
E-scooters

Sustainability or Safety?

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Sustainability or Safety?



E-SCOOTERS' SUSTAINABILITY

E-scooters quickly diffused since they represent a sustainable solution to the "last-mile" problem



E-SCOOTERS' SAFETY ISSUES

A significant number of accidents occurred due to road space sharing between vehicles with different speeds and masses

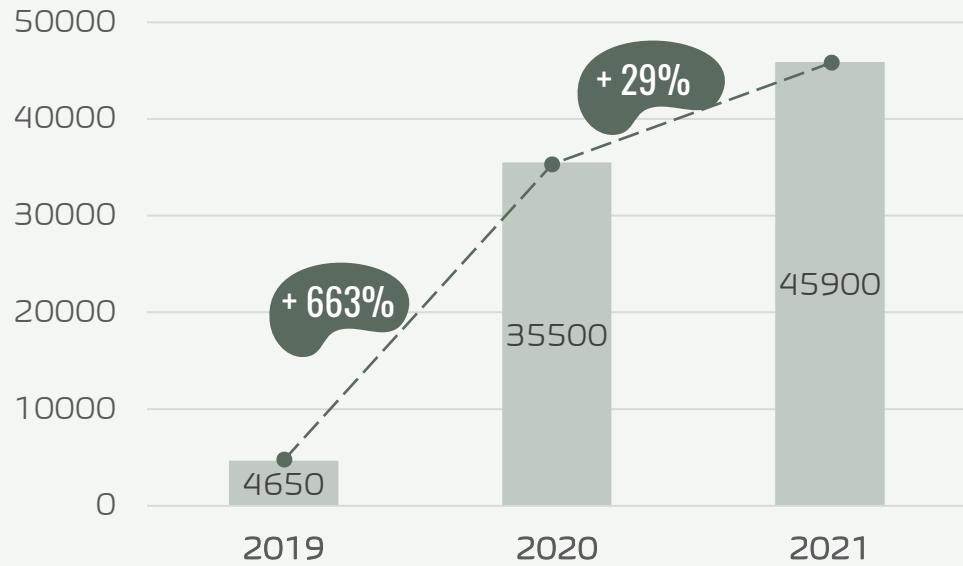


E-scooters' diffusion in Italy

SHARED E-SCOOTERS



Number of e-scooters



PRIVATE E-SCOOTERS

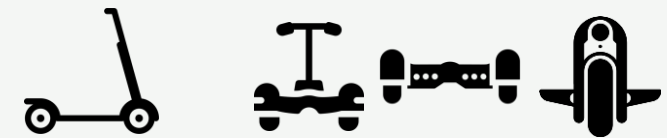


+140%

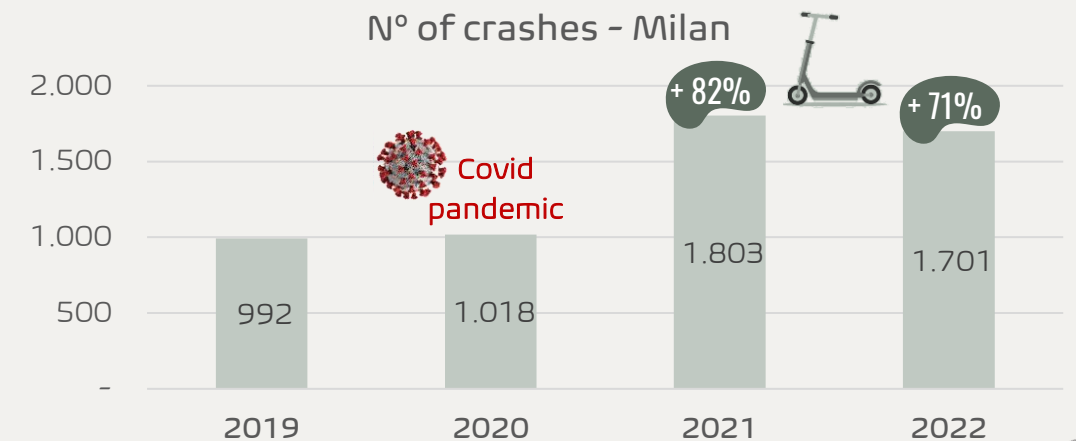
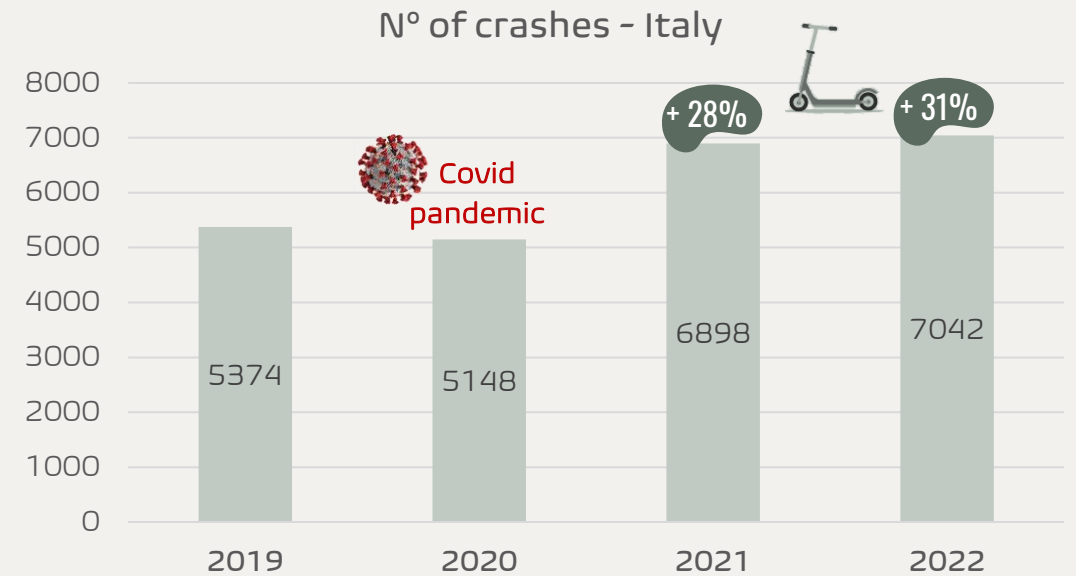
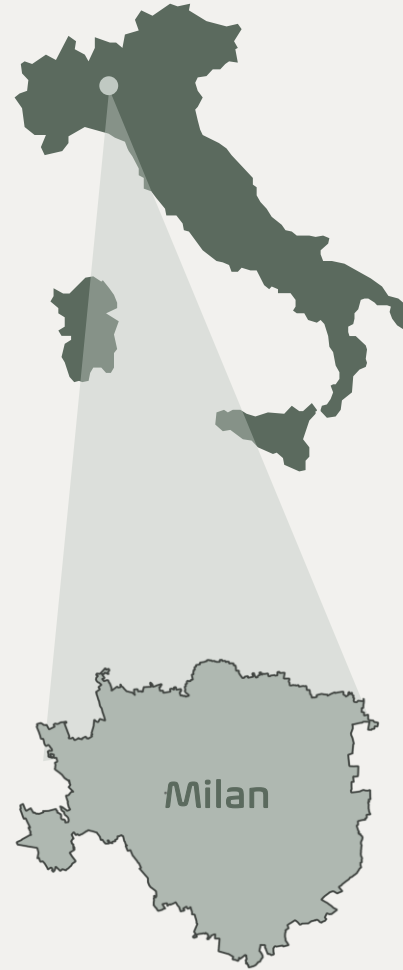
Increase in sales in e-mobility industry between 2019 and 2020

90%

10%



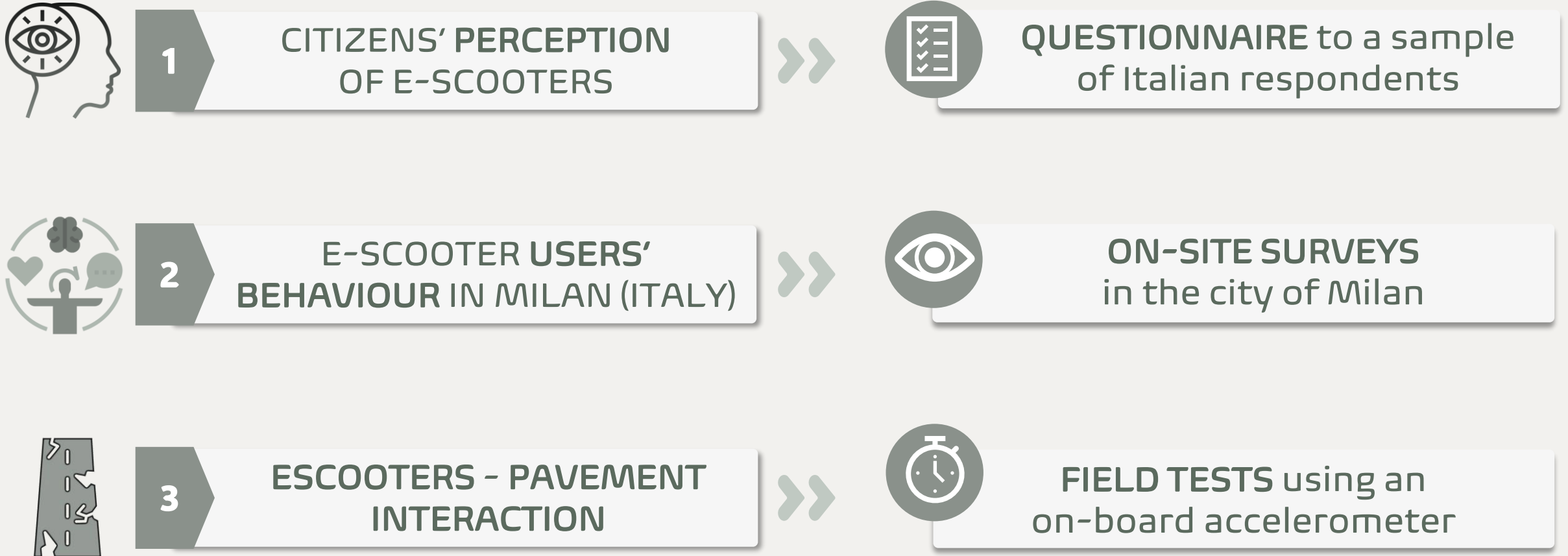
Accidents involving micromobility vehicles



Results from a case study in Milan



Objectives and Methods



"Safety Aspects of E-Scooters in Urban Areas: Preliminary Results on Citizens' Perception, Users' Behavior and Role of Pavement", 2023 A. Antoniazzi , E. Davoli, C. Nodari, and M. Crispino



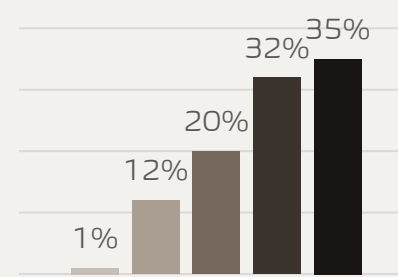
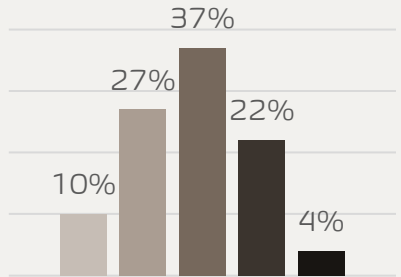
1. Citizens' perception of e-scooters



Do you consider e-scooters dangerous for other road users?

USERS

NON-USERS

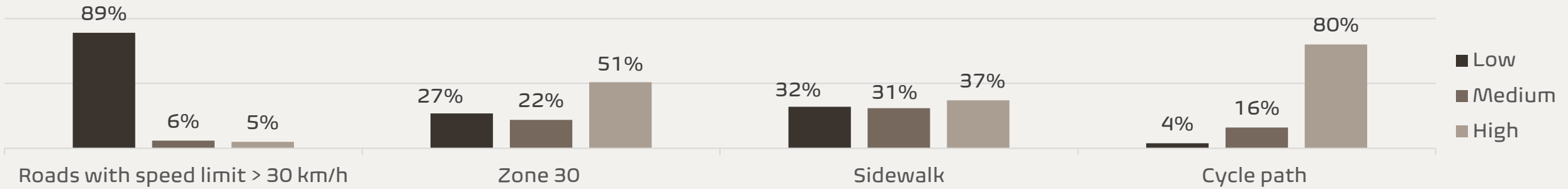


- Not dangerous at all
- Low
- Medium
- High
- Extremely dangerous

Users show significant risk awareness

Non-users perceive higher risk

Safety perception of users in relation to different circulation zones



Roads with speed limit > 30 km/h

Zone 30

Sidewalk

Cycle path



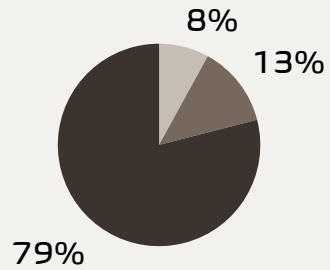


2. Users' behaviour in Milan (Italy)

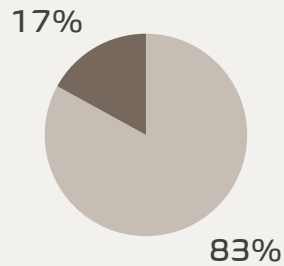


Selection of circulation zone

ROAD WITH CYLCE PATH



ROAD WITHOUT CYCLE PATH



- Vehicle lane
- Sidewalk
- Cycle path

Strong preference for the cycle path

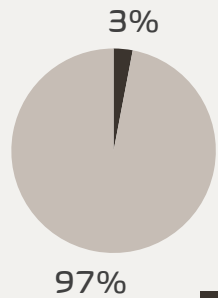


Driving on the sidewalk is forbidden!

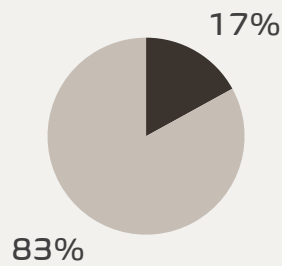


Use of helmet

SHARED E-SCOOTERS



PRIVATE E-SCOOTERS



- With helmet
- Without helmet

It is more likely that private users wear the helmet



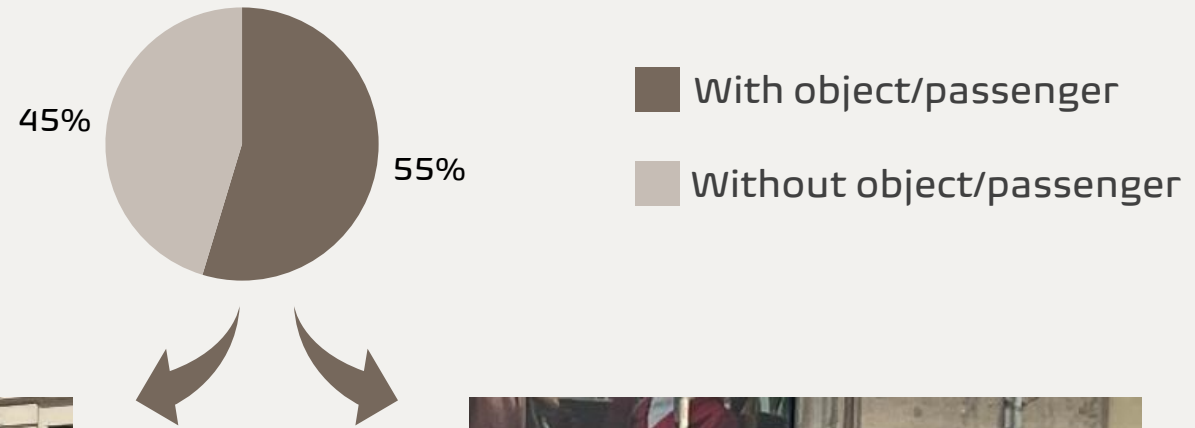
BUT over 18 it is not compulsory!



2. Users' behaviour in Milan (Italy)



Carriage of object/passenger



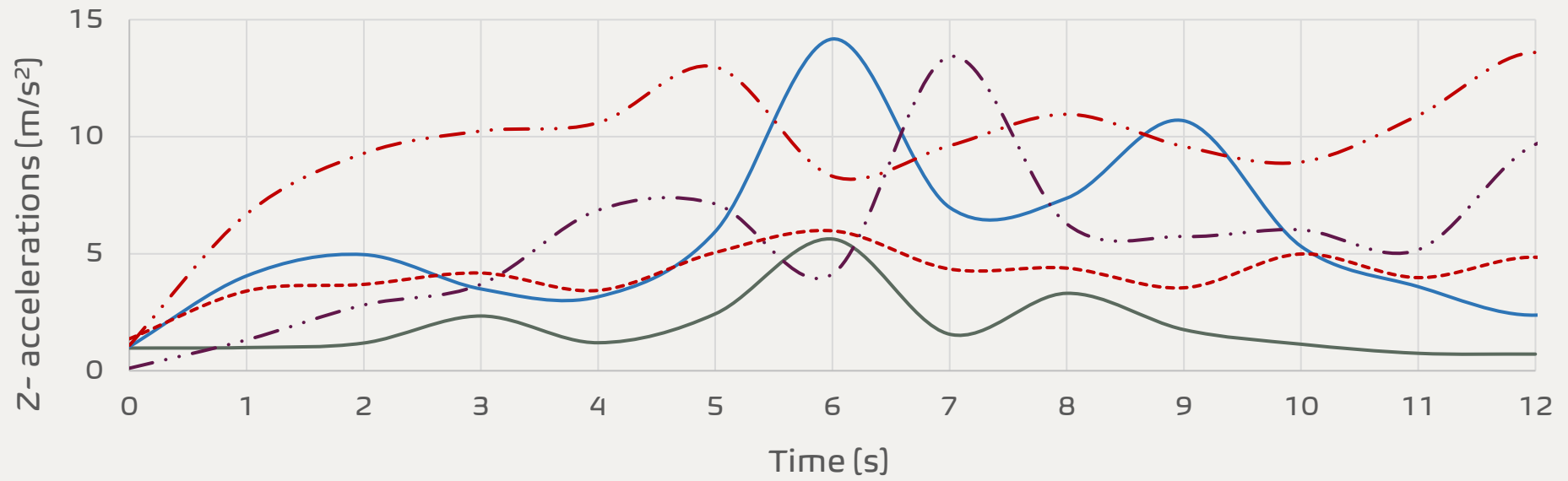
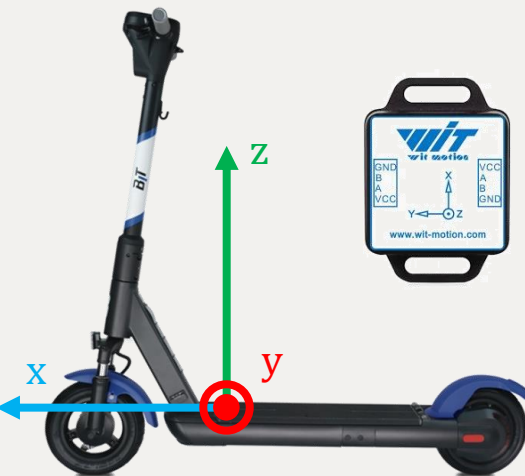
Prohibited behaviour!



3. E-scooters - pavement interaction



FIELD TESTS



25 km/h →

25 km/h →

15 km/h →

15 km/h →

6 km/h →

Reducing speed on stone pavements has major beneficial effects

What's next



E-scooters: vulnerable or dangerous?

Both, depending on the road user they interact with.

VULNERABLE



DANGEROUS



E-scooters and inter-modality

Safety concerns related to fire risk.



Driving simulators

Driving simulation to analyse the interaction between motor vehicles and light mobility vehicles.



Geofencing techniques

Easily applied to shared vehicles to reduce speed or prohibit transit.
Extremely difficult to be applied to private vehicles.



Conclusions

Rules are widely disregarded. The **NUMBER PLATE** is an essential element in ensuring that the rules are observed.



Head impact is an extremely risky condition for e-scooter riders. **HELMETS** should be mandatory regardless of driver age.

SPEED is a crucial aspect for driving stability. It should be adjusted according to pavement and weather conditions.



The sharing of road space between e-scooters and other vehicles is dangerous. **INFRASTRUCTURE** should be adapted to new needs.

Thank you for
your attention

