National Technical University of Athens
School of Civil Engineering
Department of Transportation Planning and Engineering

Two-wheeler safety in Athens: An application of the eSUM Action Pack

George Yannis
Associate Professor

eSUM Transfer Cities Seminar
Barcelona, 11 May 2010

Background

- **The eSUM Action Pack overall approach:**
- Analysis of the PTW problem
- Identification of causes and definition of objectives
- Selection of interventions and development of a safety plan
- Implementation and monitoring of the interventions
- Evaluation of the interventions or the plan

Objective

- Implementation of the eSUM Action Pack for the analysis of powered two-wheelers safety in Athens, Greece
  - Analysis of current situation
  - Identification of problems and causes
  - Selection of necessary interventions
  - Implementation of interventions
  - Evaluation of interventions

- Synthesis of the results of the implementation of the Action Pack within a broader road safety analysis context

eSUM approach for analysis of current situation

- Analysis of contextual data (background of PTW use in the city)
  - General: Demographic and social-economic data, town model, road network (design, hierarchy, furniture etc.)
  - Vehicles and mobility: vehicle fleet, mobility distribution by mode, driving habits, public transport, parking
  - Safety actions: legislation, campaigns, measures, enforcement.

- Analysis of accident data (description of the collision issues)
  - Road accident data: location, data, time, weather etc.
  - Vehicle data: type of vehicle, vehicle age, vehicle manoeuvre
  - Casualty data: age, gender, injury severity, injuries location and description
  - PTW user data: age, licence, experience.

eSUM approach for problem identification

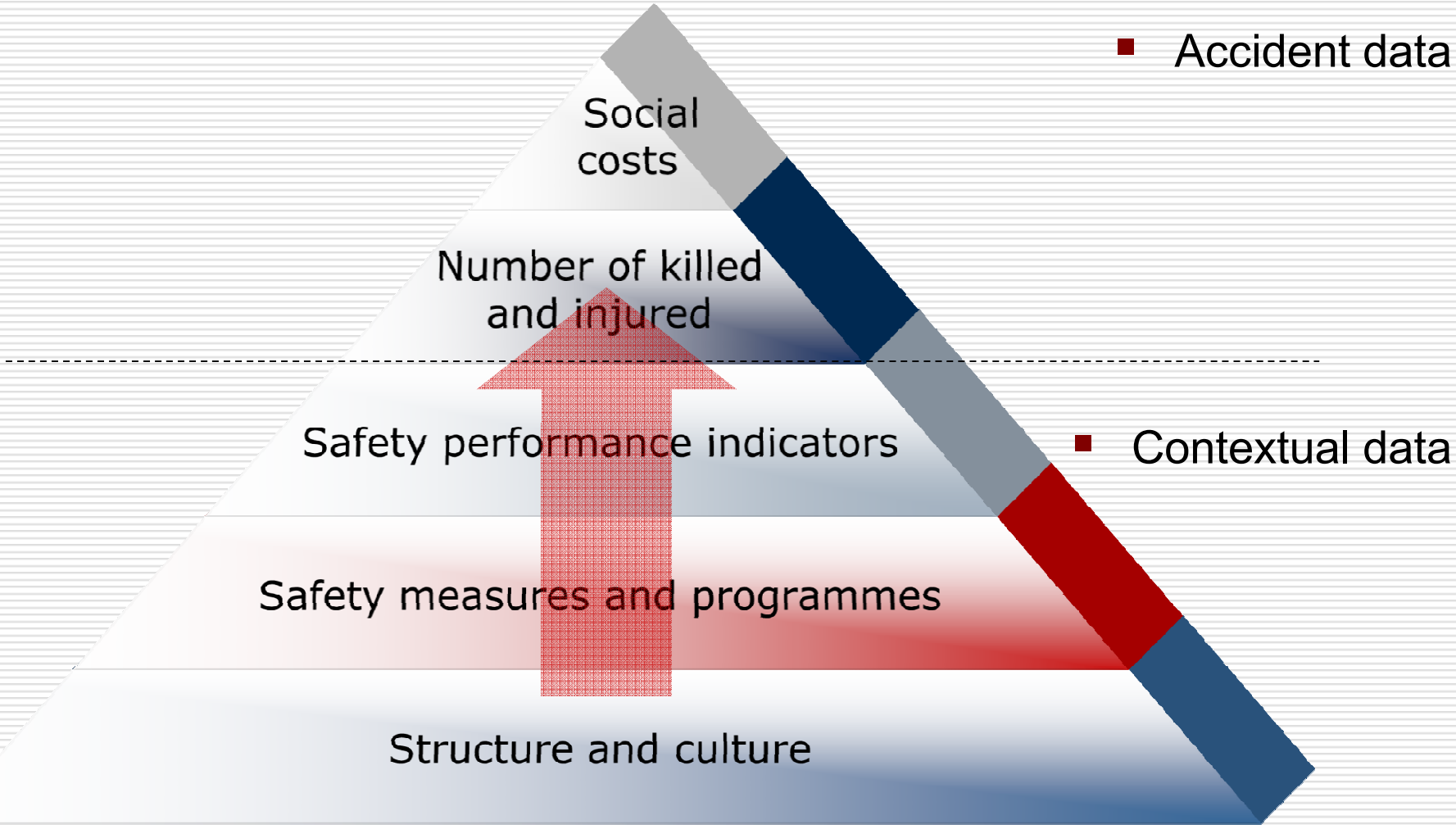
- Problem identification
  - Examination of casualty trends, locations of clusters of PTW collisions, prevailing conditions (weather, road surface etc.), high risk groups (age, vehicle type etc.), common collision types
  - Association with an indicative yet detailed list of problems and causes
- Identification of high risk sites (black spots)
  - By means of dedicated techniques
- Target setting
  - Qualitative or quantitative, but clearly defined

eSUM approach for interventions selection

- Selection and prioritisation of interventions
  - well oriented to objectives
  - well balanced: a mix of measures (training, awareness, enforcement, road design)
  - evaluated by cost-benefit and time development.

The eSUM Good Practice Guide provided guidance on potentially successful casualty reduction interventions.

Towards an integrated approach

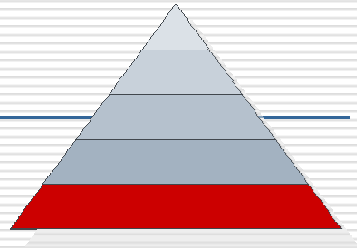


Source: SUNflower

Application for the city of Athens

- The population of the Athens area is 40% of the total population of Greece
- The number of motorcycles registered in the Athens area is 44% of the total number of registered motorcycles in Greece (32% for mopeds)
- The number of motorcycle casualties in Athens area is 57% of the total number of PTW casualties in Greece (30% for fatalities)

Structure and culture

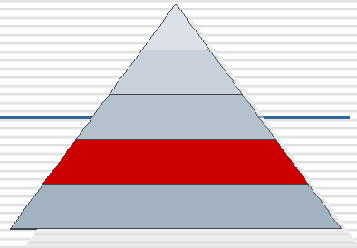


- Population: 4,500,000 inhabitants
- Surface: 465,000 Km^2 (density: 10 inh/km^2)
- Road network length: 16,000 km (4,200 junctions)

- Climate and congestion make PTW riding very attractive

- Limited respect of road rules
- PTW traffic education need further attention
- The structure and organisation of the Public Authorities as regards road safety can be significantly improved
- Implementation of the National Strategic Road Safety Plans is not systematic

Programmes and measures



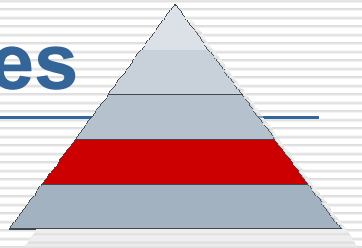
- PTW users driving lessons: Compulsory
- Legal access age: 16 for mopeds, 18 for motorcycles
- Compulsory periodical technical inspections

- Helmet wearing law: Obligatory (more than 25,000 violations recorded in the Athens area on 2009)

- Enforcement/penalty levels are defined in the Greek traffic law
  - More than 52,000 speeding violations in the Athens area
  - More than 10,000 alcohol violations in the Athens area (out of 340,000 controls)

- Quality of road design standards with respect to powered two-wheeler specifications (visibility, obstacle-free zones, road surface) is not satisfactory
- Traffic management for PTW is not sufficient
- Few PTW information campaigns

Infrastructure programmes and measures

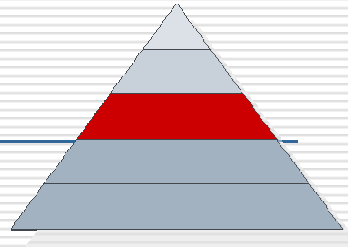


- A large programme for identification of high risk sites in the Athens area (2008 - 2009)

- Engineeering study completed
  - identification of 90 high risk sites (70 junctions)
  - identification of interventions
  - design of low cost measures

- Implementation of measures (5 million euros)

Safety performance indicators



- 3,1 million registered PTW in Greece on 2009 (32% of the total fleet)
  - Passenger cars per inhabitant in the Athens area for 2009: 0.60
  - Motorcycles per inhabitant in the Athens area for 2009: 0.14
  - Mopeds per inhabitant in the Athens area for 2005: 0.11
  - Average yearly vehicle kilometres in urban areas are:

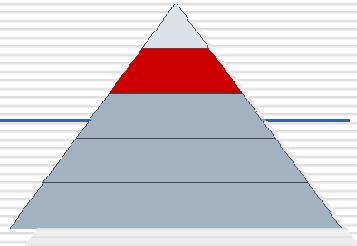
    7,176 for passenger cars, and 5,769 for PTW in Greece for 2008

- In 2008 in Athens, 208 accidents occurred with at least one powered two-wheeler rider involved with an alcohol level above the legal limit.
  - More than 50% of driver alcohol control results are unknown

- Roadside surveys in Athens for 2008, reveal use of helmet:

  74% for the front rider and 45% for the back rider
  - Helmet use reaches 95% outside urban areas (both riders), against 73% inside urban areas (front rider)

Number of killed and injured (1/2)



- PTW casualties and total casualties in Athens and in Greece per injury severity (2008)

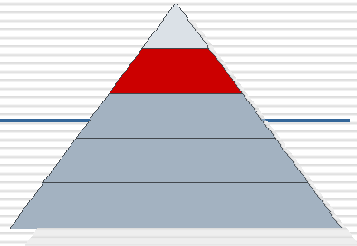
	Killed	Seriously injured	Slightly injured	Total
All casualties* - Athens	232	345	7212	7789
PTW casualties - Athens	133	224	4334	4691
% PTW casualties - Athens	**57,3%**	**64,9%**	**60,1%**	
All casualties* - Greece	1305	1611	14756	17672
PTW casualties - Greece	435	803	6969	8207
% PTW casualties - Greece	**33,3%**	**49,8%**	**47,2%**	

**pedestrians not included*

- Number of PTW casualties per 100,000 inhabitants in Athens (2008): 191

- Trends 2002 - 2008: PTW fatalities in the Athens area were increased by 28%, whereas total fatalities in the Athens area were reduced by 5%

Number of killed and injured (2/2)



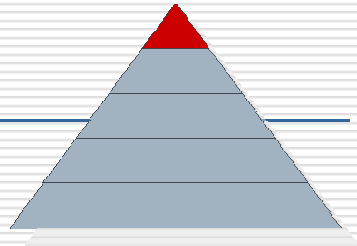
- Accident risk rates - drivers killed per million vehicle kilometres – per vehicle type and area type (Greece, 2004)

	Moped	Motorcycle	Passenger car	Total
Inside urban area	31.8	73.0	5.7	**11.8**
Outside urban area	106.3	142.1	10.2	**12.9**
Total	**41.7**	**85.7**	**8.1**	**12.3**

- Accident risk rates per vehicle type and driver age (Greece, 2004)

Driver age	Moped	Motorcycle	Passenger car	Total
16-17	54.7			**54.7**
18-24	26.7	202.0	25.2	**40.6**
25-34	18.4	62.3	7.7	**11.9**
35-44	45.3	59.5	6.3	**9.3**
45-54	42.5	30.1	5.3	**6.3**
55-64	26.6	141.9	6.5	**7.9**
>65	357.8	115.4	11.5	**17.0**
Total	**40.1**	**77.8**	**8.0**	**11.8**

Social costs



- Road accidents cost in Greece

Euros 2006	Cost of Accidents with		
	Killed	**Seriously Injured**	**Slightly Injured**
Material Damage cost	36.076	22.791	17.435
Generalised cost	554.833	29.978	8.728
Human cost (vosl)	1.018.669	132.427	10.187
Total cost	**1.609.577**	**185.195**	**36.350**
Number of PTW accidents casualties in Athens	160	270	5,000

- VOSL: value of statistical life

- Estimated yearly benefit from the prevention of around 4,600 PTW road accidents with around 5,400 casualties in total in the Athens area: 490 million Euros

Identification of problems and causes

- High number of PTW
- Inappropriate behaviour of drivers and PTW riders
- Low helmet use
- Young riders, novice riders
- Motorcycle riders more risky than moped riders
- Inadequate traffic education
- Lack of targeted road safety measures and programmes for PTW safety
- Serious weaknesses of the structure and organisation of national and local authorities, with direct impact on road safety

- High risk sites and related problems identified

Selection of necessary interventions

Good practice Guide was also taken into account

- Enforcement intensification for:
  - riders speeding
  - helmet use
  - appropriate behaviour of drivers

- Targeted campaigns for:
  - young and novice riders
  - for drivers

- Target setting and selection of specific measures
- Systematic monitoring of the measures implementation and of the targets
- Strengthening road safety administration within the local Authorities

Selection of infrastructure interventions

- Raised junctions for reducing speed in residential areas
- Bollards for preventing illegal parking and improving visibility, especially at junction areas
- Guardrails for preventing illegal crossing by pedestrians and use of the sidewalks by PTW

- Improved traffic signaling programmes
- Implementation or improvement of a complete set of road markings and traffic signs
- Improvement of lighting

The eSUM approach and the pyramid

- In general, the pyramid allows for a complete picture of the road safety phenomenon and useful insight on the road accidents causality
- “Safety Performance Indicators” is the “weakest link” in the middle of the pyramid that impedes information flow
- The links between the layers of the pyramid are as important as the layers
- The pyramid can be used to complement the eSUM Action Pack, providing a yet more integrated framework for PTW safety improvement

Conclusion

- The eSum Action Pack gathers and organises all necessary steps and related information in order to be usable by the local decision makers
- It provides a comprehensive guide containing in an organized way all necessary steps for improving PTW safety at city level.
- The Action Pack may efficiently assist analyses and decisions not only at implementation level, but also at strategic level.
- There is need for wide dissemination of the eSUM Action Pack (and the related successful examples) to all local public Authorities in Europe.