



National Technical University of Athens
Road Safety Observatory

www.nrso.ntua.gr

**FIFTH UNITED NATIONS GLOBAL ROAD
SAFETY WEEK**

6-12 May 2019



Save Lives

#SpeakUp

Modelling crash modification factors globally - i-safemodells -

Christina Gonidi

Transportation Engineer, Research Assistant

Together with:
Anastasios Dragomanovits, Alexandra Laiou, George Yannis

Workshop:

**Digitalisation
and Road Safety
Research**

Friday
17
May
2019
at 14:00

The i-safemodels project

➤ Project partners:

- **National Technical University of Athens**,
Department of Transportation Planning and Engineering
www.nrso.ntua.gr
- **OSeven Telematics**
www.oseven.io
- **Tongji University**
<https://en.tongji.edu.cn>
- **Third country partners:**
University of Central Florida, US
Purdue University, US
Loughborough University, UK
German Aerospace Center, DE

➤ Duration of the project:

36 months (estimated June 2019 – June 2022)

➤ Operational Program:

"Competitiveness, Entrepreneurship and Innovation" (EPAnEK) of the National Strategic Reference Framework (NSRF): Greece - China Joint R&D Projects

Christina Gonidi, Modelling crash modification factors globally – i-safemodels



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ



EPAnEK 2014-2020
OPERATIONAL PROGRAMME
COMPETITIVENESS • ENTREPRENEURSHIP • INNOVATION



Background

- **Accident Prediction Models** (APMs), including Safety Performance Functions (SPFs) and Crash Modification Factors (CMFs) are essential tools for transport decision makers, to quantitatively predict crashes, analyze injury severity, identify hotspots and assess safety countermeasures
- Developing APMs requires a **tremendous effort** of data collection and analysis, which could be potentially skipped if the models are **transferable** to conditions different from the ones they were developed for
- Thus, there is imperative need for **international scientific cooperation** to fully understand crash risk factors and respective measures



Research Questions

➤ Objective:

Propose international comparative analyses of road traffic safety statistics and safety modeling at both **macroscopic** (e.g. country, region) and **microscopic** level (roadway locations)

➤ Research Questions:

- Which are the **factors** that mostly influence crash frequency and severity at both microscopic and macroscopic level, and how can this influence be modelled?
- How can **hazardous locations** be best identified and appropriate **countermeasures** selected?
- Can accident prediction models be effectively **transferred** to conditions different from the ones they were developed for (e.g. in other countries)?



Methodological Challenges

- **International literature reviews** on:
 - risk factors and safety countermeasures (WP1)
 - macroscopic road safety modelling (WP2)
 - microscopic road safety modelling (WP3)
 - identification & treatment of hazardous locations (WP4)
 - safety prediction models transferability (WP5)
- **Data collection** in five countries
Greece, China, UK, Germany and the US
- **Model development**
 - macroscopic (aggregate data, e.g. at country level)
 - microscopic (roadway geometry and traffic data)
 - hazardous locations identification
- **Advanced statistical techniques**
besides traditional regression models, such as:
 - propensity score matching,
 - cusp catastrophe model, etc.



Online data platform

- Online **data platform** will be established
- **Freely available** to researchers, scholars, policy makers and authorities worldwide
- **Knowledge section**
Compendium of existing knowledge, based on the literature reviews
- **Data section**
 - macroscopic data
 - microscopic data
- **Results section**
Macroscopic & microscopic models, transferability tests



Model development

➤ Macroscopic models

Analyze crashes at aggregate spatial levels (e.g. country, region, census block) with demographic, socio-economic, built environment, traffic attributes and roadway characteristics

➤ Microscopic models

- Identify relation between road crashes and injuries, and road infrastructure characteristics and traffic
- Data availability issues to be addressed

➤ Hazardous locations

Methods for identification and methods for selection of treatments

➤ Transferability assessment

Comparative assessment of prediction performance of transferred models vs. locally developed models



Scientific and Social Impact

- Consideration of **road safety on a global level**
 - Address **knowledge gaps** in the generalization of road safety research results
- Improvement of **decision making practices**
 - Development of models to be used as **quantitative tools** in decision making
 - More **effective exploitation** of available funds for road safety, e.g. selection of more promising countermeasures
- **Road casualties reduction**
 - Improved road infrastructure safety management



Future Challenges

- Integration of a multitude of accident prediction modelling techniques, ultimately leading to **advanced road safety modelling on a global level**
- Road Authorities and Operators internationally should be encouraged to use **Accident Prediction Models** as a decision making tool.
- Evidence-based probability of being involved in a crash can be used for **personalized vehicle insurance pricing policies**





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