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Comparative assessment of road safety performance in Greece

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Introduction – Research Objective

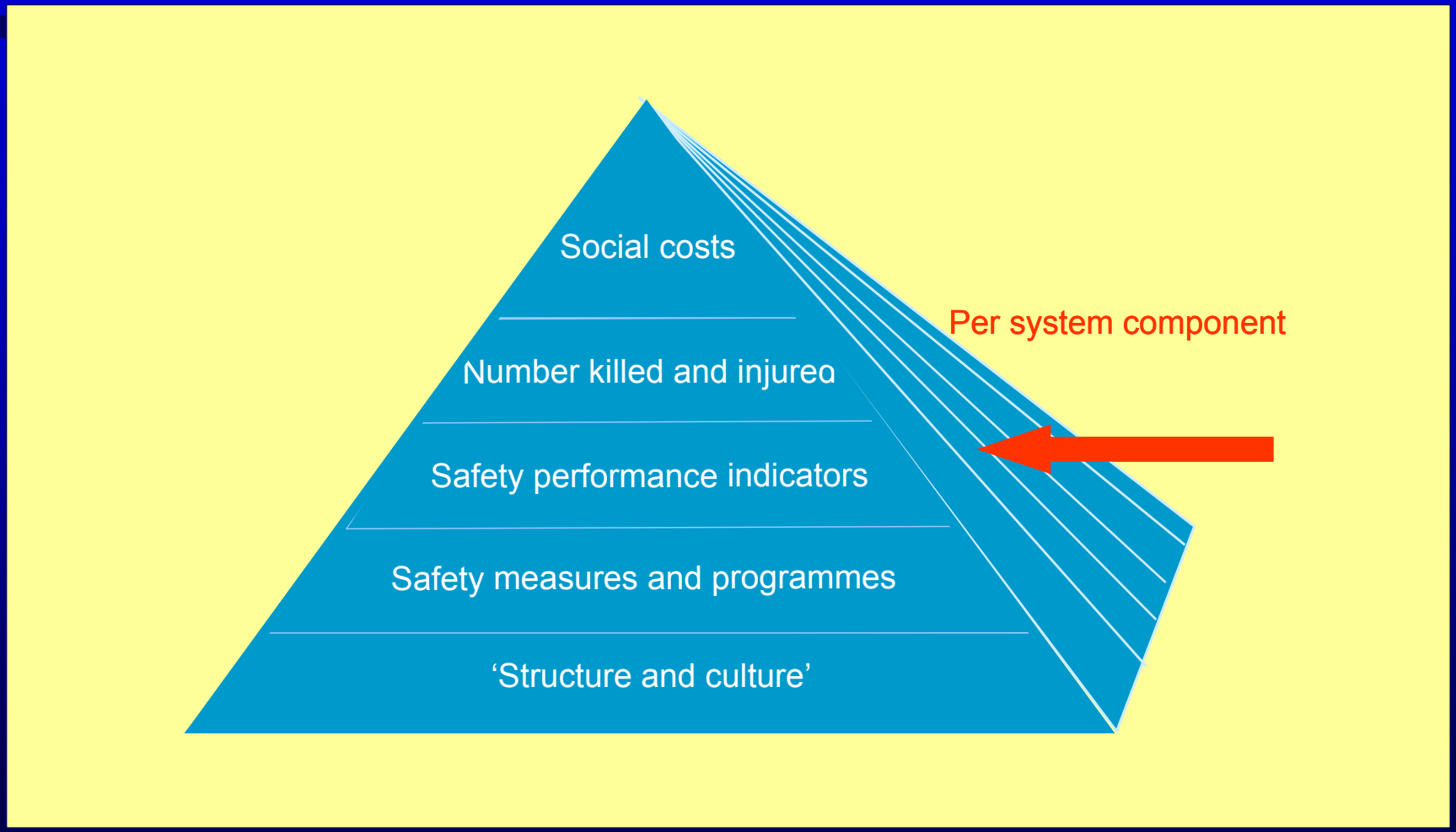
Original SUNflower program

- European Union (EU) funding (DG TREN)
- Participants: the SUN countries (Sweden /United Kingdom /Netherlands)
- Motivation: 40,000 EU-15 citizens killed annually in road traffic accidents
- Selection criterion: the high level of road safety –as a starting point
- Question: what allowed for spectacular improvement in these countries

Objective – Structure of the SUNflower+6 program

- New members: Greece – Portugal – Spain / Catalonia (southern countries), Czech Republic – Hungary – Slovenia (central countries)
- Inclusion in the EU action plan (“White Paper”) aiming at:
  - 50% reduction of fatalities due to road accidents between 2001-2010
- Analyses target: proper indicators definition – examination of data resources reliability – identification of strengths / weaknesses

Methodological framework: safety target pyramid (a)



Methodological framework: safety target pyramid (b)

- *Target pyramid* – inspired by the Road Safety Strategic Plan of New Zealand up to year 2010
- *Basic idea:* development of a framework to depict each region's performance through a total score of indicators (from the pyramid)
- *Presupposition:* understand undergoing processes among different levels for the hierarchy of road accidents causes and consequences
- The pyramid may be viewed as *three-dimensional*
  - The first dimension (vertical) regards the formation of *levels* that facilitate the diagnosis of the prevailing problems in a certain territory (e.g. country)
  - The second dimension concerns the allocation of these problems to the main *components of the road transport system* (road – vehicle – user)
  - The third dimension concerns the investigation of these *over time*

Methodological framework: footprint scheme

- *The "footprint" scheme* concerns the formation of a:
  - (initially) practical, well grounded tool for the conduction of road safety level comparisons between different regions
  - (eventually) means of transfer of basic findings from a certain region to others, through appropriate adaptation (knowledge transfer)
- *Prerequisites for Successful comparisons* between territories:
  - Adequate knowledge of each road system's basic aspects
  - Incorporation of the fewest possible indicators in a suitable form
- *The "footprint"* may be viewed as a depiction of:
  - The situation in terms of social cost (casualties and monetary cost)
  - The elements that allow for the formation of cause-effect relations
- *Final target*: prediction of measures' major effects beforehand

Present road safety status in Greece (1)

✓ *Trends over the past 7-8 years*

- Notable improvement between 1998-2003
- Interruption of this trend in 2004-2005

	1998	1999	2000	2001	2002	2003	2004	2005
Injury road accidents	24.819	24.231	23.001	19.671	16.809	15.751	15.509	16.937
Persons killed	2.182	2.116	2.037	1.880	1.634	1.605	1.670	1.658
Vehicles (x1000)	4.323	4.690	5.061	5.390	5.693	5.968	*6.257*	*6.579*
Speed infringements	92.122	97.947	175.075	316.451	418.421	447.249	382.970	374.712
Drinking & drivin infringements	13.996	17.665	30.507	49.464	48.947	45.546	40.986	46.938
Drink & drive checks	202.161	246.611	365.388	710.998	1.034.502	1.271.217	1.281.102	1.376.307

- Improvement attributed (at least partly) to intensified enforcement
- Especially in alcohol tests, the EU recommendation is almost reached

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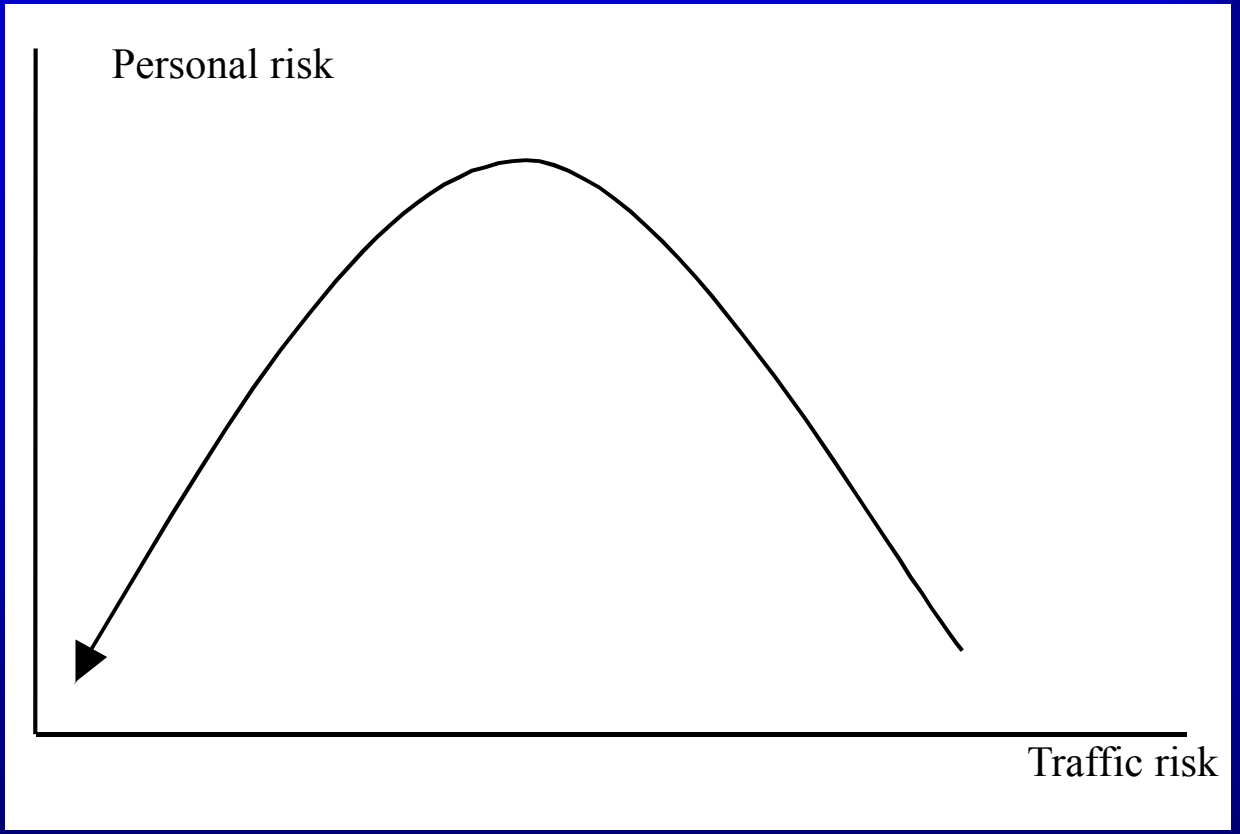
Present road safety status in Greece (2)

✓ *Main barriers that hinder the improvement of road safety*

- The fragmentary implementation of road safety measures and lack of coordination between the competent Authorities
- The lack of systematic enforcement of all relevant infringements
- Road network insufficiencies and inadequate maintenance inside and outside urban areas
- The lack of an efficient system for road safety training, as well as of a reliable vehicle technical inspection system
- An insufficient system for road casualty care
- The lack of systematic monitoring of the road safety level and of the appropriate assessment of measures efficiency

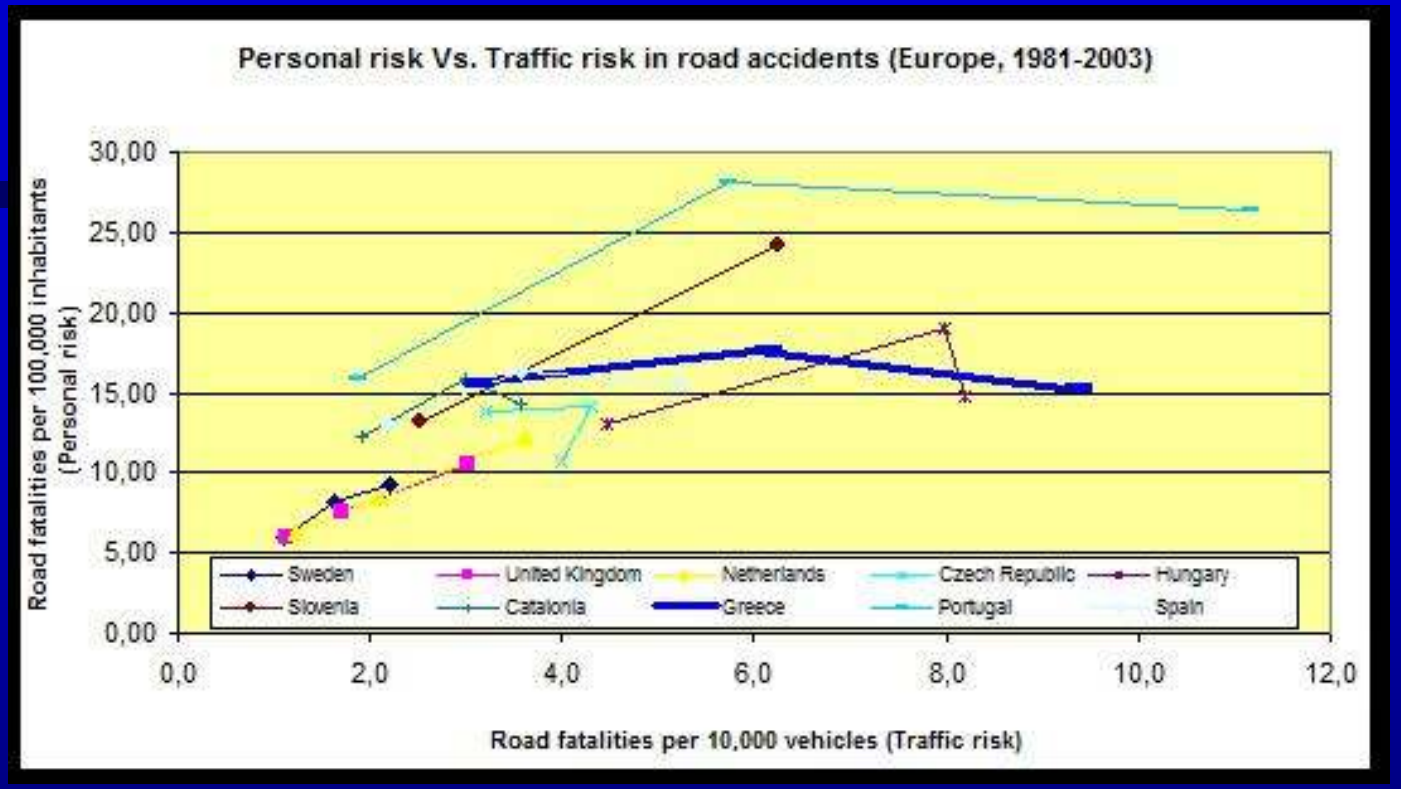
Personal Risk vs. Traffic Risk: shape – definition

- *Personal risk* (mortality rate): fatalities / inhabitant
- *Traffic risk* (fatality rate): fatalities / registered vehicle
- *Fatality risk* (acc. to exposure): fatalities / vehicle-km
- The direction (arrow) of the diagram suggests increase of motorization rate
- This indicator is largely determined by car ownership



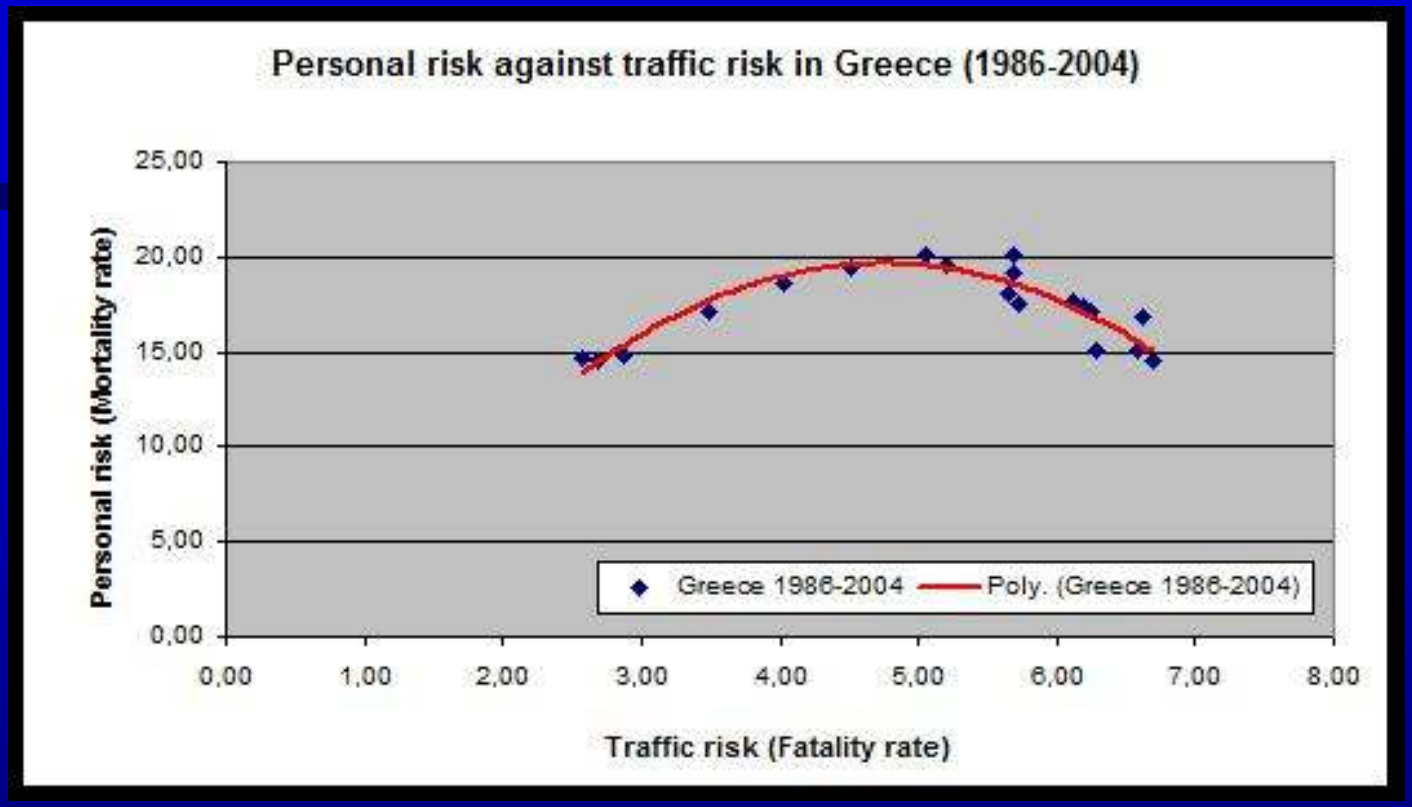
- Territories with low motorization rate (developing countries, often) exhibit large traffic risk opposed to low personal risk
- As the size of vehicle fleet increases traffic risk goes down, while personal risk increases to go down again after a certain turning point is reached

Personal Risk vs. Traffic Risk: interpretation – use



- Much more complete interpretation for countries standing close in the diagram
- SUN countries along the left (declining) branch of their diagrams for 20 years
- Southern countries probably passed their turning point during 1990s
- More detailed comparisons may be feasible by shifting (superposing) curves

Personal Risk vs. Traffic Risk: the case of Greece



- A 2nd order polynomial model appears statistically significant (R^2 = 0.84 & 0.95)
- Decline in fatalities increase since 1994-95 at 330veh and 200 cars/1000 people (485 vehicles make a realistic assumption if mopeds are included)
- Turning point for mortality rate 1998-99 at 415veh and 260 cars/1000 people (385 vehicles make a realistic assumption if mopeds are included)

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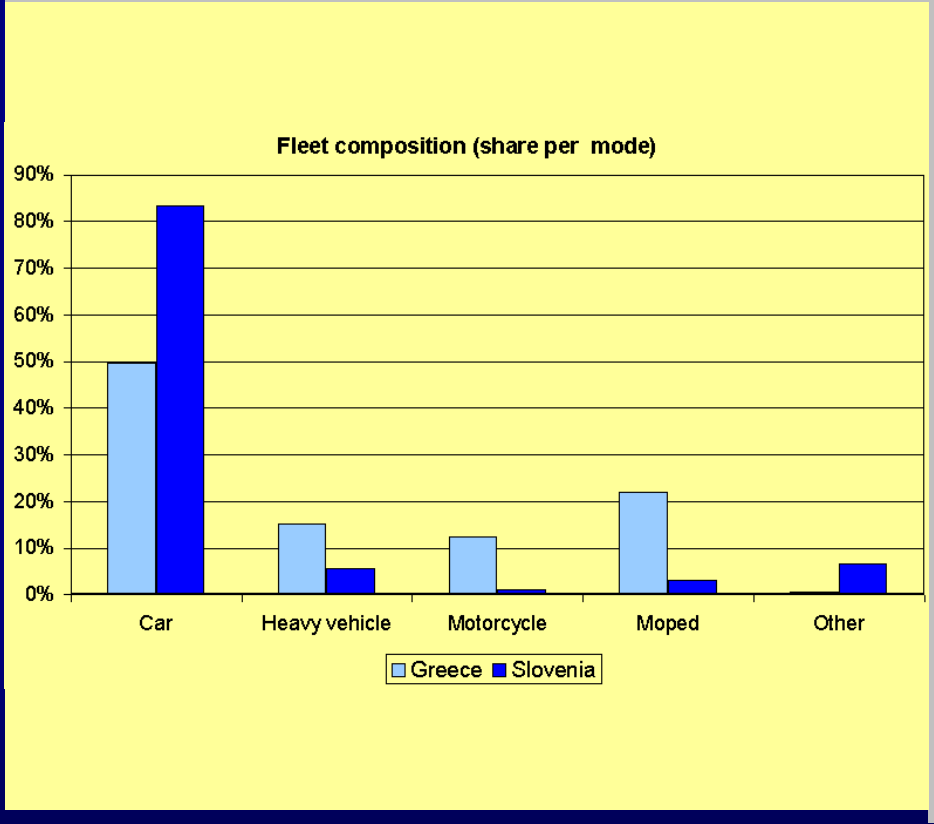
Case study: Greece – Slovenia (1)

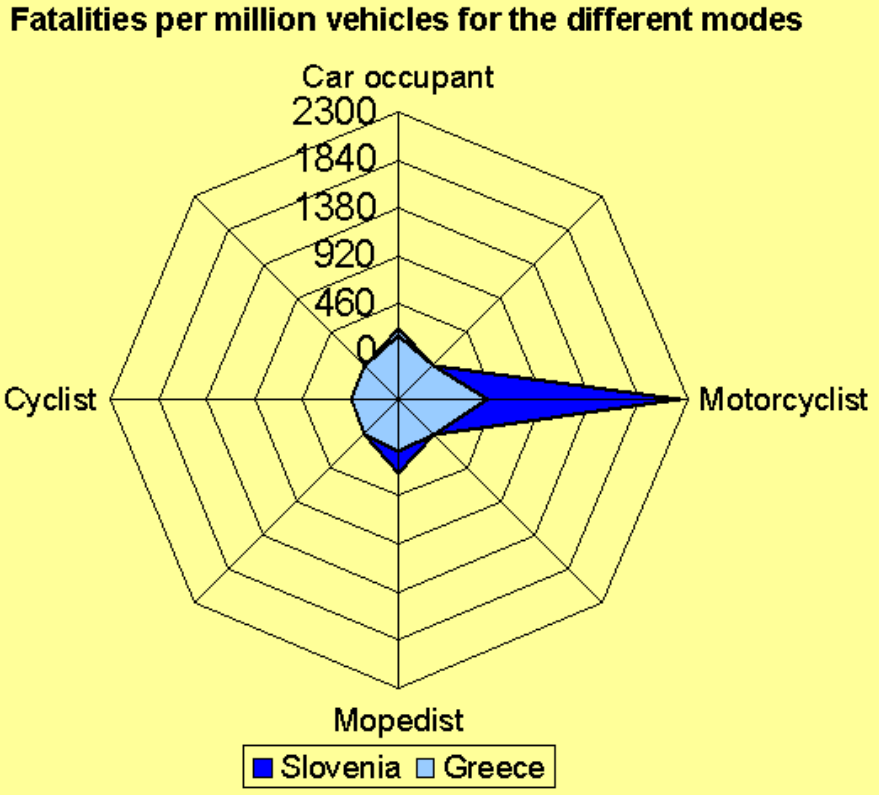
- Certain differences are recorded in the structure of road networks
  - Passenger cars are prevailing in Slovenia, while PTW are proportionately much fewer than in Greece
  - Seat belt and helmet use from drivers seems to be twice more frequent in Slovenia (90% and 75% compared to 45% and 40% respectively)
  - Motorways correspond to 3% of total road network length in Slovenia and just 1% in Greece (tending to increase significantly, though)
- Still, several interesting common features are identified as well
  - Extremely comparable mortality rates in each age group
  - Fatality rate values are similar in passenger cars, but rather different in PTW (much higher in Slovenia)
  - Motorways exhibit fatality shares exceeding 4fold their shares on total network length as road types in both countries

Case study: Greece – Slovenia (2)

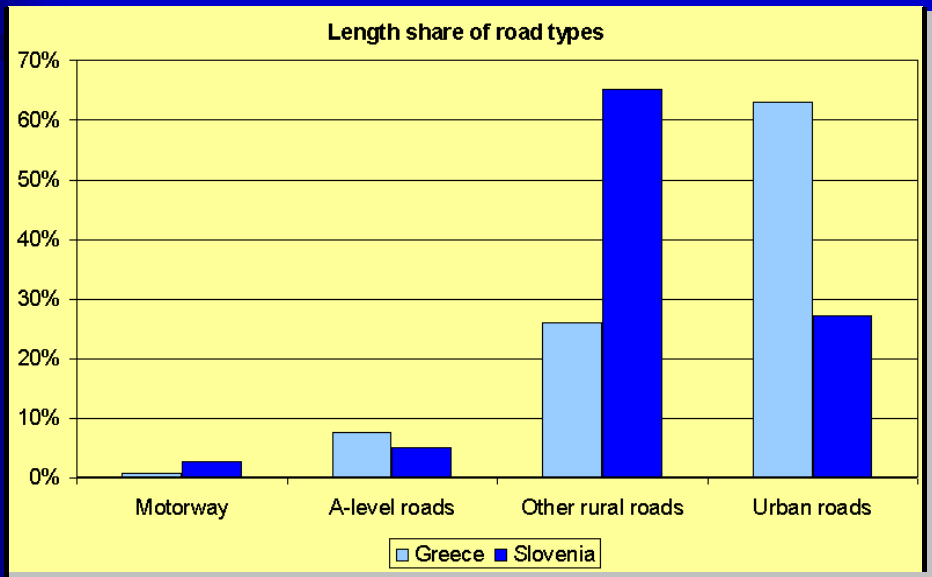
Safety Performance Indicators (SPI)

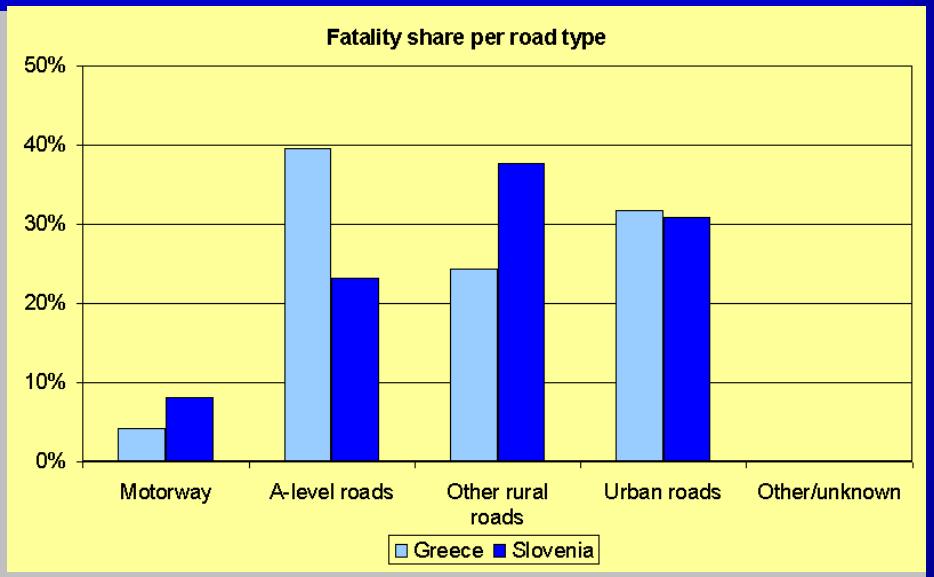


Final outcomes (casualties)



Case study: Greece – Slovenia (3)





Share of collision partners (%) in fatal crashes (2003)

	Single vehicle	Passenger car	Lorry	Coach	Motorcycle	Moped – bicycle
Greece	36,0	28,7	14,9	3,2	4,0	0,3
Slovenia	35,1	41,3	14,9	4,1	0,8	0,4

Comparison with the other southern countries (1)

- ✓ *Importance of social and general transport context*

'2002	Greece	Portugal	Spain	Catalonia
Road traffic fatalities	1.634	1.675	5.347	812
Population (million)	10,99	9,89	41,55	6,79
Road length (thousand km)	120	125	665,2	61,7
Motorway length (km)	742	1,835	9,739	937
Area (thousand km^2)	131,96	89,04	505,99	32,11
Motor vehicles (million)	5,74	5,29	25,07	4,22
Passenger cars (million)	3,69	4,98	18,7	3
Lorries (3,5 tones) (thousand)	1,109	158	1,935	281
Motorcycles (million)	0,91	0,15	1,52	0,43
Mopeds (million)	1,61	0,46	2,04	0,31
Motor vehicle km (x 10^9)	67,94	73,75	345,52	49,61
Motor veh-km on motorways (x 10^9)		10,23	74,34	17,89
Motorcyclist kilometers (x 10^9)			0,635	0,58
Road user person-km (x 10^9)	136,33	109,1	788,75	
Meter road length per capita	10,6	12,6	16	9,1
Motor vehicles per inhabitant	0,52	0,535	0,6	0,6
Motor veh-km ('000) per motor vehicle	11,84	13,95	13,8	11,8
Kilometers travelled per person	12,4	11,03	18,98	

Comparison with the other southern countries (2)

✓ *Positive reduction in fatalities*

- In mortality rates, from 17% in Greece to 41% in the case of Portugal (21% for Spain, 27% for Catalonia);
- In fatality rates, from 40% in Spain to 64% in the case of Portugal (44% for Catalonia, 53% for Greece);
- In fatality risks, from 40% in Catalonia to 57% in the case of Portugal (47% for Spain, 51% for Greece)

✓ *Importance of drinking & driving problem*

- GR: Drivers over limit appear to be present in 22-23% of fatal accidents
- In all 3 countries: 32-33% of toxicology tests on killed drivers positive
- Respective upper values prescribed by Euro Care: 20% and 25%

Comparison with the other southern countries (3)

✓ *PTW riders constitute a specific problem*

- Share in total fatalities: 15% in Portugal and 23% in Greece & Spain
- Especially Greece exhibits a pretty low ratio of PTW fatalities/vehicles
- Still, helmet use is disappointingly low (20-30% for various types)
- At least use has increased 3-fold in 5 years (and so did penalty notices)

✓ *Young drivers: a truly vulnerable group of road users*

- In spite of the reduction in “relative ratio” values, drivers between 18-25 are 1.5-2.0 times more often involved in fatal accidents
- Drivers aged 18-20 and 21-24 exhibit highest accident involvement (10.6 and 7.8 per 1000 license holders, opposed to an average of 3.8)

Conclusions: Footprint Methodology added value

- The principles for the design of a representative road safety “footprint” for different territories (e.g. countries) are relatively simple
- Comparative assessments by means of this methodology:
  - Allow for the detection of countries declining from a reference situation
  - Are not necessarily intended to interpret emerging observations, but certainly pinpoint road safety aspects that ask for further investigation
- The SUN countries demonstrate much higher road safety level
- The value of this tool lies on the possibility to correlate findings concerning different levels of the target hierarchy pyramid
  - It is desirable to achieve actual transition between different levels
  - By the time the method reaches its highest potential it will be possible to predict the effects of particular actions/measures beforehand

Recommendations: Greece – present status / perspective

- Limited exposure data hinder comparison between southern countries
- Given this limitation, it appears that the southern countries have similar road safety performance and suffer similar problems
- Greece experienced a phase of improvement between 1998-2003
  - 415veh or 258 cars/1000 people were some site-specific threshold
- Many lives would be saved if compliance with legislation were higher
  - Only 40-45% of car drivers involved in serious accidents use their seat belt
  - In spite of a notable improvement, 3.5% of total alcohol tests are positive
  - The same holds for excessive speed, although monitoring is not effective
- The large share of vulnerable road users affects total performance
  - PTW riders account for about 23% of total fatalities
- Limited coordination between Authorities – drivers training discrepancies