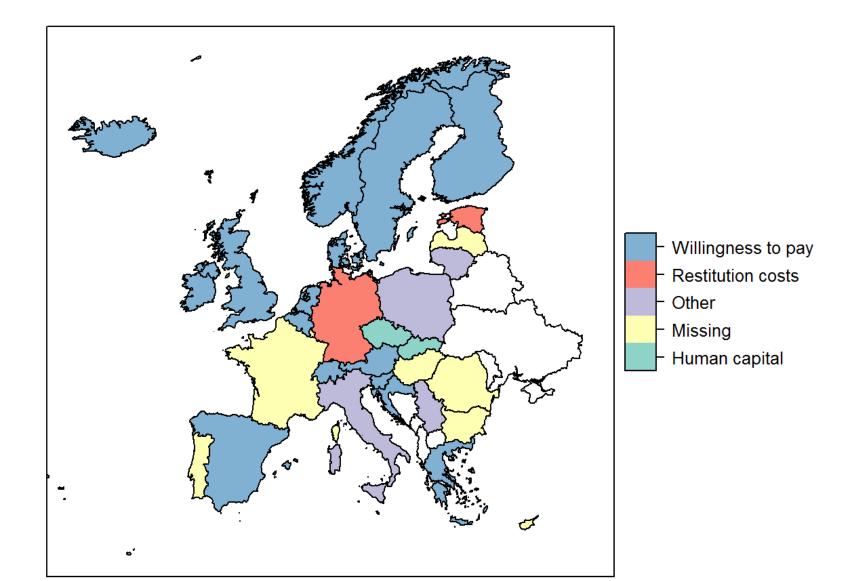




fatalities serious injuries slight injuries fatal crashes serious injury crashes slight injury crashes property damage only

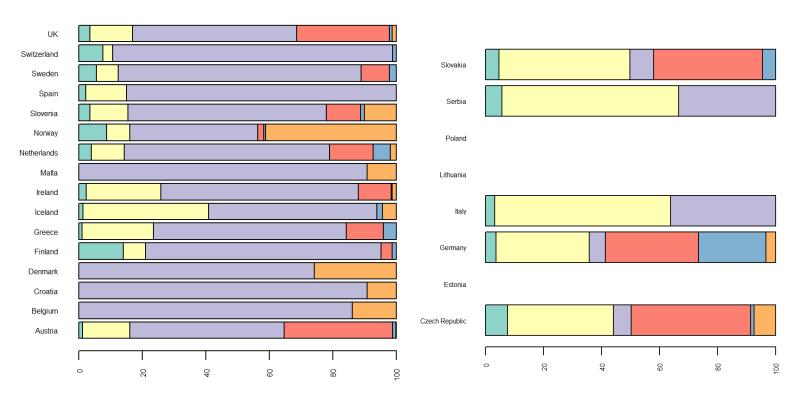


### Method human costs



### **Cost by component**

O



WTP countries

Non-WTP countries

components

production.losshuman.costs

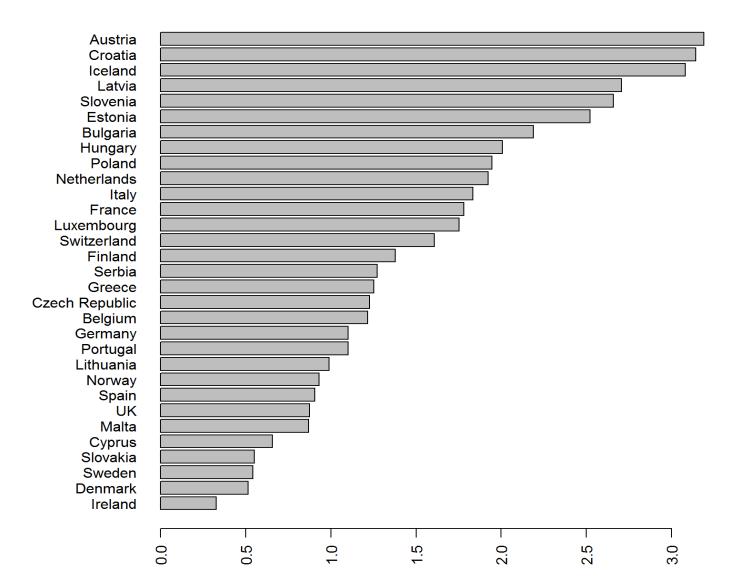
property.damage

other.costs

administrative.costs

medical.costs

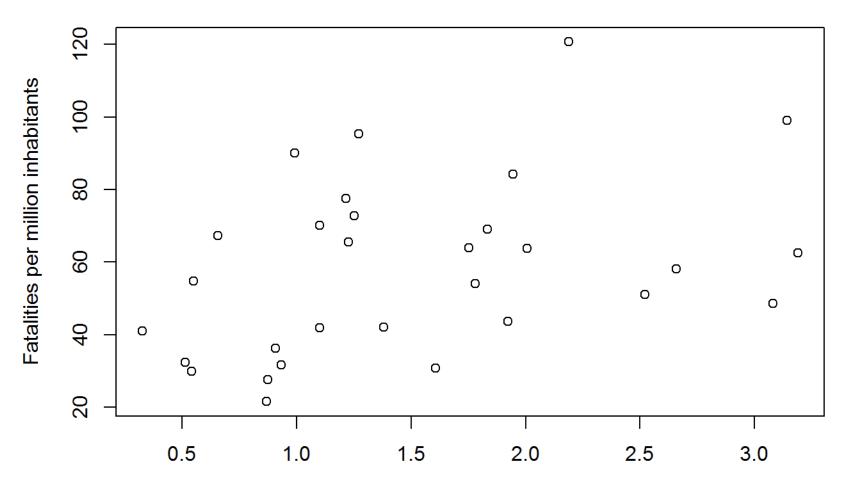
### Total costs (%GDP)



# What explains the differences in total costs?

- Road safety level (number of casualties / crashes)
- Methodological issues:
  - Cost items included
  - Methods
  - Severity categories included, particularly property damage only crashes
  - Correction for underreporting?

### **Relation mortality – total cost**

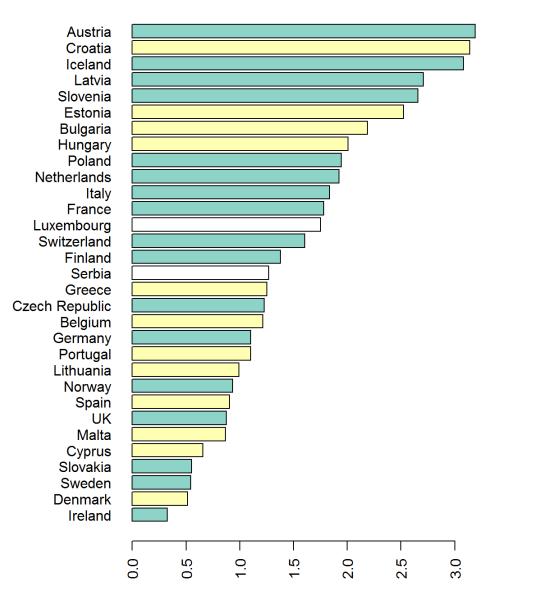


% GDP

### Total costs (%GDP)

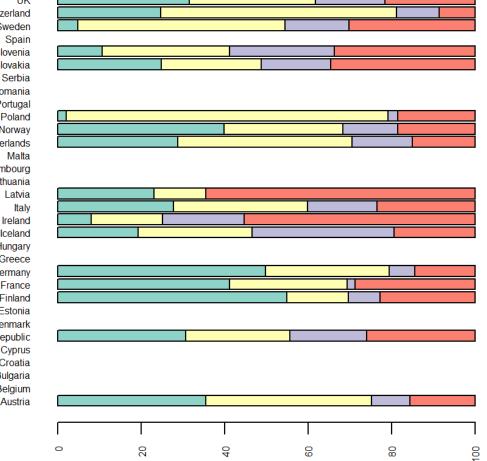
PDO included?





## **Total costs by severity**

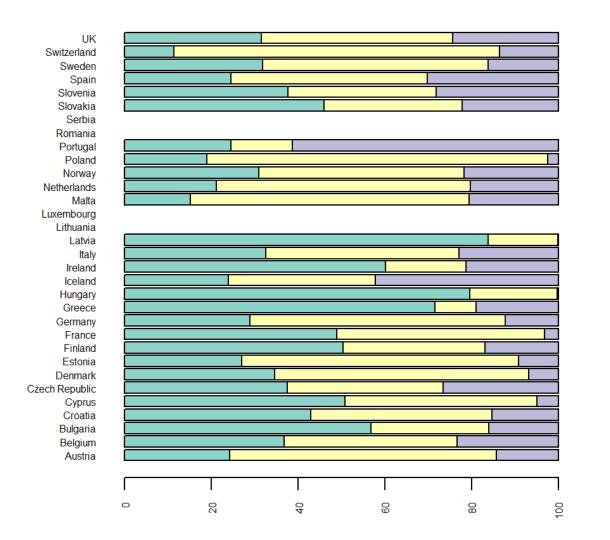
UK Switzerland Sweden Spain Slovenia Slovakia Serbia Romania Portugal Poland Norway Netherlands Malta Luxembourg Lithuania Latvia Italy Ireland Iceland Hungary Greece Germany France Finland Estonia Denmark Czech Republic Cyprus Croatia Bulgaria Belgium Austria



### severity categories

- fatalities
- serious injuries
- slight injuries
- pdo crashes

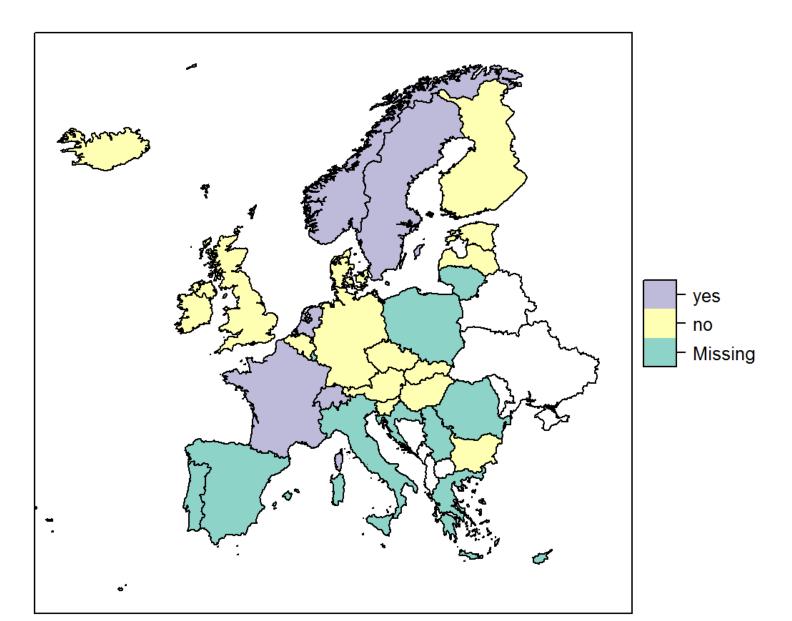
### **Total costs by severity**



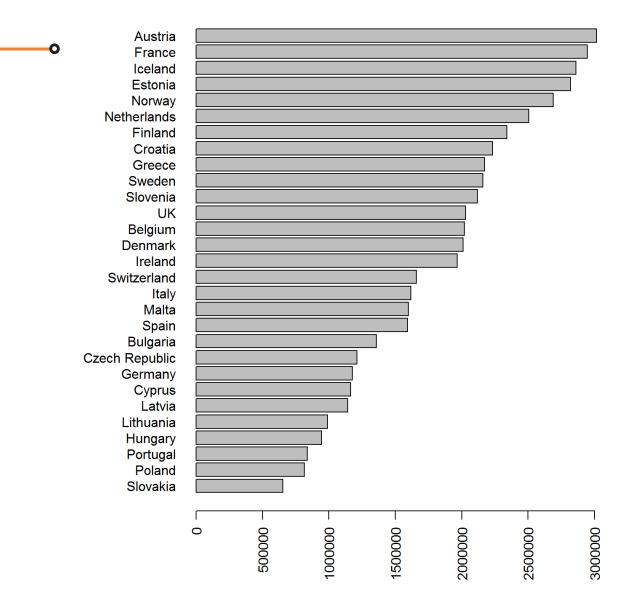
### severity categories

- fatalities
- serious injuries
- slight injuries

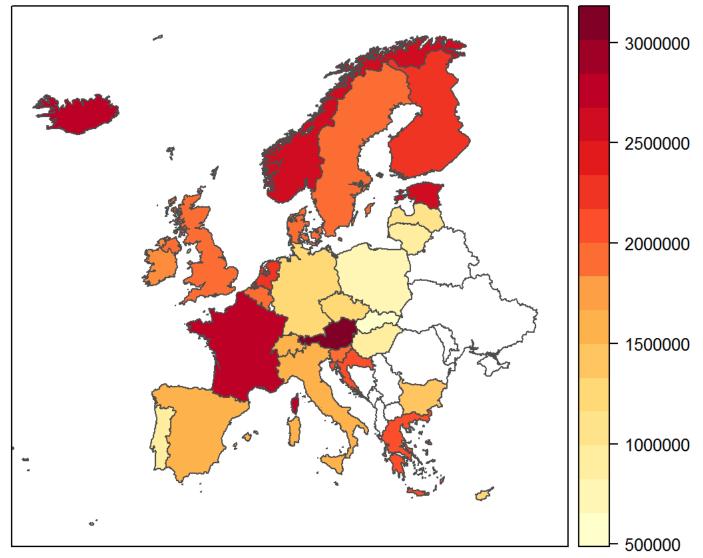
## **Correction for underreporting**



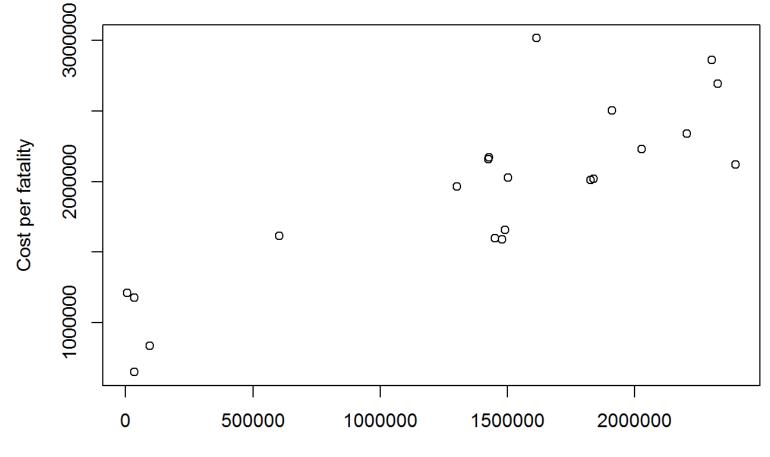
### **Costs per fatality**



### **Costs per fatality**



### **Human cost fatalities**

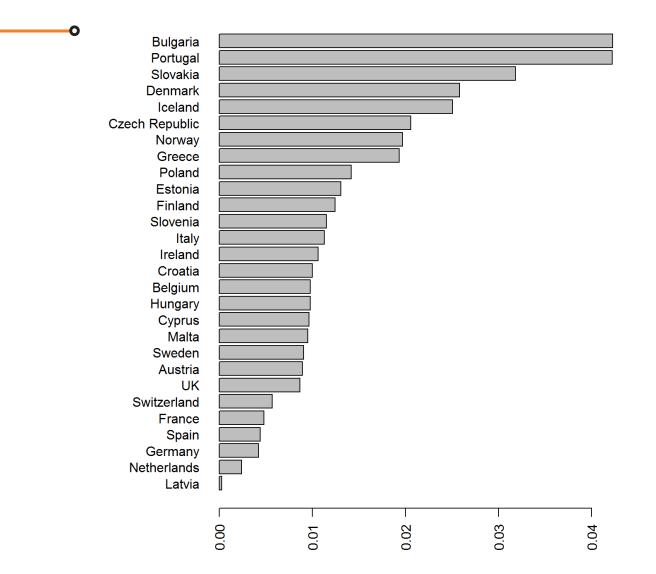


Human cost of fatality

### **Costs of serious injuries**

Serbia Romania Luxembourg Estonia Norway Finland **Czech Republic** Slovakia Sweden Denmark Portugal Bulgaria Spain Belgium Hungary Cyprus Italy Croatia Switzerland Malta Iceland Austria France Slovenia Greece Ireland UK Netherlands Germany Lithuania Latvia 0.00 0.05 0.10 0.15 0.20 0.25 0.30

## **Costs of slight injuries**



### Conclusions

- Official estimates of costs of road crashes in European countries range from 0.3 to 3.2% of GDP
- Costs per fatality range from 0.7 to 3.0 million EUR (2015)
- Variations mainly explained by methodological differences:
  - Different cost components
  - Willingness to pay or other method
  - Correction for underreporting
  - Inclusion of property damage only crashes
- Harmonization of cost estimates is needed for cost-benefit analysis on EU level

### Next steps

- Developing a coherent set of EU values for cost-benefit analysis
- Value transfer
  - Adding missing cost components
  - Estimating values using methods recommended in guidelines
- Incorporating all values in the EEA-tool of the SafetyCube Decision Support System