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Conference

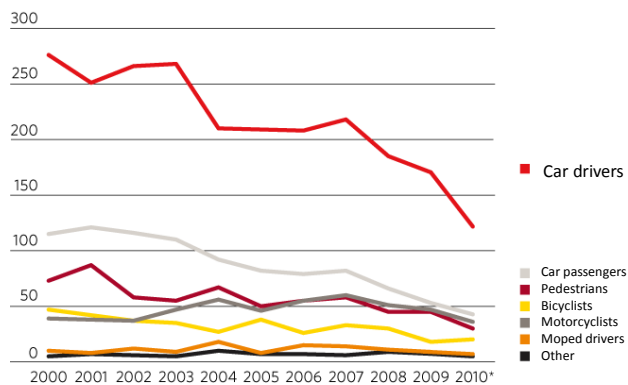
The process of reviewing interim targets and indicators for Road Safety in 2010–2020 in Sweden

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TRAFIKVERKET
SWEDISH TRANSPORT ADMINISTRATION

Number of fatalities by road user in Sweden

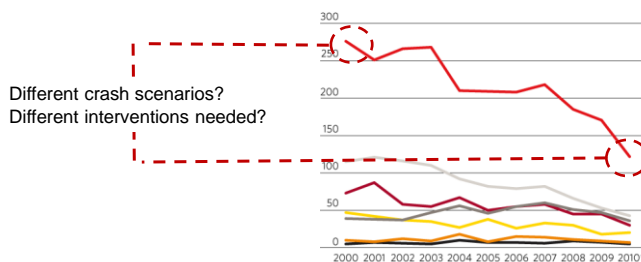


*As of 2010, excluding suicides (15–20 cases per year)

Can we continue with the same development?
EU-target: - 50% road fatalities to the year 2020

Problem formulation

1. At what level is the safety quality of the road transport system year 2020?
2. How can we identify necessary safety improvements and quantify their effect in injury reduction to 2020?



The previous approach

- Limited knowledge about the correlation between different SPI (enhanced system effects or double counting)

Road Safety Performance Indicator	Starting position	2010	Target year 2020	Trend
Number of fatalities on the roads	440	270	220	In line with required trend
Number of persons seriously injured on the roads	5 500	4 700	4 125	In line with required trend
Percentage of traffic volume within speed limits, national road network	43 %	-	80 %	In line/not in line with required trend
Percentage of traffic volume within speed limits, municipal road network	52 %	-	80 %	Not measured
Percentage of traffic volume with sober drivers	99.71 %	99.74 %	99.90 %	In line with required trend
Percentage of those wearing a seat belt in the front seat of passenger cars	96 %	96 %	99 %	Not in line with required trend
Percentage of cyclists wearing a helmet	27 %	27 %	70 %	Not in line with required trend
Number of new passenger cars with the highest Euro NCAP score	66 %	74 %	100 %	In line with required trend
Percentage of new heavy vehicles with automatic emergency braking system	0 %	0 %	100 %	Not in line with required trend
Percentage of traffic volume on roads with speed limits of more than 80 km/h and median barrier	50 %	67 %	75 %	In line with required trend
Percentage of safe pedestrian, cycle and moped passages in the municipal road network	Approx 25 %	-	Not defined	Not measured, no target
Percentage of safe crossings in main municipal road network for cars	Approx 50 %	-	Not defined	Not measured, no target

http://publikationswebbutik.vv.se/upload/6340/2011_118_analysis_of_road_safety_trends_2010.pdf

The previous approach

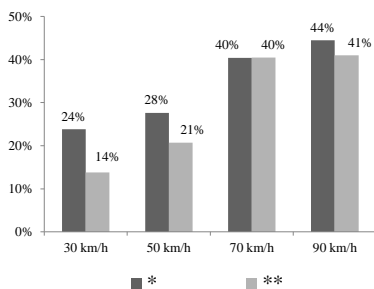
Reduction of fatalities if all targets are fulfilled	- 424
Compensation for double-counting (factor 0,6)	- 254
Fatalities 2005-2007, in average each year	460
Possible target 2020 (460-254)	206
Suggested target 2020	220

5 2013-11-21

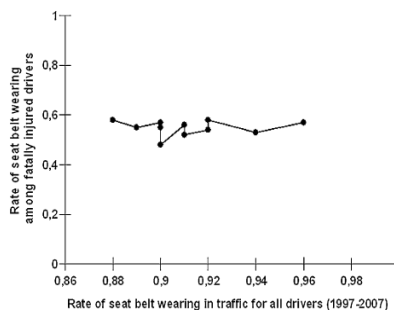


Two problems (at least)

1. dependent relationship between different SPIs
2. nonlinearity between an increase of an SPI and the final outcome.



Strandroth et al. (2011)



Tingvall et al. (2010)

6 2013-11-21



Objective

- Develop and apply a new method to forecast changes in crash numbers in response to road safety interventions
- Suggest a scenario with new interventions to reach the new target

Method

1. Reasonable assumptions on some SPI by 2020

Assumptions on implementation of safety interventions (baseline)

		Parameters	Projection
VEHICLE	HGV	Lane Departure Assistance	100% among new vehicles from 2015
		Autonomous Emergency Braking for rear-end crashes	100% among new vehicles from 2015
		Electronic Stability Control (ESC)	100% among new vehicles from 2015
		Seat Belt Reminder (SBR)	100% among new vehicles from 2011
	Passenger car	Lane Departure Assistance	100% among new vehicles from 2015
		Electronic Stability Control (ESC)	100% among new vehicles from 2008
		Autonomous Emergency Braking for pedestrians and EuroNCAP pedestrian score 21	100% among new vehicles from 2015
		Autonomous Emergency Braking for bicyclists	100% among new vehicles from 2015
		Autonomous Emergency Braking for rear-end crashes	100% among new vehicles from 2015
		Seat Belt Reminder (SBR) front seats	100% among new vehicles from 2009
		Seat Belt Reminder (SBR) back seats	100% among new vehicles from 2015
		Crashworthiness	10 years newer cars
	Motorcycle	Whiplash protection	40% among new vehicles from 2000, 60% among new vehicles from 2000, 80% among new vehicles from 2010
Antilock Brake System (ABS)		50% among new vehicles from 2010, 100% among new vehicles from 2017	
INFRA-STRUCTURE	Rural roads	Median barrier	90 km/h speed areas with AADT >4000 and width >12 m
	Urban roads	Intersections	50% of intersections in urban areas with functional road class 3-5 are re-built to roundabouts
		Safe moped-bicycle-pedestrian crossings	20% of Moped-Bicycle-Pedestrian crossings in urban areas have speed bumps etc

9 2013-11-21



Method

1. Reasonable assumptions on some SPI by 2020

2. Apply the assumptions on the 2010 casualty crashes

1. Case by case analysis of fatal crashes
2. Probability calculations on serious crashes

Question at issue: How many and which crashes will be left given these assumptions?

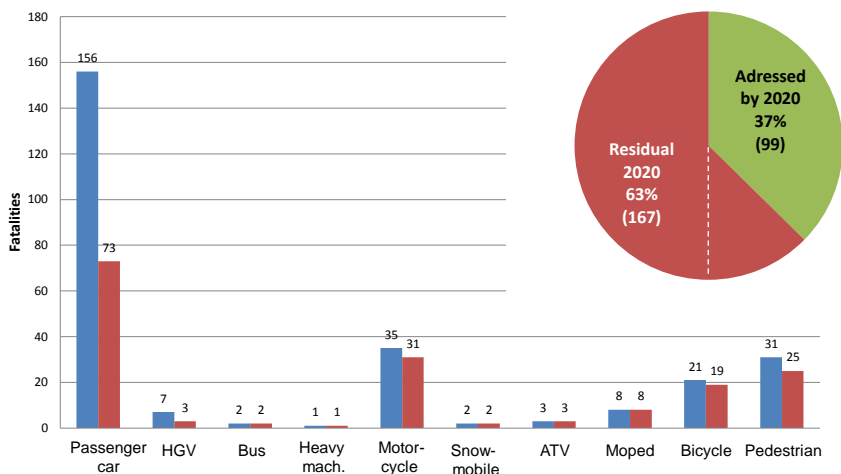
3. Analysis of residual (crashes left by 2020) and investigation of the future potential of different interventions.

- Is it possible to reach the new target? What are the safety gaps?

10 2013-11-21



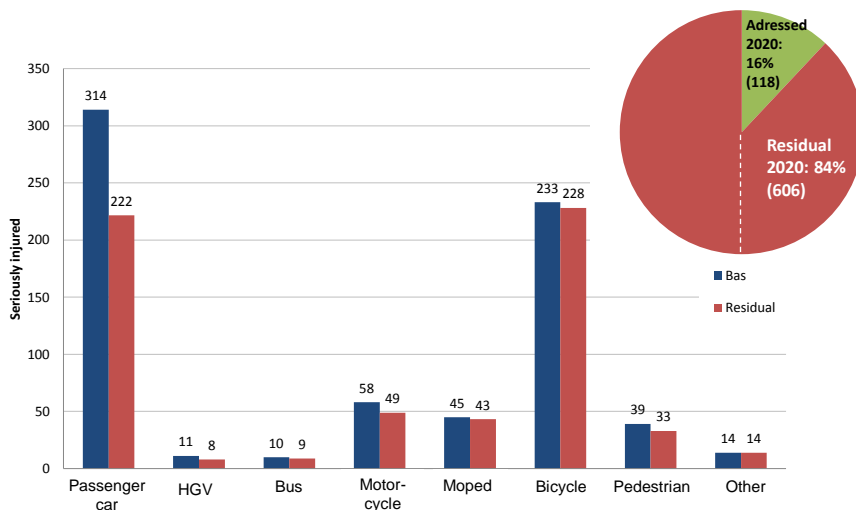
Results – Estimation of fatalities 2020



11 2013-11-21



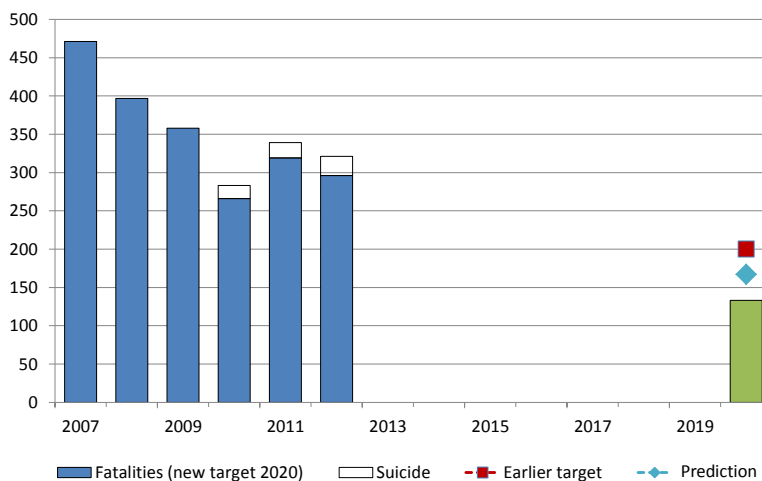
Results – Estimation of seriously injured 2020



12 2013-11-21



Prediction 2020 compared to new target



13 2013-11-21

Compensation for external factors and random variation

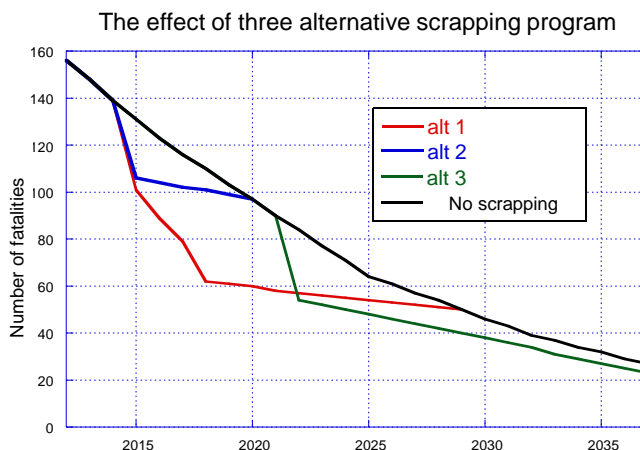
Status quo, 2010	266
Eliminated by 2020 according to the prediction	- 99
Residual in 2020 after the prediction	167
Expansion of traffic volume, 1 % per year	+ 11
Demographic effects	+/-0
Corrected for 3-year average	+ 24
Residual in 2020 after consideration of external factors	202
Half of number of fatalities in 2010 remain in 2020	-133
Remaining to be eliminated above and beyond the prediction	69

14 2013-11-21

Scenarios – Potential of future interventions

Area of intervention/measure	Potential Fatalities in 2020	Potential, very severe injuries (RPMI 10 %) in 2020	50 % reduction in number of fatalities	40 % reduction in number of very severe injuries (RPMI 10 %)
Speed limit reduction, municipal roads, 3 %	3	21		
Municipal speed limit reduction, 5 %	5	35	5	35
Municipal speed limit reduction, 8 %	8	55		
Speed limit reduction, state-owned roads, 3 %	11	26		
Speed limit reduction, state-owned roads, 5 %	18	42	22	51
Speed limit reduction, state-owned roads, 8 %	27	64		
Replacement of all vehicles, alternative 1	8	11	6	8
Replacement of all vehicles, alternative 2	17	13		
100 % New motorcycles equipped with ABS, 2015	1	3	1	3
Divided roads with lower circulation	3	0		
Better guard rail protection when the speed limit is 80 kilometres per hour or higher	3	8		
GCM ¹ crossings with speed bumps, 50 % of those with functional road classification 3-5		3		
GCM ¹ crossings with speed bumps, 80 % of those with functional road classification 3-5		5		
GCM ¹ crossings with speed bumps, total	3	11	2	8
Breath alcohol ignition interlock device programme	0	x		
Unguarded level crossings secured	2	2	0	
Reconstruction, turn-offs and backing up	6	4	3	2
Use of seat belts	14	38	4	18
Safe intersections, state-owned road network	18	28	0	0

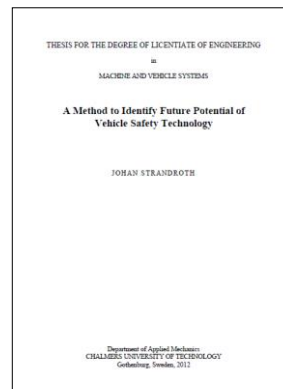
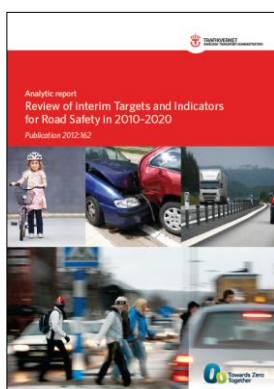
Applications – relate interventions to a “do-nothing option”

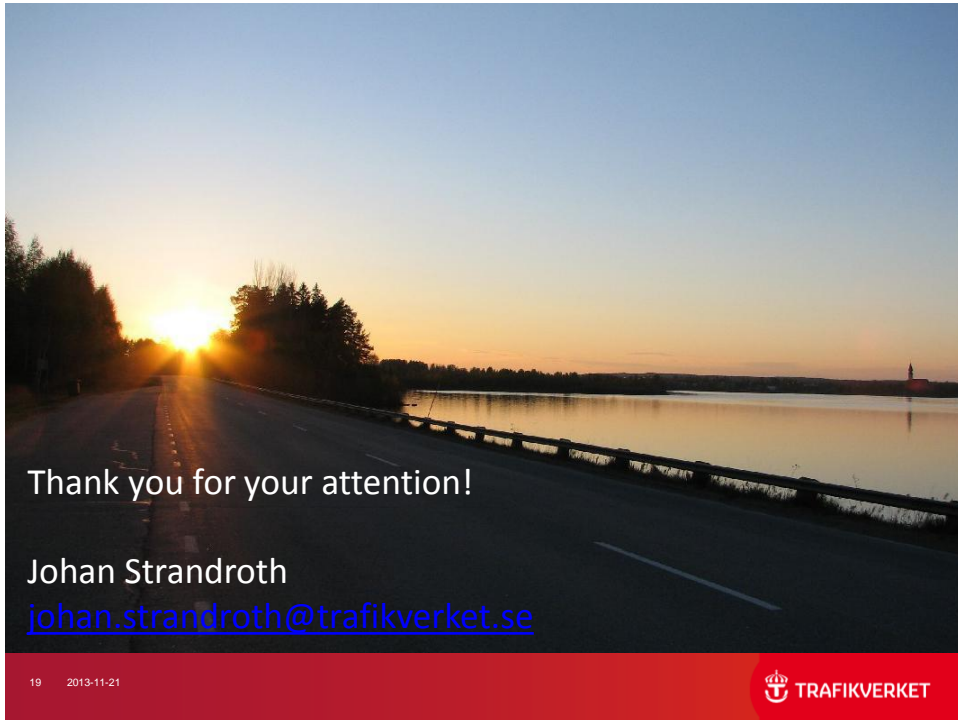


Conclusions/Limitation

- The crashes of tomorrow may not have the same characteristics as the crashes of today
- Prospective analysis is an important complement for retrospective data in predicting the future and identify safety GAPS
- Accurate assumption of future interventions is challenging
 - Stakeholders need to be involved
- Validation could be valuable (2000-2010)

Further reading





Thank you for your attention!

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