
Safety in urban micromobility and the RideSafeUM initiative

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Abstract

Micromobility has presented itself as a deal-breaker when it comes to solving some of our most pressing urban mobility challenges. These small and physically or electrically-powered modes can be the cornerstone to make better use of public space, decrease carbon emissions and health issues and boost multimodality to achieve efficient and sustainable systems. However, there are still lessons to be learnt to unleash the full potential of micromobility. Safety is one of these key issues. RideSafeUM is an initiative co-funded by EIT Urban Mobility that will bring micromobility safety benefits to users, public authorities and operators through the use of innovative technology. In this technical note, we analyse the context in which the project is conceived, and explain the phases that will lead to the development of proof of concept at the end of 2022.

Keywords

Micromobility; safety.

Introduction: The urban mobility revolution

Micromobility has grown exponentially in our cities. While bicycles have been popular for a while and bike sharing systems started blooming in the mid-2000s, the unprecedented growth in micromobility offer that our cities have witnessed since the mid-2010s can surely be classed as a revolution.

In the past decade, shared micromobility companies have tried their luck in different urban environments deploying both station-based and dock-less systems under the expectant eye of city authorities. As it happens in any sandbox kind of environment, we have seen the rise and fall of many: bankruptcies, mergers, acquisitions... (Arias-Molinares and García-Palomares, 2020; Anaya-Boig et al., 2021). And we have also watched government policies react and adapt to the circumstances: permits, concessions, prohibitions... Moreover, during the last two years, micromobility systems' operations and profitability have also been significantly affected by the Covid-19 pandemic (CB Insights, 2021).

This rapid-changing environment has been followed also by users that are likely to have felt confused. The sudden disappearance of shared micromobility companies can undermine the trust of users in the reliability and flexibility of these systems, which is one of their big selling points. Private micromobility devices owners also need to stay on top of changing regulations, which can become tiring and tedious.

As the years go by, it has become apparent that these new(ish) transport modes and mobility services are here to stay. Micromobility has been praised for being a key element to transform our mobility systems (Abduljabbar et al., 2021). However, public authorities, private operators and users need to do some homework if we want these systems to reach their promising potential. Competition, use of public space, subsidies, coordinated planning, inclusion, traffic rules, rider training, infrastructure... It is a long (but doable!) list of issues.

The plot thickens: Safety is an issue – We need a change (or many)

Safety has been stated to be one of the most important aspects to consider to increase user engagement with micromobility (EIT Urban Mobility, 2021). Safety in itself should be a priority, and it is becoming so as many cities are joining Vision Zero and uniting different goals (health, inclusion, economic efficiency, etc.) under the same wonderful mantra: safety, safety, safety (Engelking, 2020).

Ironically, micromobility trips are less likely to cause accidents (to riders and other road users) than trips made by car or motorcycle. However, in terms of who suffers the damage, in a micromobility accident the rider is the most likely injured party. (International Transport Forum, 2020).

No wonder users feel vulnerable knowing that if they are hit, it will be them taking the worst part of it. The lack of protected space to ride does not help (EIT Urban Mobility, 2021), and this may be the reason why riders sometimes feel safer on sidewalks and pedestrian streets. However, sidewalks and pedestrian streets are designed for serving pedestrians' needs and in most cases they are not suitable for "hosting" vehicles, such as bicycles and e-scooters. The intrusion of other vehicles has wreaked havoc with a consequent high degree of polemics. It is also worth noting that the highest percentage of micromobility accidents happen when users are inexperienced, mostly on their first rides. (Austin Public Health, 2019).

Building on all of this, it seems that dedicated infrastructure and training are two very big pillars in providing safer conditions for micromobility riders and other road users. Moreover, in line with what was mentioned earlier, regulation should build on understanding the needs and performance of these modes (EIT Urban Mobility, 2021). In other words, to make informed and efficient choices on how to manage infrastructure (and maintain it), provide useful training and regulate for micromobility it is key that authorities have the right input.

Existing literature has pointed out to the need to collect data on micromobility trips and crashes, as a great source to nurture decision-making (International Transport Forum, 2020). The use of public space is a very sensitive issue: re-shaping our urban environment must be done carefully and strategically. Moreover, providing the appropriate training and deciding which traffic rules and potential restrictions work best require an understanding of the interaction of micromobility with other modes and the general built environment. To support all of this, data collection and analysis can be a great ally. In addition, pro-active crash prevention, based on technological means to identify priority action (e.g. maintenance, fixing potholes), are a key factor to improve safety management.

All in all, solutions to safety issues must be oriented to fulfilling the needs of all affected parties: users, public authorities and private operators (European Union, 2021). All have key roles to play in making the micromobility environment safe, which is imperative to achieve a sustainable mobility system.

The RideSafeUM story: Using technology to prompt dynamic safety management and planning

RideSafeUM is an initiative to proactively improve micromobility safety through better provision of information to users, smooth reaction in case of accident and data analysis for learning, policy-making and management purposes. EIT Urban Mobility is an entity within the European Institute of Innovation and Technology (EIT). Founded in January 2019, EIT Urban Mobility has been supporting innovative projects to change the way we move in cities and achieve more liveable and sustainable

environments. RideSafeUM is born in response to the need to make micromobility safer and encourage increased ridership of what have become key modes for the future of our mobility systems.

The Consortium developing the work for this project is composed of a varied array of partners. Involved public authorities include Ajuntament de Barcelona – with technological support from Institut Municipal d’Informàtica (IMI) –, Roma Mobilità and Thessaloniki Major Development Agency. Private sector partners include micromobility operators Dott and Rise, as well as consulting and technology companies like Applus IDIADA, BRAINBOX and FACTUAL. Finally, academic and research-related entities complete the mix with players like Centre for Research and Technology Hellas (CERTH), Universitat Politècnica de Catalunya (UPC) and CARNET Barcelona. This balanced mix of partners across different European geographies guarantees a unique and comprehensive perspective for the project.

The RideSafeUM solution will be based on the integration of computer-vision software, with camera, GPS and a gyroscope. This technology will be either supported by users’ smartphones or through integrated equipment in the operator’s hardware. In addition, a city dashboard will enable authorities to identify and dynamically manage micromobility safety issues as well as the implementation of regulations.

The system will work on a bi-lateral communication basis. Real-time information (via an app or the operator’s front-end) of regulations will be displayed to the user. At the same time, alerts will be sent to authorities if an accident occurs, using a black-box function. The system will allow to identify accident severity and decide whether to call emergency services. Anonymised data on incompliances and accidents will help to build informed decisions about city regulations and use of public space.

Use cases and objectives

In order to define the exact features that RideSafeUM should include, the first thing to focus on was to understand what would be the objectives of city authorities and operators, tied to what would benefit users (and non-users) to feel safe and comfortable while riding (or sharing public space with) micromobility devices.

To do this, the Consortium organised a workshop, where initially city authorities and operators explained their goals, challenges and plans related to safe micromobility. Afterwards, a dynamic session was carried out to translate identified needs into features, rank them according to feasibility and added value, and finally prioritise them and define immediate action. Methodologies included a structured brainstorming, Q-methodology exercise and multiple-choice questionnaires. The workshop was a great chance for bringing together cities, operators, technology providers and academia from different European countries into the same discussion.

System development

The solution will classify the city into zones, reflecting the different applicable regulations. An application will be developed to differentiate the type of pavement where the micromobility device is circulating and react accordingly. Said application will work through an algorithm based on artificial vision. Lane/riding surface information, location and velocity will be processed by the system and notify the user about existing restrictions, as well as warn her/him if the rules are being broken (e.g. speeding or access to a restricted area). Anonymised data will be sent to the dashboard afterwards.

In the event of an accident, an alert signal will be sent to the central control system, and the last few seconds of the video recording will be shared with city authorities (after processing to eliminate sensitive data and guarantee compliance with GDPR) to evaluate accident severity and decide whether to call emergency services, avoiding false positives. This alert signal will function as a 'black

box' - the recorded information will allow the city authorities to achieve a better understanding of the causes of the accident. The definition of an accident will be done through a gyroscope signal.

The city dashboard will have a double objective:

1. Feed the software with any restrictions imposed by the City Council or competent authority;
2. Serve as a visualisation tool with intuitive graphs and maps to collect and analyse data derived from the user/vehicle software and help local authorities with decision-making and accident reaction.

As can be implied from all of these functionalities, interoperability will be of utmost importance, to guarantee effective communication between micromobility devices, city infrastructure and operators' existing systems. This is of special significance given the aim for the solution to be scalable and applicable to different locations and circumstances.

Testing and iterating

The test phase is designed to start towards the end of August 2022 and last until the end of the year. Three European cities have been selected for the trials: Barcelona, Rome and Thessaloniki. While the Barcelona pilot will be targeted at private bicycle and e-scooter users, both the Rome and Thessaloniki trials will be based on cooperation with shared mobility operators Dott and Rise.

Conclusion and expected outcomes

The increased presence of micromobility solutions in our streets has raised safety concerns for riders and other road users, especially for the most vulnerable. For this form of mobility to continue raising in popularity and live up to the expectations that are held for it in the mobility transformation arena, safety issues need to be addressed.

RideSafeUM will focus on improving safety for riders of shared or private bicycles and e-scooters, as well as for pedestrians. Dynamic information management as well as data analysis will be the basis for improved short-term performance and excellent medium- and long-term decision-making. Improved short-term performance will be achieved through user safety warnings, identification of incompliances with existing regulation, and dashboard notifications to assist in calling emergency services in case of accident. From a strategic medium- and long-term perspective, public authorities will be able to make data-driven decisions. These decisions will range from how and where to modify the use and design of public space (e.g. dedicated lanes, parking, signage) to implementing and re-shaping regulations as well as education and training campaigns and permanent efforts.

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