The fourth Annual Scientific Seminar of the

Nordic Traffic Safety Academy

May 5th – 6th 2015

Theories and research methods in Road Traffic Safety Science

VTT - Technical Research Centre of Finland in Espoo, Finland

Road safety monitoring tools in Poland

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Poland

Plan of the presentation:

- Road safety situation in Poland
- Polish road safety management system and the National Road Safety Programme 2013-2020
- Monitoring tools at the central and regional level
- Science-based decision making – main challenges

Poland – some facts

- 38,5 mln inhabitants
- 24,8 mln vehicles
- 3202 - fatalities in 2014
- 1127 - pedestrians killed in 2014

Road safety management structures in Poland

» Central government level:

National Road Safety Council responsible for co-ordination and high level strategic decisions in road safety

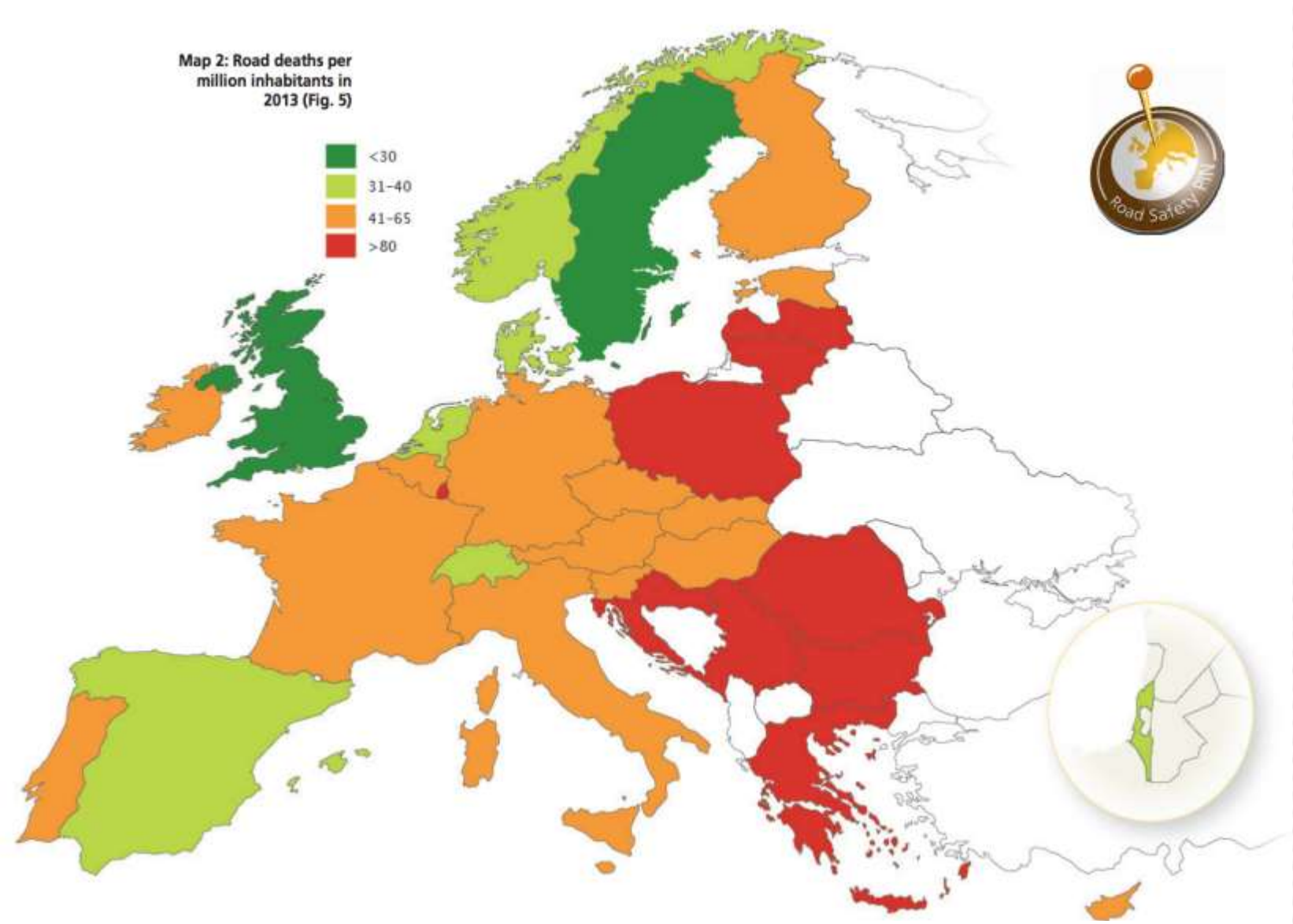
» Self-government level:

Regional Road Safety Councils in 16 Voivodships

No road safety structures in 374 Poviats

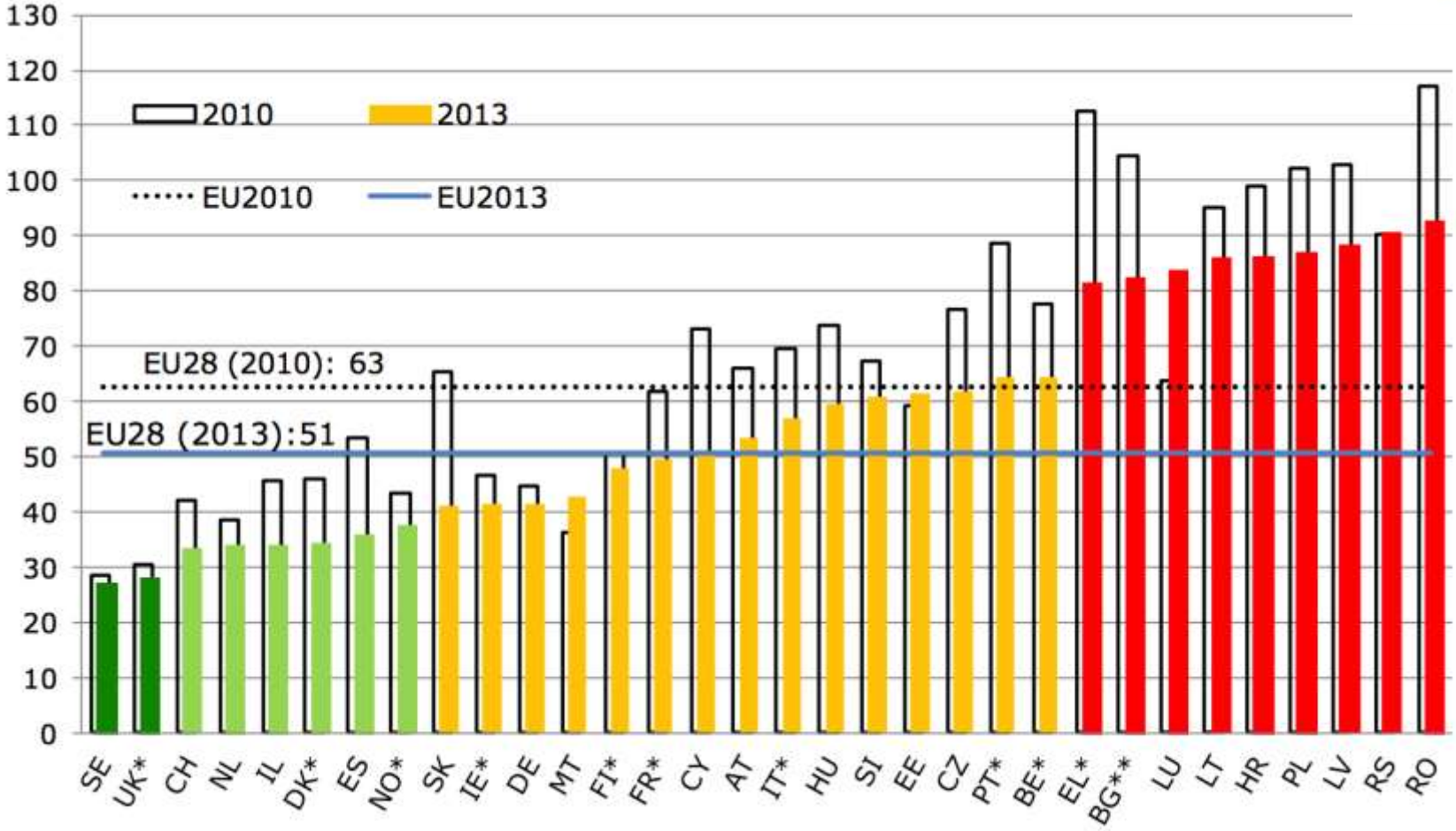
No road safety structures in 2479 Gminas

Fatalities per 1 million inhabitants in Europe in 2013



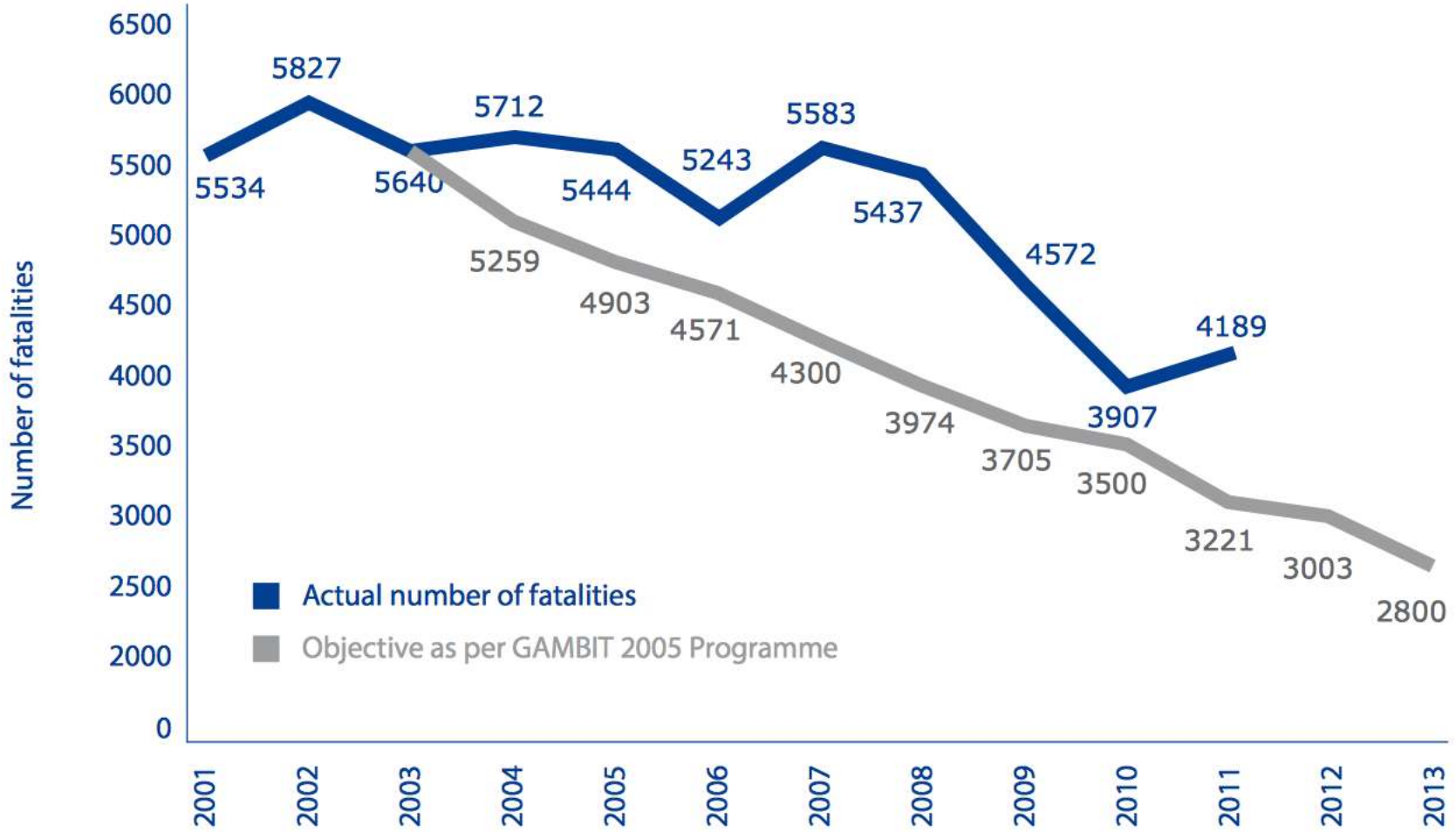
8th Annual Road Safety Performance Index (PIN) Report

Fatalities per 1 million inhabitants in Europe

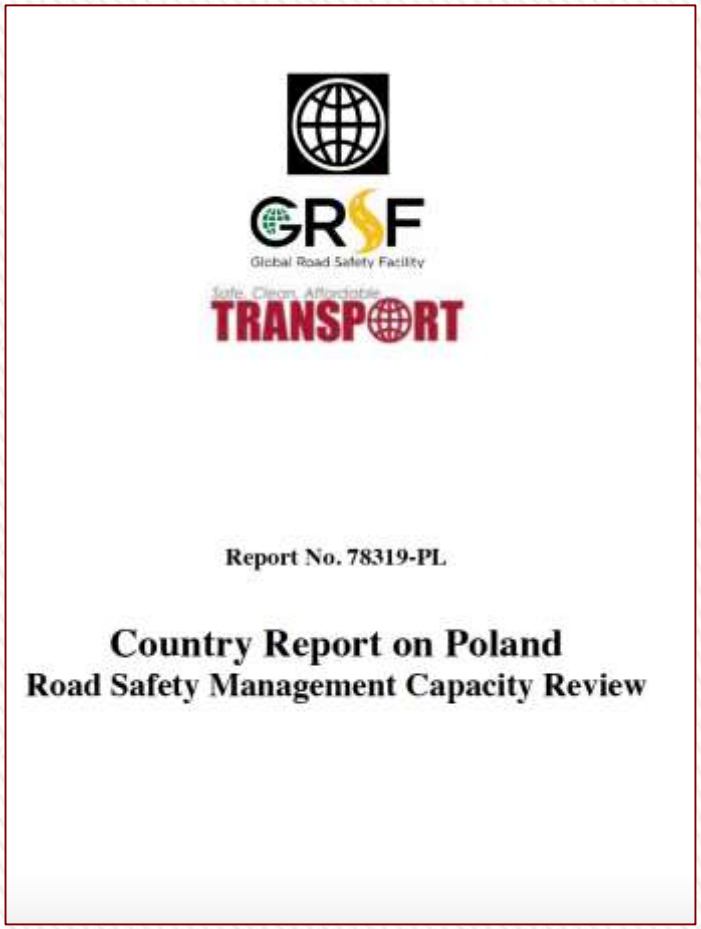


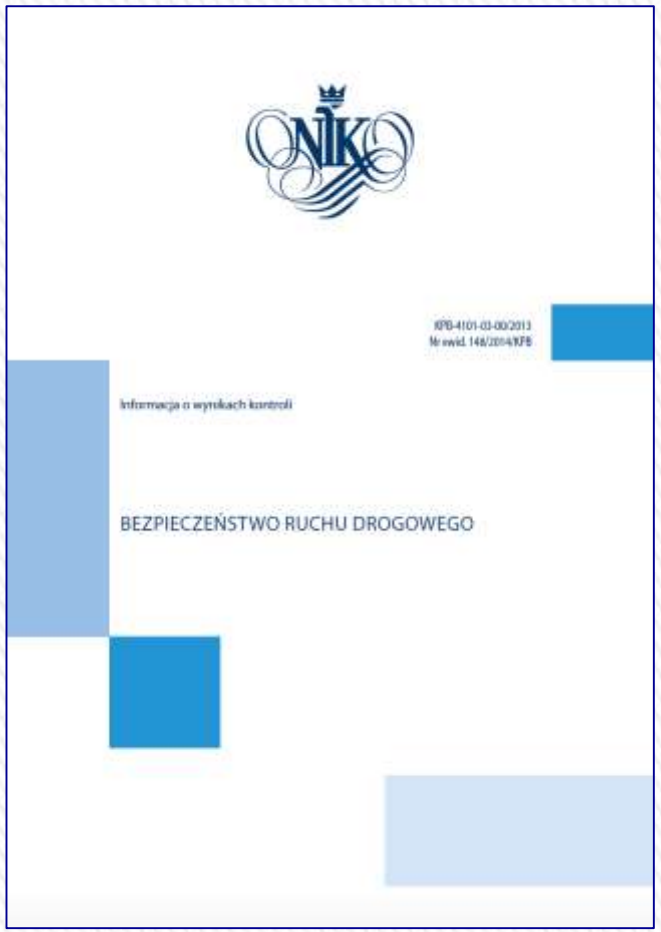
8th Annual Road Safety Performance Index (PIN) Report

Goals of the former National Road Safety Programme



Recent Reports on road safety management in Poland





Key findings on road safety management capacity Poland

- Access to road safety data below the national level is patchy
- No well-coordinated road safety data system in Poland
- There is lack of in-depth analysis that would lead to a better understanding for Poland's poor road safety record
- There is little systematic monitoring, evaluation and routine collection of before and after data
  (it means that the results of road safety activity are not known)

Two examples of road safety monitoring in Poland:

- At the central level:

National Road Safety Programme 2013-2020
Time-series analysis of the fatality trends

- At the self-government level:

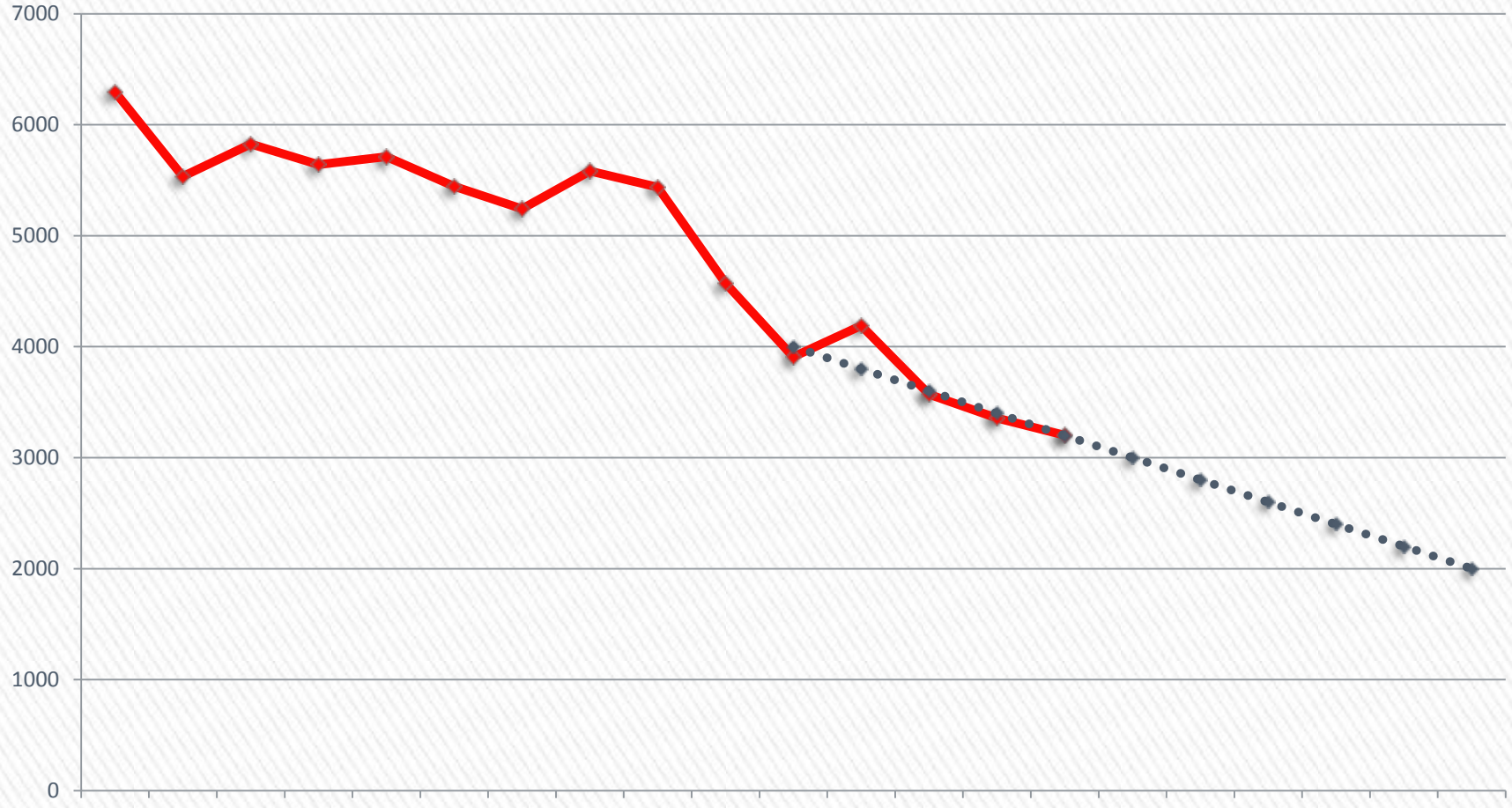
Warmia-Mazury Road Safety Observators SPIs

National
ROAD SAFETY
COUNCIL

NATIONAL ROAD
Safety Programme
2013–2020

Document adopted by the National Road Safety Council on 20.06.2013

Goal of the National Road Safety Programme 2013-2020



Monitoring indicators

Pillars of the Programme		Year 2010
Final indicators for the complete Programme		
All pillars	The number of victims (victims/year)	3,907
	The demographic victim indicator (victims/1 million inhabitants/year)	102.3
	The automotive victim indicator (victims/1 million vehicles/year)	169.6
	The victim concentration rate (victims/1 billion pass-km/year)	No data available
Final rates for individual pillars		
Safe Road User	The number of pedestrians as victims of road accidents (victims/year)	1,235
	The number of cyclists as victims of road accidents (victims/year)	280
	The number of motorcyclists and motor drivers as victims of road accidents (victims/year)	320
	The number of victims in the accidents caused by drunk drivers (victims/year)	352

Monitoring indicators

Pillars of the Programme	Year
Safe Roads	The number of victims in head-on collisions (victims/year)
	The number of victims in side and rear-end collisions (victims/year)
	The number of victims in accidents resulting with the vehicle falling out the road (victims/year)
	The number of victims on sections of transit roads in built-up areas (victims/year)
	The number of victims on the intersections and junctions (victims/year)
	The number of victims on the horizontal curves (victims/year)
	Number of victims at night time (victims/year)
Safe Speed	Number of victims of road accidents caused by excessive speed (victims/year)
Safe Vehicle	Number of victims of road accidents with defective vehicles (victims/year)
Rescue system and post-crash response	Number of victims who died within 30 days after the accident (victims/year)
	Number of victims with permanent disability (victims/year)

Indirect rates relating to individual pillars	
Safe Traffic User	Share of people with fastened seatbelts in the vehicle (%)
	Share of children transported and properly protected in the vehicle
	Share of motorcyclists, motorbikers and cyclists using helmets (%)
	Share of drunk drivers or drivers under influence of other substances detected in control (%)

Monitoring indicators

Indirect rates relating to individual pillars	
Safe Road	Share of the calmed traffic roads in road network in built-up areas [%]
	Share of roads equipped with the infrastructure for pedestrians and cyclists in country and voivodeship road network [%]
Safe Speed	Average speed of vehicles on motorways and expressways (kilometres per hour)
	Average speed of vehicles on country roads (kilometres per hour)
	Average speed of vehicles on city roads
	Share of drivers exceeding speed on motorways and expressways (%)
	Share of drivers exceeding speed on country roads (%)
	Share of drivers exceeding speed on city roads (%)
	Share of drivers exceeding speed, detected in control (%)
Safe Vehicle	Average vehicle age (years)
	Share of vehicles with defects (%)
Rescue and post-crash response	The average arrival time of rescue services on site of accident (minutes)

Structural time-series analysis

Methodology

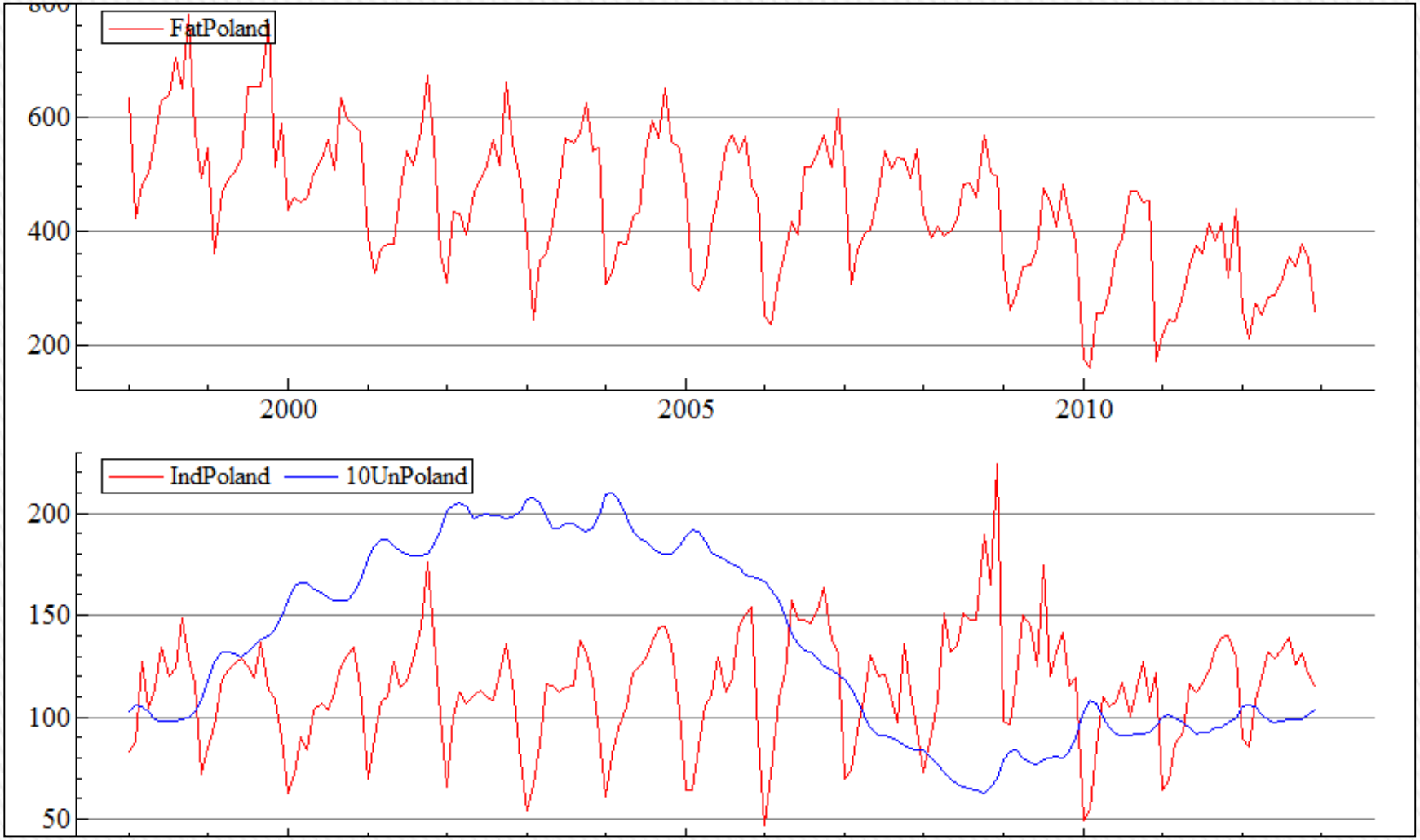
$$LogF_t = \mu_t + \gamma_t + \beta\, x_t + \sum_{k=1}^{K} \lambda_k w_{kt} + \varepsilon_t \qquad \varepsilon_t = N(0, \sigma_\varepsilon^2)$$

$$\mu_t = \mu_{t-1} + \sum_{l=1}^{L} \lambda_l w_{lt} + \eta_t \qquad \eta_t = N(0, \sigma_\eta^2)$$

$$b_t = b_{t-1} + \zeta_t \qquad \zeta_t = N(0, \sigma_\zeta^2)$$

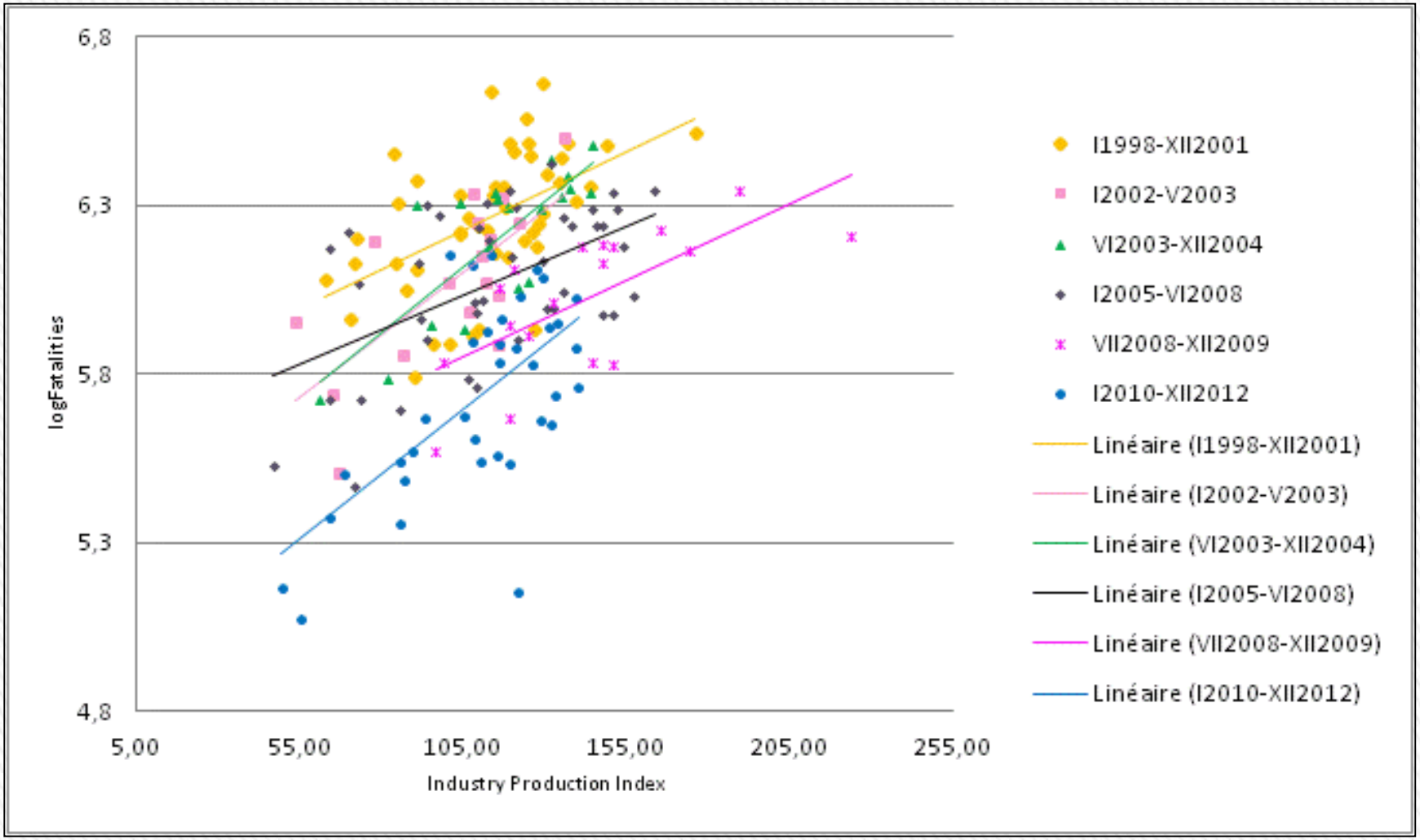
$$\gamma_t = -\sum_{j=1}^{s-1} \gamma_{t-j} + \omega_t \qquad \omega_t = N(0, \sigma_\omega^2)$$

STRUCTURAL TIME SERIES MODELLING IN RELATION TO ECONOMIC FACTORS

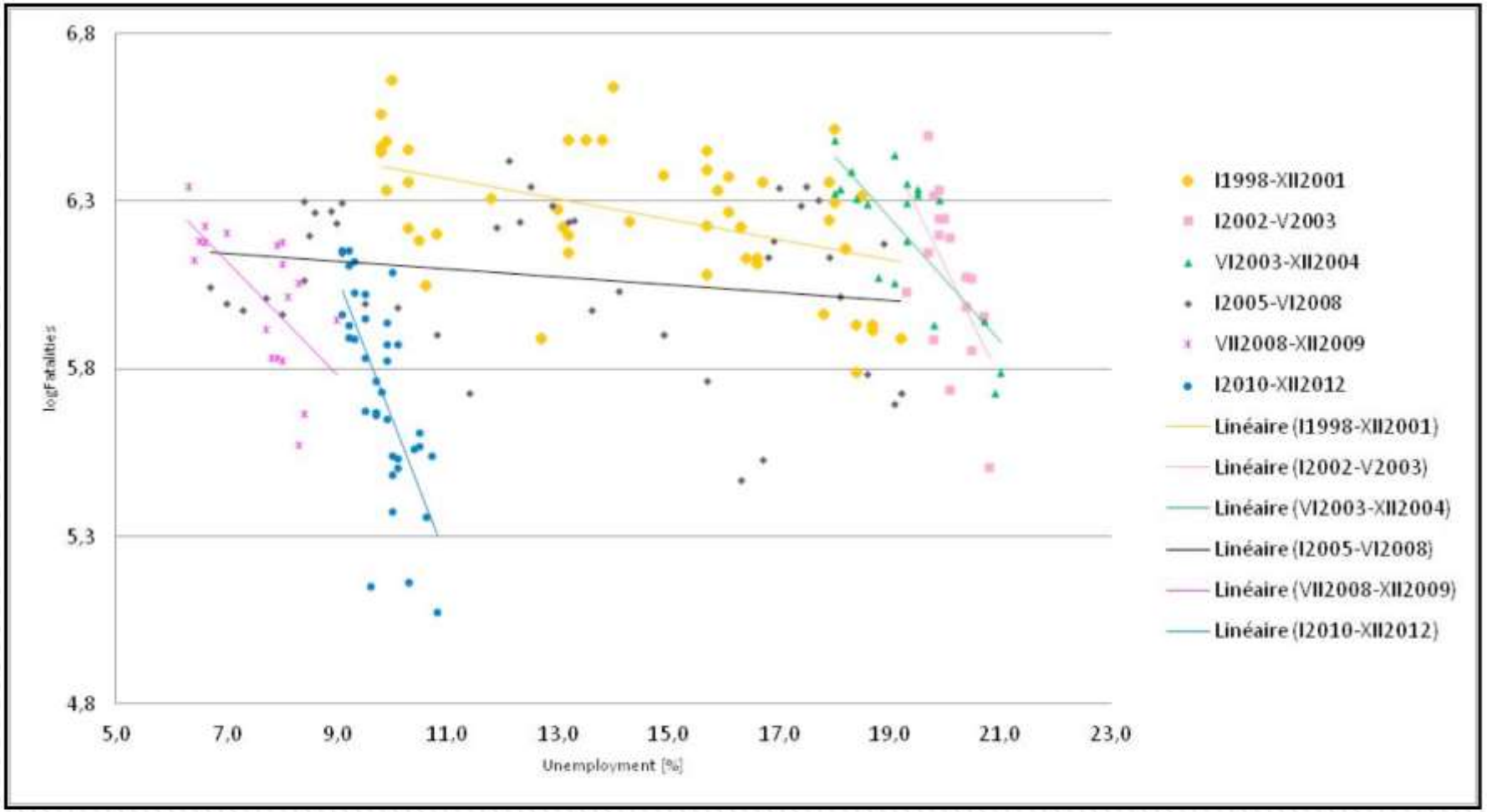


Bergel-Hayat, Ruth, UPE IFSTTAR GRETTIA, Marne la Vallée, France
Zukowska, Joanna, Gdansk University of Technology, Gdansk, Poland

Fatalities vs. industry production in Poland (cross-analysis)



Fatalities vs. unemployment rate in Poland (cross-analysis)



Results and performance criteria of the models fitted

Parameters	Model 1	Model 2	Model 3	Model 4
UR	**-0.02702**	-	-	-
t-value	*-2.46904 [0.01460]*	-	-	-
logUR		**-0.28340**	-	-
t-value		*-2.20839 [0.02864]*	-	-
IPI			**0.00193**	-
t-value			*3.57327 [0.00047]*	-
logIPI	-	-	-	**0.29147**
t-value	-			*4.58520 [0.00001]*
pulse_12.2001	**-0.30653**	**-0.31299**	**-0.28412**	**-0.28886**
t-value	*-2.84173 [0.00507]*	*-2.89371 [0.00434]*	*-2.69786 [0.00773]*	*-2.81225 [0.00554]*
shift_2.2002	**0.26978**	**0.25566**	**0.26283**	**0.25106**
t-value	*3.38701 [0.00089]*	*3.22675 [0.00152]*	*3.26131 [0.00136]*	*3.17852 [0.00178]*
pulse_1.2006	**-0.34209**	**-0.34338**	**-0.28092**	**-0.20650**
t-value	*-3.29645 [0.00121]*	*-3.29610 [0.00121]*	*-2.74793 [0.00669]*	*-2.00997 [0.04612]*
pulse_1.2010	**-0.43472**	**-0.42786**	**-0.41196**	**-0.35786**
t-value	*-4.15322 [0.00005]*	*-4.06078 [0.00008]*	*-4.04241 [0.00008]*	*-3.54465 [0.00052]*
shift_6.2010	**0.18159**	**0.17617**	**0.18809**	**0.18439**
t-value	*2.37136 [0.01891]*	*2.29839 [0.02283]*	2.41128 [0.01703]	2.41331 [0.01694]
pulse_12.2010	**-0.81530**	**-0.81494**	**-0.86049**	**-0.88776**
t-value	*-7.83931 [0.00000]*	-7.80664 [0.00000]	-8.43953 [0.00000]	-8.86506 [0.00000]
AIC	-4.3087	-4.3061	-4.3565	-4.4012
BIC	-3.9362	-3.9336	-3.9839	-4.0287

Conclusions for Poland

Models 1-2
- 1 point of increase in the unemployment rate in the month is associated with a decrease of 2,7% in the number of fatalities in the month
- 1% of increase of the unemployment rate in the month is associated with a decrease of 0,3 % of the number of fatalities in the month.

Models 3-4
- 1 point of increase in the IPI in the month is associated with an increase of 0,2% in the number of fatalities in the month
- 1% of increase of the IPI in the month is associated with an increase of 0,3% of the number of fatalities in the month

Warmia-Mazury Road Safety Observatory

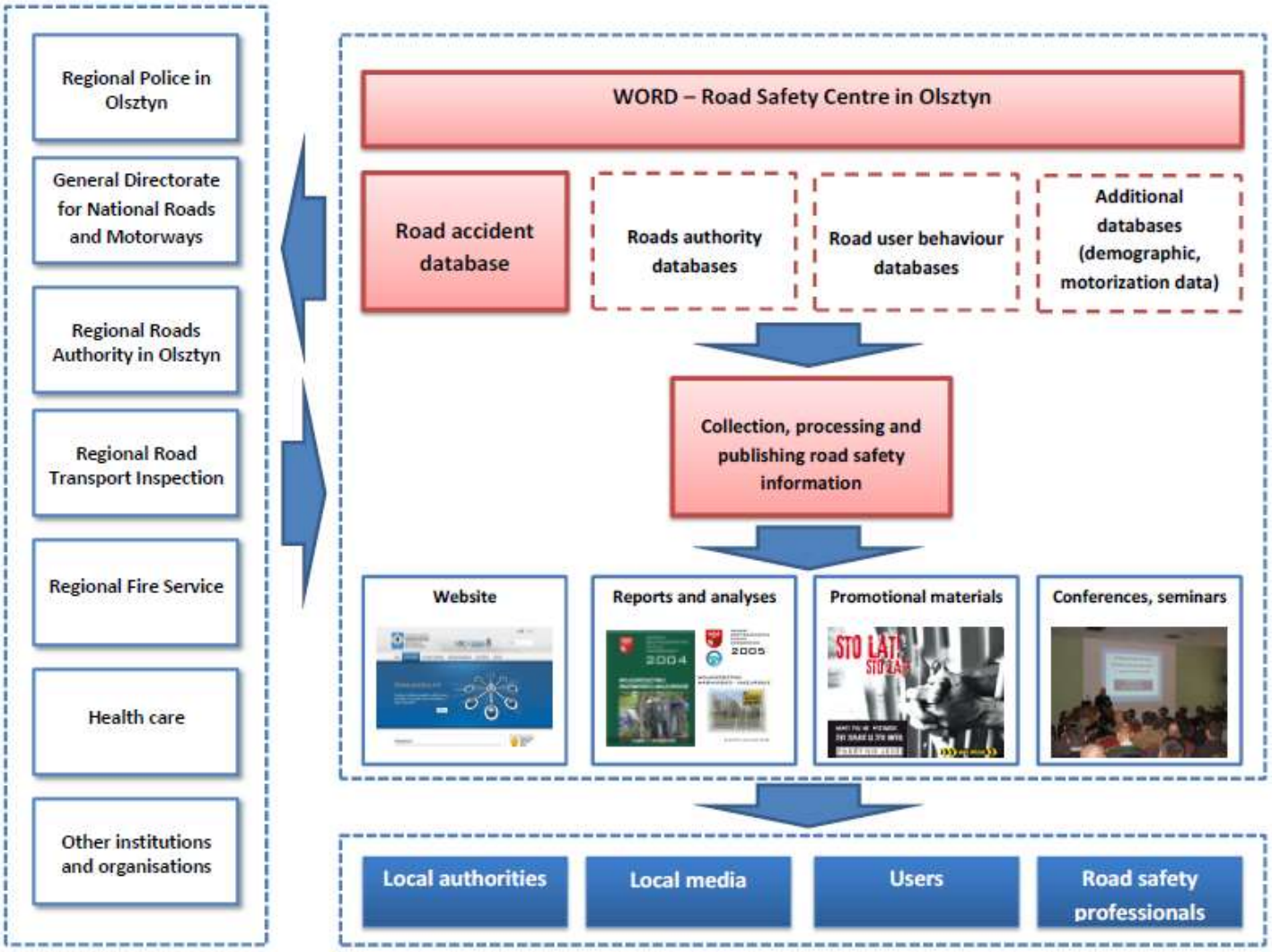
www.obserwatorium.word.olsztyn.pl




Warmia-Mazury

- 24 173 km²
- Population 1.4 million
- The capital of region – Olsztyn
- 21 districts (poviats)
- 12.354 km of roads
- 715.000 motor vehicles (530.000 pass. cars)

Warmia-Mazury Regional Road Safety Observatory



Road Safety Ranking

- To monitor safety performance at poviat level
- To indicate the best and worst performing poviats
- Methodology based on the idea of Safety Performance Indicator (SPI) composed of 4 ratios:
  - no. of killed per 100.000 population
  - no. of accidents per 100.000 population
  - no. of killed per 100 accidents
  - no. of accidents per 100 km
- The final SPI corresponds with „stars classification”

***** POWIAT PISKI

WSKAŹNIKI ZAGROŻENIA		min.	POZYCJA NA TLE REGIONU	max.
Wskaźnik demograficzny I wypadki / 100 tys. mieszkańców	61,7	57,2		177,1
Wskaźnik demograficzny II zabici / 100 tys. mieszkańców	3,4	2,4		32,1
Ciężkość wypadków zabici / 100 wypadków	5,6	2,5		34,4
Gęstość wypadków wypadki / 100 km	5,6	5,6		78,6

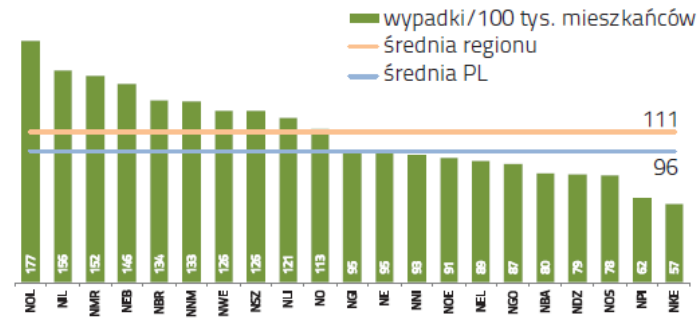
kolor niebieski – wartość niższa, kolor czerwony – wartość wyższa od przeciętnej dla regionu

** POWIAT OLSZTYŃSKI

WSKAŹNIKI ZAGROŻENIA		min.	POZYCJA NA TLE REGIONU	max.
Wskaźnik demograficzny I wypadki / 100 tys. mieszkańców	177,1	57,2		177,1
Wskaźnik demograficzny II zabici / 100 tys. mieszkańców	22,3	2,4		32,1
Ciężkość wypadków zabici / 100 wypadków	12,6	2,5		34,4
Gęstość wypadków wypadki / 100 km	16,8	5,6		78,6

kolor niebieski – wartość niższa, kolor czerwony – wartość wyższa od przeciętnej dla regionu

Road Safety Ranking



** POWIAT OLSZTYŃSKI

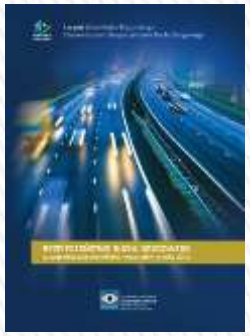
SKUTKI ZDARZEŃ DROGOWYCH		
wypadki	214	↗
zabici	27	↘
ranni	285	↗
kolizje	1 556	↘
koszt zdarzeń (mln zł)	174,6	↘

W porównaniu z rokiem ubiegłym: ↗ - wzrost ↘ - spadek → - bez zmian.

***** POWIAT PISKI

SKUTKI ZDARZEŃ DROGOWYCH		
wypadki	36	→
zabici	2	↘
ranni	46	↘
kolizje	494	↘
koszt zdarzeń (mln zł)	35,2	↘

W porównaniu z rokiem ubiegłym: ↗ - wzrost ↘ - spadek → - bez zmian.



** POWIAT OLSZTYŃSKI

OCENA POZIOMU BEZPIECZEŃSTWA
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2,25

***** POWIAT PISKI

OCENA POZIOMU BEZPIECZEŃSTWA
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5,00

***** POWIAT BARTOSZYCKI

Liczba mieszkańców	61 038
Powierzchnia	1 307,49 km²
Długość dróg	655,4 km
Gęstość sieci drogowej	50,1 km/100 km²

** POWIAT OLSZTYŃSKI

Liczba mieszkańców	120 854
Powierzchnia	2 838,02 km²
Długość dróg	1 274,5 km
Gęstość sieci drogowej	44,9 km/100 km²

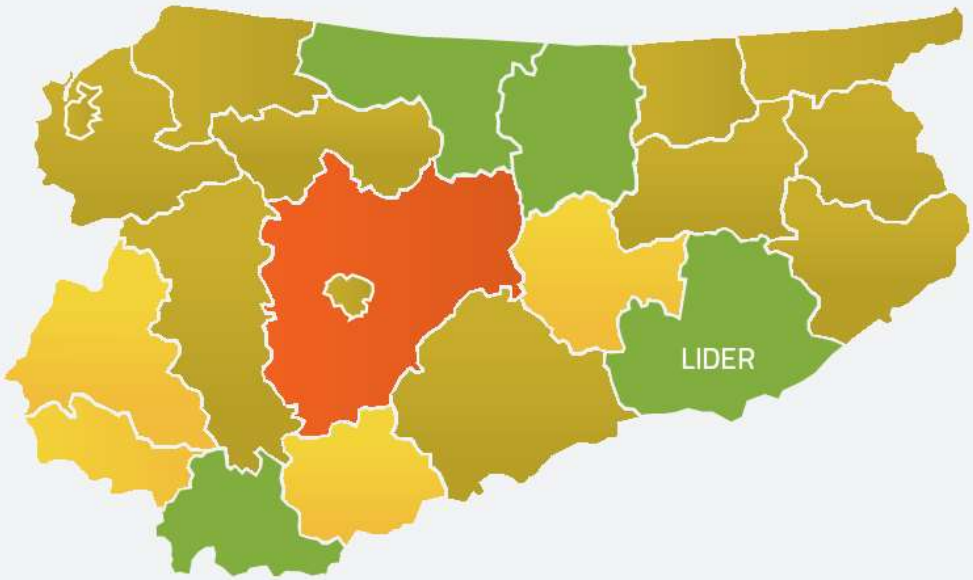
*** POWIAT IŁAWSKI

Liczba mieszkańców	93 047
Powierzchnia	1 385,22 km²
Długość dróg	859,9 km
Gęstość sieci drogowej	62,1 km/100 km²

**** POWIAT GIŻYCKI

Liczba mieszkańców	57 759
Powierzchnia	1 119,51 km²
Długość dróg	514,1 km
Gęstość sieci drogowej	45,9 km/100 km²

Poziom bezpieczeństwa w poszczególnych powiatach w roku 2012



Ocena poziomu bezpieczeństwa

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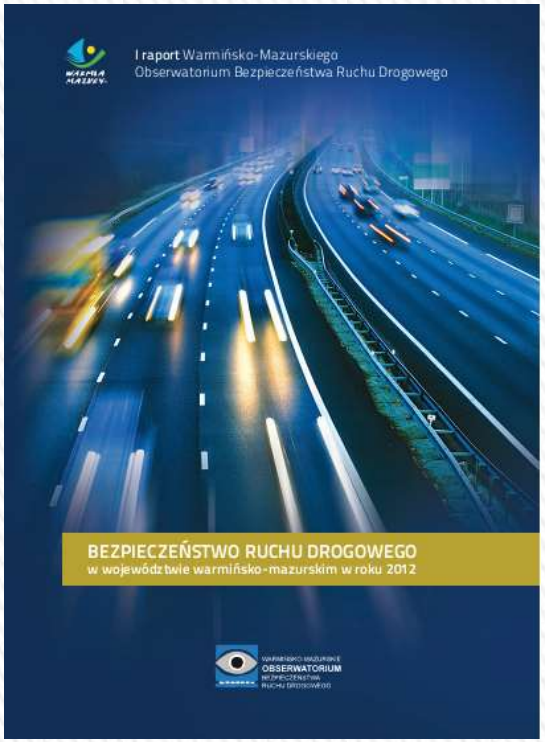
WARMIŃSKO-MAZURSKIE
OBSERWATORIUM
BEZPIECZEŃSTWA
RUCHU DROGOWEGO

www.obserwatorium.word.olsztyn.pl



Challenges:

- Development of evidence-based road safety decision-making in Poland
- Provide veryfied and reliable data and knowledge (specially at the regional level)
- Provide easy-to-use monitoring tools
- Predict the national trends in a short-term perspective

Thank You for Your attention!

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