



## General Assembly Vienna

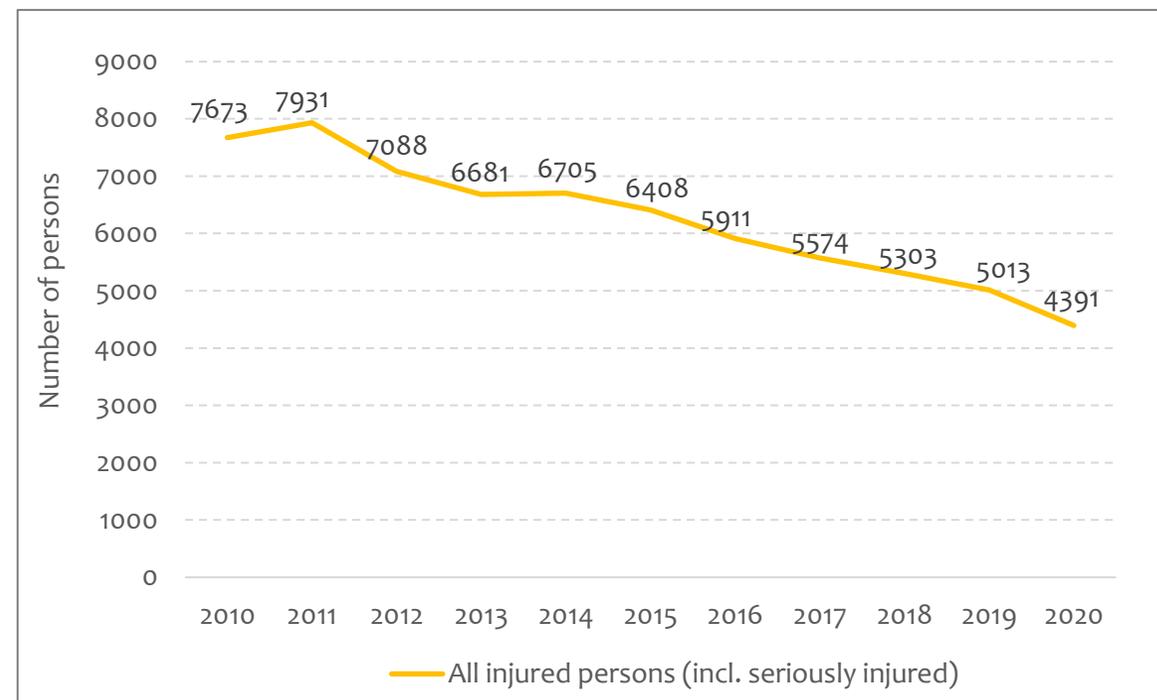
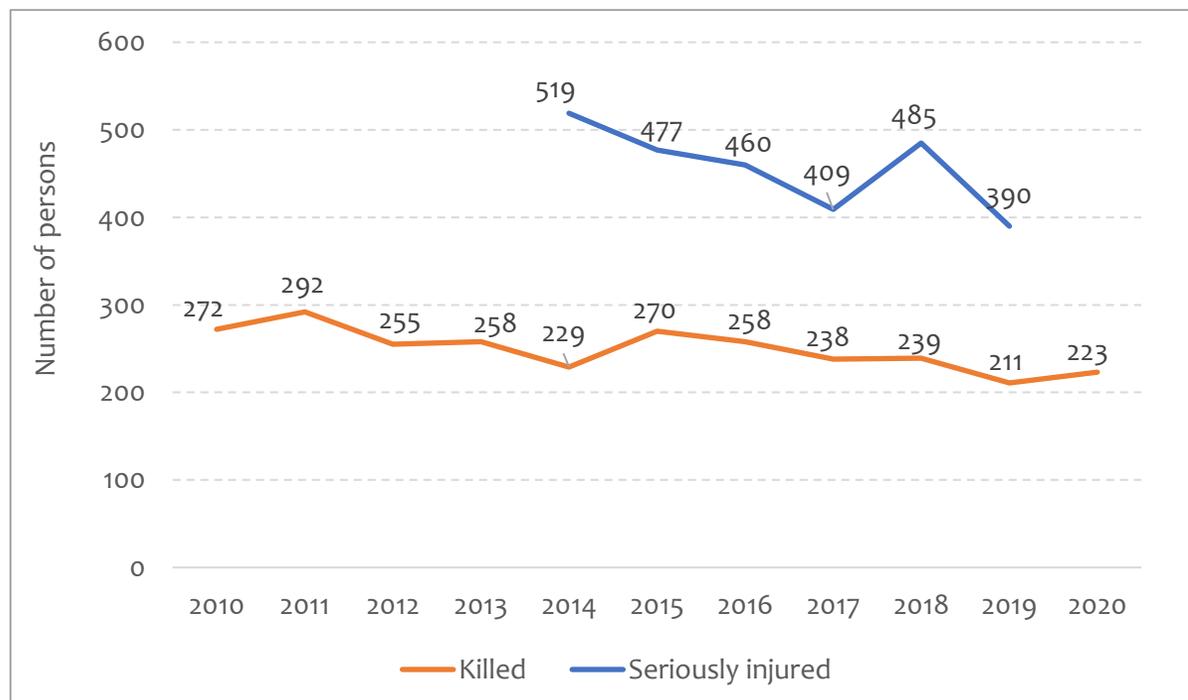
The 25<sup>th</sup> of November 2021

*Experiences on infrastructure KPI*

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*Finland*

# Road safety situation in Finland



- Sources: Statistics Finland (year 2020 data still preliminary)
- Police reported accidents
- Separation of serious injuries (MAIS<sub>3+</sub>) since 2014

# Road network characteristics in Finland

Road Class	Length, km	AADT, vehicles/day	Accident costs	
			c/vehicle km	1 000€/km, year
Class I main roads	9,000	6,000	1.6	36
Class II main roads	5,000	2,900	2.0	21
Regional roads	13,000	1,400	2.5	13
Connecting roads	51,000	300	3.0	4
All public roads*	78,000	1,300	2.1	10

\*Excluding 350,000 km of private roads and 26,000 km of streets

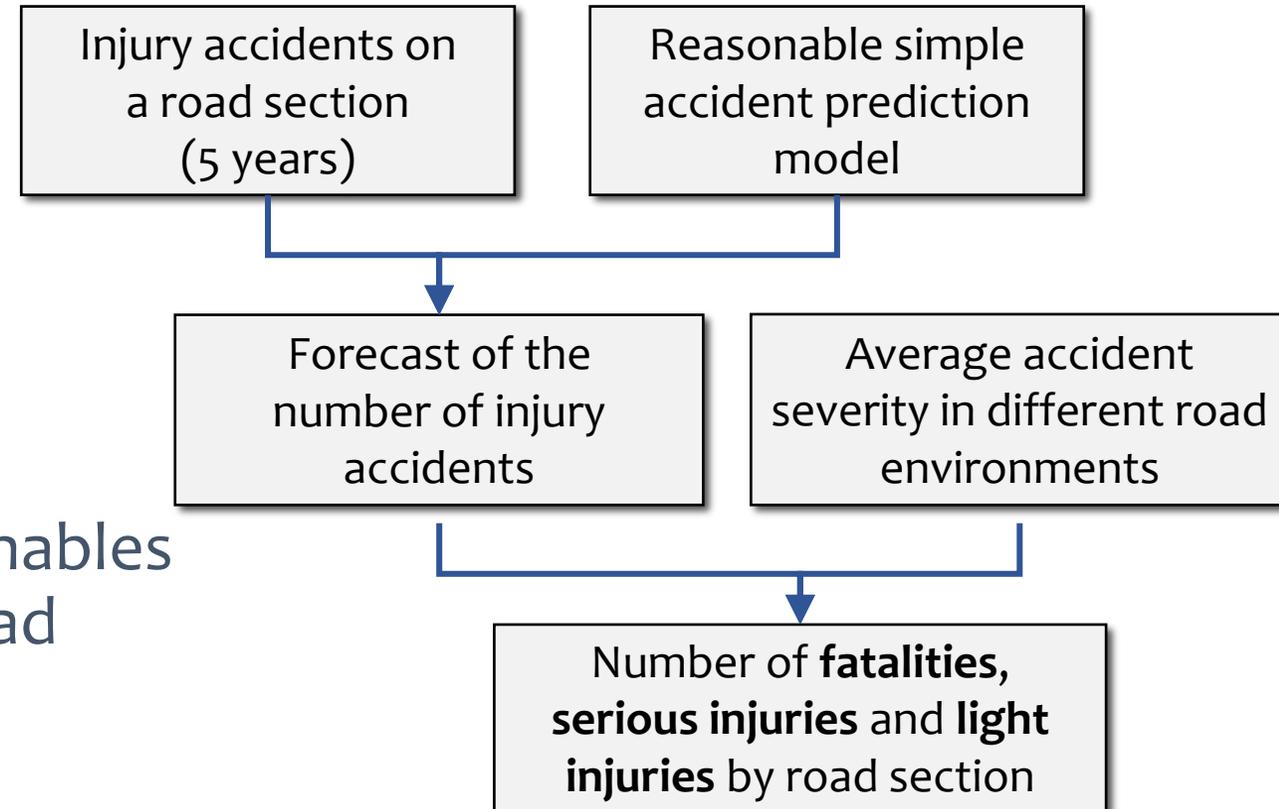
# Distribution of serious injuries\* by accident type

Road Class	Single	Head-on	Pedestrian or bicycle	Other
Class I main roads	23%	37%	10%	30%
Class II main roads	26%	31%	15%	28%
Regional roads	40%	20%	16%	23%
Connecting roads	58%	13%	15%	13%
All public roads	36%	27%	13%	24%

\*Killed or seriously injured (MAIS3+)

# Estimation of safety using Empirical Bayes method

- TARVA tool\* is used to estimate the safety of all public roads in Finland
- Reliable safety forecast is needed for estimating the safety effects of road improvements
- Precise injury figures by severity enables calculation of accident costs by road section (average length 5.5 km)
  - Minimise random variation



\*Details at AAP article: <https://doi.org/10.1016/j.aap.2013.04.008>

# Injuries and their costs on public roads\*

Consequence	Yearly number	Average cost, k€	Total, M€ /year	Share, %
Death	162	2,565	416	44%
Serious injury	258	1,269	327	34%
Light injury	2,691	77	206	22%

\*Average for years 2016–2020

Source for accident costs: Finnish Transport Infrastructure Agency (2020)

[https://julkaisut.vayla.fi/pdf12/vj\\_2020-48\\_tie-rautatielikenteen\\_hankearviointin\\_web.pdf](https://julkaisut.vayla.fi/pdf12/vj_2020-48_tie-rautatielikenteen_hankearviointin_web.pdf)

# KPI definition – KPIs 1 & 2

Roads with a safety rating above an agreed threshold\*

\*KPI 1: % of the distance driven

KPI 2: % of the road network length

- **Accident costs (€/vehicle km) under the threshold**
- Threshold definition: The proportion of road length in each road class falling under the **10/20/50th** percentiles of accident costs
- The idea is to keep the thresholds based on accident costs from 2016–2020 for future comparisons
- Review of accident costs is done separately for each road section (average length ~5.5 km)

# Roads with accident costs lower than 10% / 20% percentile (2021)

## KPI 1: Rated safe as a percentage of the distance driven

Criteria	Class I main roads	Class II main roads	Regional roads	Connecting roads	All public roads
10% percentile	32.6%	45.5%	39.0%	44.4%	37.4%
20% percentile	53.0%	54.2%	53.1%	59.8%	54.2%

## KPI 2: Rated safe as a percentage of the road length

Criteria	Class I main roads	Class II main roads	Regional roads	Connecting roads	All public roads
10% percentile	10.0%	10.0%	10.0%	10.0%	10.0%
20% percentile	20.0%	20.0%	20.0%	20.0%	20.0%

Safety rating = Accident costs (€/vehicle km)

# Safe Class I main roads in southern Finland – by accident cost (20%)

Map representations

Select:  Current s...  Effects  
 By road section

Data type:  Value:   Open popup windows

Acc.type:  Road category:  Min value=0.30, max value=1.78

Close of value window removes target road section highlight.

Length=670 km



Source:  
TARVA tool

# KPI definition – KPIs 3 & 4

Roads with opposite traffic separation or speed limit equal or lower than xx km/h\*

\*KPI 3: % of the distance driven over roads

KPI 4: % of the road network length of roads

- Threshold is defined so that the following roads are considered safe:
  - Maximum speed limits of **50/60/70** km/h on rural roads
  - Maximum speed limits of **30/40/50** km/h on urban roads

# Roads with opposite traffic separation or speed limit equal to or lower than 50/30 km/h (2021)

## KPI 3: Rated safe as a percentage of the distance driven

Criteria	Class I main roads	Class II main roads	Regional roads	Connecting roads	All public roads
Separated directions	45.6%	32.9%	11.5%	1.5%	30.7%
Rural 50, urban 30 km/h	0.2%	0.6%	3.6%	11.7%	2.7%
Total	45.8%	33.5%	15.1%	13.2%	33.4%

## KPI 4: Rated safe as a percentage of the road length

Criteria	Class I main roads	Class II main roads	Regional roads	Connecting roads	All public roads
Separated directions	14.9%	2.6%	0.5%	0.0%	1.9%
Rural 50, urban 30 km/h	0.2%	0.6%	2.3%	7.0%	5.0%
Total	15.1%	3.2%	2.9%	7.0%	6.9%

# Safe Class I main roads in southern Finland

– by separation or speed limit 50/30 km/h

## Map representations

Select:  Current s...  Effects

By road section

Data type:  Value:   Open popup windows

Acc.type:  Road category:  Min value=0.49, max value=2.54

Close of value window removes target road section highlight.

Length=599 km



Source:  
TARVA tool

# Lessons learned

- Results obtained with accident costs as a criterion do not differ very much to results obtained with separated driving directions and speed limit as criteria
- Share of safe vehicle kilometres is substantially larger than the share of safe road network length
- Data required for analyses is not available from streets and private roads

# Thank you!

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