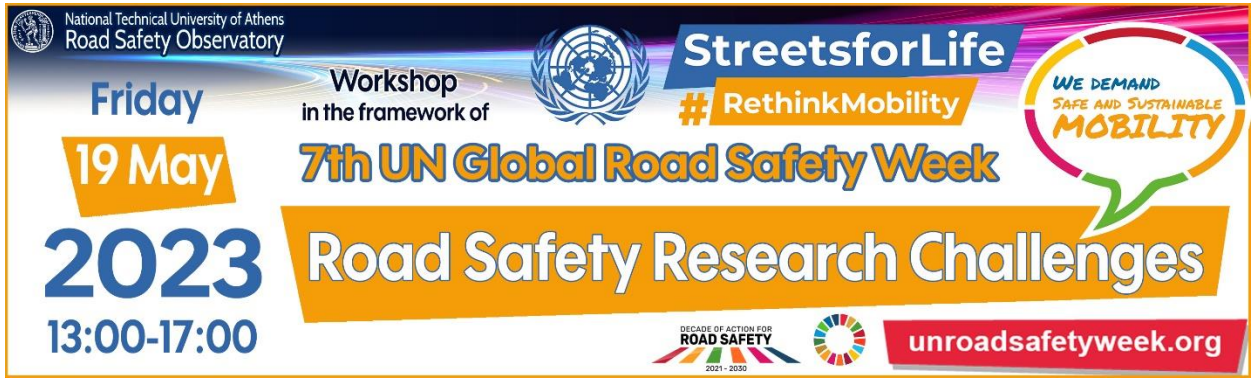


Micromobility Safety

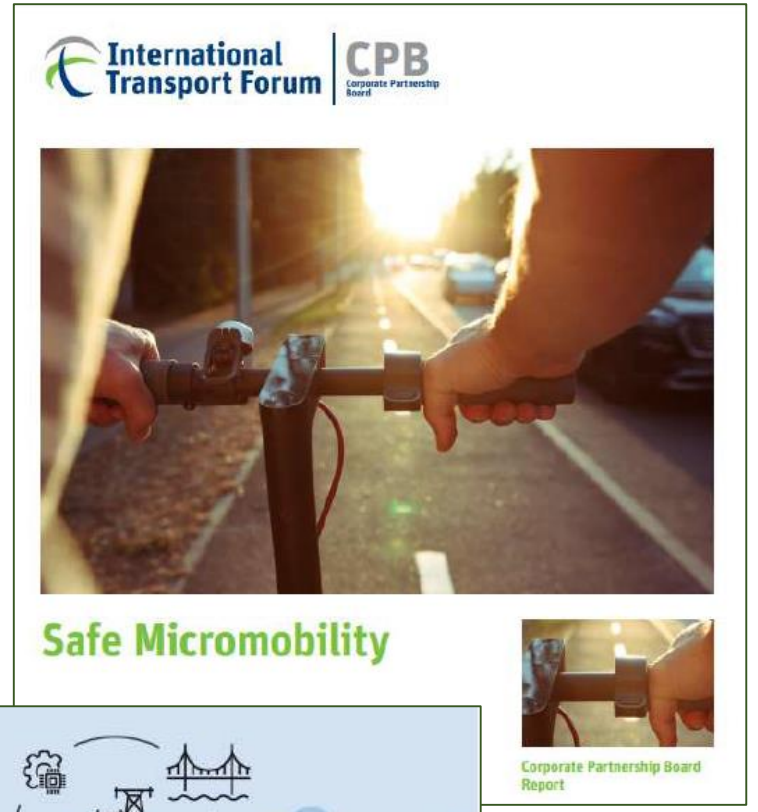
Katerina Deliali, PhD

Together with:
Virginia Petraki & George Yannis

Micromobility Safety

- **Objective**:
  - Assist ITF in updating the content of the previously published report (2020) on safe micromobility.
  - The new report, to be called "Micromobility: Back to the Future" will consist of two parts with the Micromobility Safety being one of those and the analysis is conducted by NTUA.
  - The other part relates to the environmental impacts of the operation of micromobility vehicles.

- **Duration of the project**:
  - 6 months



Objectives

- Review and synthesize the scientific and gray literature on the safety of micromobility (presented)
- Collect and analyze quantitative and qualitative data (cities, operators) to capture additional safety facts and trends.
- Synthesize information from all available sources to provide policy recommendations within the context of the "Safe System Approach".

Methodology

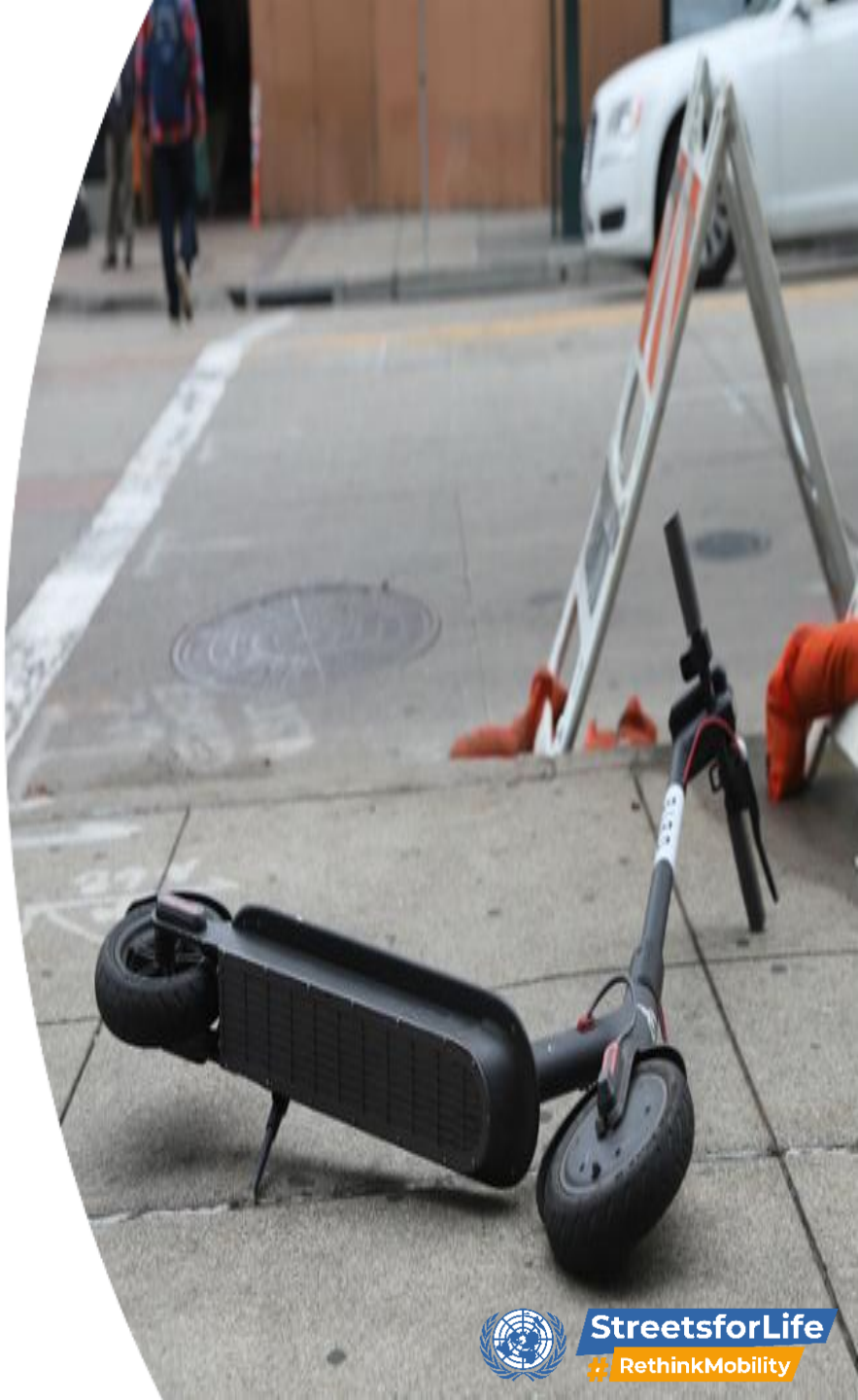
- **Current phase:** Review and synthesis of the literature:
  - Scientific papers
  - Factsheets
  - Reports & policy briefs

  To collect information about e-scooters, e-bikes, and bikes:
  - Crash, injury, fatality statistics and trends
  - Road users involved in crashes
  - Risk factors (e.g., weather, user behaviors, etc.)
  - Exposure data and modal shift to micromobility

- **Next phase:** Interview and questionnaire data, real-world data (e.g., crashes)

Results – Crash & Injury Trends

- When a crash involves an e-scooter then:
  - Most of the times there is an injury (73-94%)
  - Most of the times (61-76%) it results in a minor injury
    - Injuries mostly affect the upper body and the head
- Most of e-scooter reported injuries (93%) are due to **single-user crashes** *(Toofany et al. 2021)*.
- Single-user e-scooter injuries mostly involve the rider and secondly, pedestrians.
- Falls specifically account for a significant number of crashes (~80%) and injuries (64-85%).
- For shared e-scooters injuries account for 15% of all incidents.
- Fatalities & e-scooter crashes:
  - Fatalities correspond to 9% of reported injuries
  - Most e-scooter fatalities (~85%) are due to motor vehicles
  - For shared e-scooters fatalities account for < 0,10% of incidents
- Crashes and injuries are going up, same as demand – data is missing.



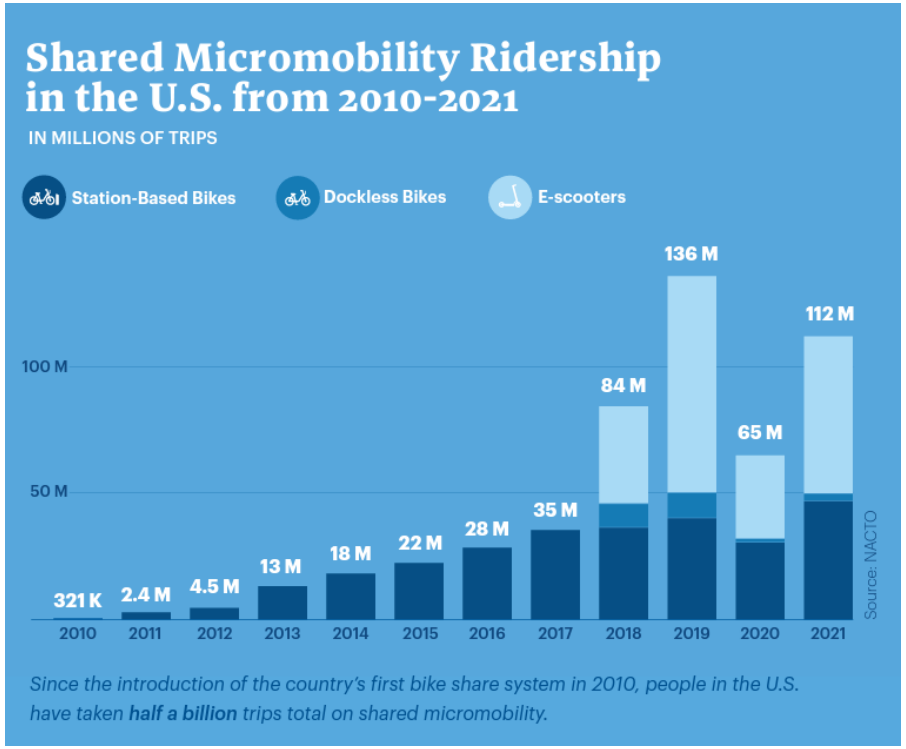
Results – Safe Users, Vehicles, Infrastructure

Safe Users	Safe Vehicles	Safe Infrastructure

Risk factors:
• Speeding
• Riding under the influence of alcohol/drug
• Helmet use
• Nighttime/reduced lighting conditions
• Non-experienced riders
	Design features:
	• max speed limit,
	• larger wheels and tyres,
	• brakes,
	• back and front lights,
	• bells
	• Shared micromobility modes:
	  ○ periodical safety/ maintenance checks
	  ○ additional app-based features such as: geofencing, drunk driver detection
		Risk factors:
		• Lack of cycling infrastructure, especially separated cycle lanes and proper intersection treatments to ensure safe crossings
		• Poor pavement quality (cracked pavement, potholes)

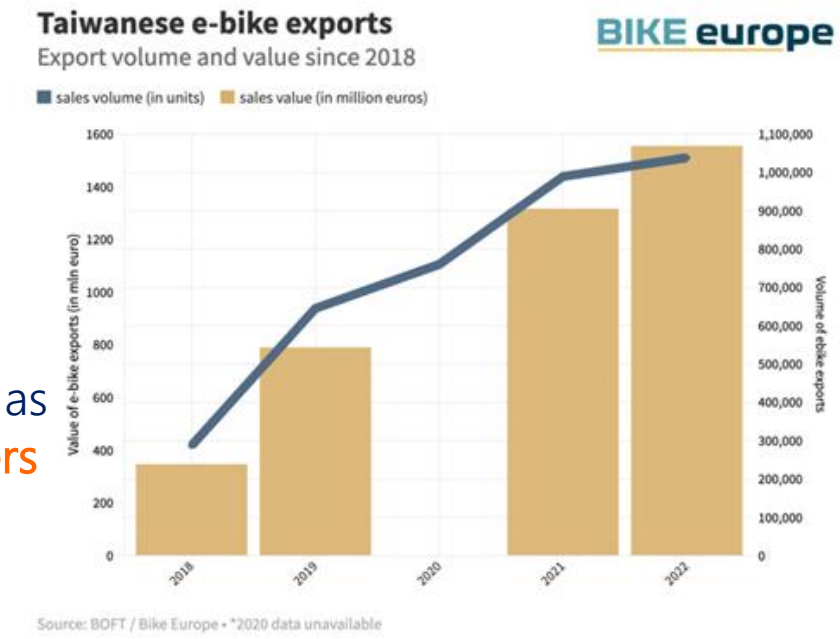
Results – Safe Trips

- Several sources (e.g., sales of micromobility vehicles, travel demand data, etc.) indicate that there is an increasing trend in micromobility.
  - Higher micromobility demand → "Safety-in-numbers"
- Modal shift studies focus mainly on survey data (also from operators).
- Depending on the area & available modes, micromobility might replace car trips (most likely in the US) or public transport trips (most likely in Europe).
- Modal shift does occur between micromobility modes, too.



Safety implications of micromobility trips

- Car/taxi trip replacement can improve road safety as exposure to motor vehicles decreases.
- More micromobility modes on the road improve "safety-in-numbers".
- Shifting from walking/cycling to micromobility should not be seen as a negative trend as this shift can result in either more frequent users & longer trips.



Streets for Life

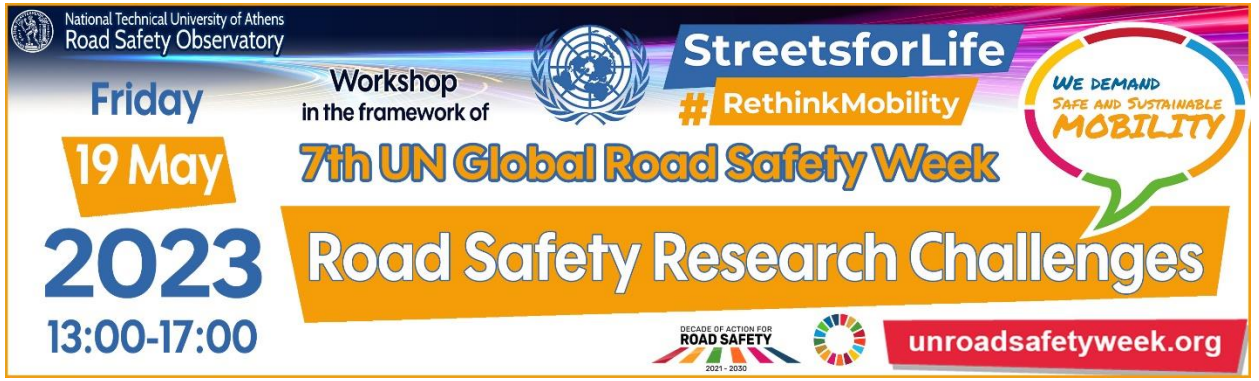
- The massive adoption of micromobility modes has the potential to realize important goals related to society and the environment.
- As evolving modes of transport, there are many knowledge gaps about their operation and especially about their safety.
- Failing to understand their safety implications and provide countermeasures and a holistic regulatory framework, societies are kept from realizing safety, equity, accessibility, and emission goals.

Scientific and social impacts

- Produce new knowledge on the safety of micromobility modes.
- Identify research gaps.
- The outcome of the analysis is of high importance for:
  - Cities and transport authorities
  - Policy makers
  - Manufacturers of micromobility modes
  - Micromobility operators
  - Mobility/delivery companies with micromobility fleets
  - Road users

Future Challenges

- Crash under-reporting
  - Non-injury crashes are not always reported
  - Crashes involving micromobility modes do not correctly classify the mode type
- Common terminology as new modes evolve
- Exposure data – similar to cycling, e-scooter/e-bike demand data is not available and less likely to be able to differentiate between shared and owned modes
- Regulatory framework for both private & shared micromobility modes



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