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Lisbon Mobility  
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The background is a dark blue gradient. It features several white lines: some are straight and intersect, while others are curved and wavy. Scattered throughout are small, solid-colored circles in green, purple, red, and yellow. The text is centered in the middle of the page.

# A5.3 MANAGING THE PUBLIC SPACE THROUGH BETTER ASSET MANAGEMENT & CONTROL

D5.3.1 Market and Data Research

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# Technical Information

## Title: Managing the Public Space Through Better Asset Management & Control - Market and Data Research

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### **DISCLAIMER**

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# Introduction

**It is a fact: urban mobility is going through an enormous transformation, which key drivers are technology and changing habits, patterns and culture** (and COVID-19 pandemic played / is playing an important role in this transformation).

**All over the world, citizens and governmental entities are demanding for cleaner, more sustainable and more efficient alternatives to fulfill their mobility needs**, bearing in mind the environmental agenda of protecting our planet.

**Today, over 55% of the world's population lives in urban area<sup>1</sup>**. This represents several challenges as well as may lead to stressful and exasperating situations, such as the (lost) time people spend in traffic congestion lines while traveling in city (on average, vehicle traffic speeds hit 15 kilometers an hour<sup>2</sup>).

**Hence micromobility, which refers to short-distance transport (less than 8 kilometers), has the capacity to offer city residents an alternative to dodge stressful situations**, by offering higher average speeds, avoid being stuck in traffic jams, ease of parking, a lower cost of transportation, and ultimately, health improvement, by fresh air traveling.

In addition, referring to **micromobility is not specific to any technology. This term turned popular with the spread of dockless bike-sharing services and electric (e-scooters)**, and it is rapidly becoming an efficient and reliable transportation mode within cities.

**Furthermore, it does not require much more additional investment in infrastructure**, as it leverages bike lanes and public space that already exists in the majority of cities.

It does have, however, the **tough and fraught challenge of promoting safety and the uncluttered usage of the public spaces** (streets and sidewalks) that protects the public's right-of-way rules, which has to be triggered by local governmental institutions and companies through incentives and regulatory policies.

E-scooters have their limitations, as well: they **perform poorly in hilly areas or on brick-lined streets, they are not suitable when weather conditions are bad, and there is no space to carry or stow groceries or personal belongings**. Some micromobility operators are already considering these needs when designing future vehicles.

On another perspective, **a curious fact is that micromobility vehicles are not new**. It all began with the invention of the first bicycle, 200 years ago, until they started to gain traction during the 1990s.

**Only recently, specially driven by technology advances**, such as the growing use of smartphones, GPS tracking, connectivity, mobile payments, among others, micromobility options are now, more than ever, actual alternatives to mobility, with exponential adoption rates.

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<sup>1</sup> United Nations. (2021, March). *68% of the world population projected to live in urban areas by 2050, says UN*. Retrieved from United Nations: <https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>

<sup>2</sup> Kersten Heineke, B. K. (2019, January). *Automotive & Assembly*. Retrieved from Micromobility's 15,000-mile checkup: <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/micromobilitys-15000-mile-checkup>

For instance, in 2018, in the United States of America, a single player reached \$2 billion valuation, due to hitting 10 million e-scooter rides in 120 cities, roughly in more than a year<sup>3</sup>.

**To foster micromobility adoption, operators and services' providers also play an important role** since, for example, e-scooters are capable to complement a bus or metro ride. Hence, partnerships, including with public transportation companies, will be fundamental for users to plan, book, and pay for their trips.

**Many service providers offer shared mobility management solutions and/or software to provide a seamless and complete user experience**, combining all transportation modes (public and micromobility) into a single platform, which adds convenience and value for users' daily life.

Summing up, this document outlines a micromobility market analysis, focusing on e-scooters and dockless bikes, for the Portuguese market, with emphasis in Lisbon, as well as for the global market, identifying some of the rising trends and challenges that public and private companies are and will face regarding this industry.

A brief description of the impact of COVID-19 pandemic is also included (did it cause a rising demand for these alternatives? Did it deaccelerate?).

Additionally, it offers a competitor landscape analysis, clearly identifying each player's value proposition, business models and other relevant data, as well as the current state of practice regarding the most relevant regulation policies.

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<sup>3</sup> Yakowicz. (n.d.). Retrieved from <https://www.inc.com/magazine/201902/will-yakowicz/bird-electric-scooter-travis-vanderzanden-2018-company-of-the-year.html>

# E-Scooter Market Analysis

## Lisbon Market Analysis

**Lisbon is committed to the mobility agenda, intending to achieve the Paris Agreement and having been the European Green Capital in 2020.** Moreover, Lisbon Municipality is looking at mobility innovation and sustainability to improve the quality of life of its citizens (and visitors).

In December 2019, the **Lisbon Municipality, the World Business Council for Sustainable Development (WBCSD) and more than 50 other companies signed the Corporate Mobility Pact**, and assumed the commitment to develop and implement over 200 mobility initiatives, intending to make mobility more sustainable in Lisbon. This Pact calls for private and public companies based in Lisbon to take ownership of their impact on mobility issues in the city.

Furthermore, former city Councilman Miguel Gaspar reinforced in an interview given to *Cities Today*<sup>4</sup> that “**one of the biggest challenges Lisbon is currently facing is the commitment to hit carbon emissions targets by the year 2030**”. Alongside this target, it was also pointed out the **ambitious target shift of turning more than 150 000 day-to-day private vehicle commuters into more sustainable ways of transportation by 2030**. This will help citizens and visitors to travel easily, faster and more sustainably, and to reduce car traffic on the road, decreasing CO2 emissions, air pollution, and, therefore, improving air quality.

In fact, **developing and promoting a more sustainable, greener and people-friendly city is a goal for the next years**. The emergence of the shared micromobility ecosystem in Lisbon is one of the initiatives to accomplish this target, through providing more environment-friendly means of transportation and mobility, having the potential to yield significant environmental benefits in Lisbon, particularly if it coincides with the decrease of single-occupancy vehicles in Lisbon.

**E-scooters are here to stay even though citizens and visitors have different opinions about it.** Some think about this mode as a perfect way to go through the city, while others consider it an unfriendly welcome to the city, when the e-scooters are obstructing sidewalks or poorly parked in public space.

In fact, in 2019 there were **over 7 000 working e-scooters all over the city of Lisbon, representing over 10 000 trips every month**, with a 100% utilization rate (considering working scooter fleet). With a compound annual growth rate (**CAGR**) of **approximately 30%**, by 2024, it is expected that this value represents roughly 15 900 scooters<sup>5</sup>.

These scooters travel short distances across the city, being the **normal length of a**

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<sup>4</sup> Carey, C. (2020, April 07). How Lisbon is reshaping its mobility landscape. Retrieved from Cities Today: <https://cities-today.com/how-lisbon-is-reshaping-its-mobility-landscape/>

<sup>5</sup> Deloitte analysis

**micromobility ride in Lisbon of 2.5 km** and, on average, a **single scooter has a daily turnover close to 3 times a day**. With a 2% increase in micromobility usage per year, Lisbon can decrease CO<sub>2</sub> emissions from cars by 25% by 2029<sup>6</sup>.

Data from 2019<sup>7</sup> shows that, **when it comes to parking areas, 33% of scooters stay in high congestion areas** all day. These congestion areas in Lisbon (4 to 5 major areas), touch 5.6% of Lisbon's population.

Regarding operators, in 2019, **there were 11 micromobility operators in Lisbon** and 9 of them emerged between October 2018 and March 2019.

**Concluding, the emergence of shared micromobility in Lisbon is certainly welcome, but needs to be managed** as the emergence of scooters has resulted in congestion in isolated pockets across the city.

## Global Market Analysis

**Growing oil and gas prices, saturation inside the automotive segment and the ease of parking and of accessibility**, are some of the key factors that are driving this market at a very fast pace.

In addition, **under the Paris Agreement, the European Union has committed to cut its greenhouse gas emissions by at least 40% below 1990 levels by 2030**. The significant role of micromobility in this effort is, therefore, reinforced, by reducing gas emissions, which represents an urging matter, especially for the American and Chinese markets.

**Moreover, traffic congestion, atmospheric pollution and concerns about environmental footprint, urbanization and rapid population growth, are not just issues that Lisbon is facing**. These are now worldwide hot topics in what concerns the existing transportation modes and ways to travel around the city.

Currently, **more than half of the world's population is living in urban areas**, and this number is expected to rise up to two-thirds by 2050, and, truth be told, all of these people need to move around<sup>8</sup>.

Hence, micromobility market has now the potential to grow: **nearly 60%<sup>9</sup> of all car trips in United States of America (USA), China and the European Union, are 8 kilometers or less**, generating opportunities for e-scooters to become alternative travel modes to perform relatively short-distance and last-kilometer journeys, replacing the use of private car. Also, **around 70%<sup>10</sup> of Americans, who live in major urban areas, associate positive aspects**

<sup>6</sup> Deloitte analysis based on TomTom (2022, January 28). *Lisbon Traffic Report*. Retrieved from TomTom Traffic Index: [https://www.tomtom.com/en\\_gb/traffic-index/lisbon-traffic](https://www.tomtom.com/en_gb/traffic-index/lisbon-traffic)

<sup>7</sup> Uses Jump Bike data from Lisbon

<sup>8</sup> *United Nations (2021, March). 68% of the world population projected to live in urban areas by 2050, says UN*. Retrieved from United Nations: <https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>

<sup>9</sup> Kersten Heineke, B. K. (2019, January). *Automotive & Assembly*. Retrieved from Micromobility's 15,000-mile checkup: <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/micromobilitys-15000-mile-checkup>

<sup>10</sup> Populus (2018). *The Micro-mobility Revolution: The Introduction and Adoption of Electric Scooters in the United States*.

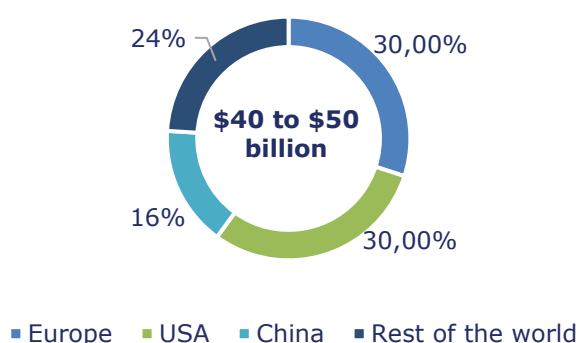


**to e-scooters.**

Another 2018 report<sup>11</sup>, reveals that **Americans took over 84 million trips using micromobility options**, such as dock less scooters, bikes, and traditional bike share systems. Of these, **nearly 38.5 million trips were on shared e-scooters.**

Overall, **the estimated global market for shared e-scooter rides will reach approximately \$40 to \$50 billion, in 2025.** By regions, the estimated size of micromobility market by 2025 can reach \$12 to \$15 billion in America and in the European market and \$6 to \$8 billion in China (\$10 to \$12 billion for the rest of the world) (Figure 1).

**Estimated Global Market by 2025 (%)**



**Figure 1** - Estimated Global Market by 2025. **Source:** BCG (target population x average number of trips x average local price)

The global **micromobility market is expected to grow at a 12% CAGR**, from 2019 to 2029<sup>12</sup>. **One of the main reasons for this disparity in terms of market value by region relates to pricing-per-kilometer strategies.** In the European Union, pricing is approximately 50% compared to the USA, and in China, it represents only about 20% of USA pricing.

Looking into a different perspective in terms of market dimension, **North American region is one of the best markets for micromobility** because of a tremendous public awareness, strong emphasis on eco-friendliness, urban planning and favorable geographical features to the use of micromobility systems.

**Whereas in Europe, one of the main drivers to expand micromobility market is definitely traffic congestion and the fast pace of urbanization**, forcing people to live outside city centers and therefore increasing the average travel commuting distance.

The **Asian region is the location for the majority of urban and congested population centers worldwide.** Thus, micromobility assets are capable to offer faster, easier and cheaper alternative than traditional transportation systems, promoting as well more sustainable journeys

<sup>11</sup> National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility.*

<sup>12</sup> Business Insider. (September, 2019). Retrieved from Global Micromobility Market Is Expected To Grow At A Cagr Of 11.95% During The Forecast Period 2019-2029:

<https://markets.businessinsider.com/news/stocks/global-micro-mobility-market-is-expected-to-grow-at-a-cagr-of-11-95-during-the-forecast-period-2019-2029-1028553181>

across cities.

**Concerning the main challenges of a micromobility ecosystem**, acts of vandalism and robbery towards these assets are permanent issues, as well as fleet daily retrieval, charge, (re)allocation, maintenance and reparation, that may lead to an increase in human capital costs, difficulty in guaranteeing user compliance with designated policies (use of helmet, where to park, etc.), among others.

To conclude, it is **vital to increase infrastructure for alternative transportation modes** (and define policies and regulations to harmonize its use in the community life), **alongside to limit car and other pollutant vehicles circulation in cities**. This is one of the biggest planning challenges worldwide cities are facing.

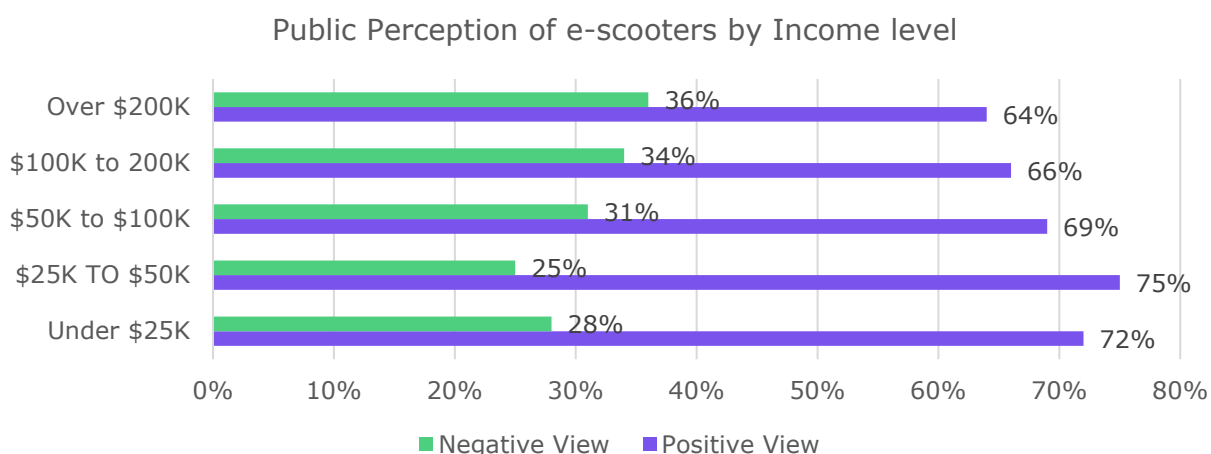
## Global Riders' Profile

Looking at the **profile of a typical micromobility rider**, according to a 2018 study performed<sup>13</sup> in the USA, **men are more willing to ride such transportation mode compared to women**, since they represented 75% of e-scooters and dock less bikes rides (compared to roughly 25% for women).

This difference between genders may be due to the fact that **women are more sensitive towards personal safety**.

**Still in gender comparisons, in the same study, 72% of women associate positive factors to e-scooters than men (67%)**, which may be due to factors regarding greater gender parity (skirts and dresses are not suitable outfits for riding bikes, being easier to ride e-scooters, for instance).

The same study states that **dock less bikes and e-scooters are more likely to register higher adoption rates by lower-income groups**, which can potentially help cities to work towards and achieve transportation equity goals (Figure 2).



**Figure 2** - Public Perception of e-scooters by Income level. Source: Populus

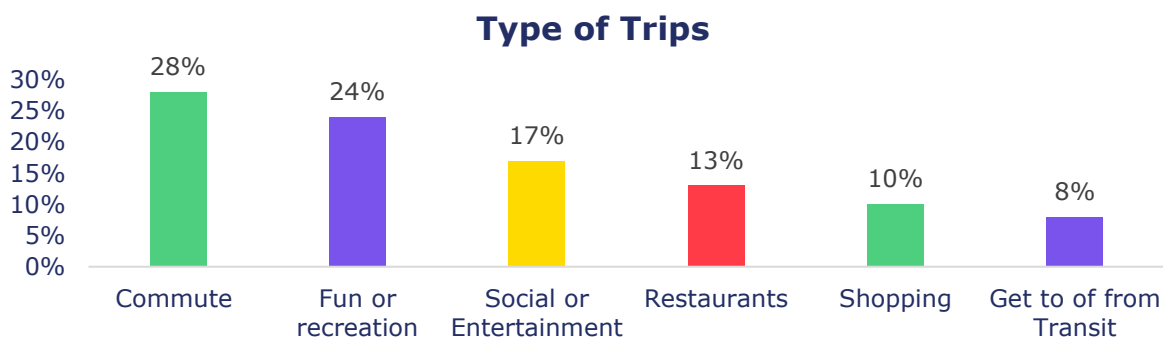
<sup>13</sup> Populus (2018). *The Micro-mobility Revolution: The Introduction and Adoption of Electric Scooters in the United States*.

Moreover, **micromobility is a perfect alternative to replace personal vehicle and ride-hailing trips** (due to traffic congestion), and to **deliver first and last-mile solutions**, by complementing with public transportation.

A 2019 worldwide study<sup>14</sup> conducted by one of the biggest e-scooters players corroborates these assumptions: over **50% of respondents use micromobility vehicles to perform commute routes (37%) or to run own errands (14%)**.

**Additionally, 9% of riders use these vehicles for first/last-mile trips to and from public transit.** In terms of types of trips. Another American study<sup>15</sup> shows that **71% of respondents indicated that they frequently use e-scooters to get to a destination** (commute, social use, restaurant, shopping or get to or from transit), while **28% stated they often use e-scooters for recreation or exercise** (Figure 3).

This same study reveals that **people usually ride e-scooters especially during weekends**, mainly afternoons and evenings, and **around the weekday commute time**, mostly in the way back-home period.



**Figure 3** - Type of e-scooter trips. Source: Portland Bureau of Transportation

## COVID-19 Pandemic Impact

Due to the current pandemic situation caused by COVID-19, people faced the imposition of staying at home, reducing the majority of traffic flows across the city, mainly commuting ones and those made by tourists, leading naturally to a **decrease in the need for micromobility assets, leveraged also by the fear of contacting with the virus.**

**As a result, the total number of trips made in the USA dropped dramatically. In fact, considering the** last weeks of March and the first weeks of April, transit ridership was down by over 80% from the previous year<sup>16</sup>.

**In Lisbon, the total number of operators went from 11 to only 4 due to the pandemic.** Also, the number of **micromobility assets dropped from 7000 to 1800** during this period.

On the upside, due to these lockdown restrictions, **citizens had the opportunity to experience their cities with fewer vehicles and hence less congestions and better air**

<sup>14</sup> Lime (September, 2019). Retrieved from Research Finds Most E-Scooter Riders Are Local Commuters, Not Tourists: <https://www.li.me/second-street/research-finds-e-scooter-riders-local-commuters-not-tourists>

<sup>15</sup> Portland Bureau of Transportation (2018). *2018 E-Scooter Findings Report*. Portland.

<sup>16</sup> National Association of City Transportation Officials (2019). *Guidelines for Regulating Shared Micromobility*.

**quality**, changing the way people think about the importance of environment and its direct effect on their cities and their own lifestyle.

Above all, people all around the world are rethinking their traditional move around habits and routines as well as consumption patterns. The need for alternatives to perform personal and short-distance trips in cities is now a reality, more than ever before.

In many cities, shared micromobility is emerging as a significant way of responding to this health and sanitary catastrophe. As lockdown measures lighten up and several cities reopen, **people are now looking for single-rider, open-air transit alternatives, instead of enclosed spaces with strangers, such as public transportation, where physical contact is inevitable and social distancing is difficult to manage.** In addition, the use of the private car is not part of most European capitals' line of thinking. Consumer behavior is shifting very quickly.

One of the **market recovery signs relates to the purchase of e-bikes that grew nearly 85%**, compared to March 2019<sup>17</sup>.

Another sign is that, **after the lockdown, cities began to offer greater support for micromobility vehicles**, investing in cycling lanes, by transforming previous roads and car lanes into pedestrian and cycling paths.

In May 2020, a consulting firm performed a worldwide survey in order to understand to **which level COVID affected consumers' (positively or negatively) view on the use of micromobility options.** It showed that **consumers are willing to use shared micromobility options on a regular basis by 12%<sup>18</sup> more compared to pre-pandemic levels.**

Naturally, after the pandemic, usage patterns and consumer behavior are changing as well. According to the same survey, users indicated the main concern is the risk of infection (instead of time to destination, as before COVID-19) but, at the same time, they are now more willing to use micromobility in a regular basis.

Concluding, **people are more aware of the importance of personal hygiene, physical distancing and avoiding crowded spaces for short trips (including commuting)**, such as public transportations. As a response, operators need to (and some have already begun) add safety and health-related challenges to the equation, in order to encourage (a safer) use of micromobility alternatives, preventing vehicle contamination.

In addition, **consumers are also more aware of the impact that traditional transportation modes have on their city atmosphere and air quality** (congestions, noise, pollution) after experiencing (the lack of it) during lockdowns, and so it is possible to look at micromobility as an option to defend the environment. It is now an opportunity to offer micromobility as an alternative for people who feel uncomfortable using public transportation, because of the COVID-19 pandemic.

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<sup>17</sup> CB Insights. (n.d.). Retrieved from The Micromobility Revolution: How Bikes And Scooters Are Shaking Up Urban Transport Worldwide: <https://www.cbinsights.com/research/report/micromobility-revolution/>

<sup>18</sup> Kersten Heineke, B. K. (2020, July). Retrieved from The future of micromobility: Ridership and revenue after a crisis: <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-future-of-micromobility-ridership-and-revenue-after-a-crisis>

# Competitor Landscape

As presented, the global micromobility market will most certainly observe impressive growth in the next years. There are several examples of solutions addressing micromobility challenges, and the following represent the **most relevant shared mobility solutions in the market**.

## Remix

Remix coordinates shared mobility programs and provides a platform for cities and municipalities to dynamically redesign routes, which is a unique feature that can be leveraged during emergencies and/or catastrophes.

### Overview

Founded in 2014, in San Francisco, California (USA).

In 2018, the total revenue hit \$155K and currently collaborates with more than 300 cities to manage their public transit, streets, and private mobility. Started as a subscription-based transit-planning model, it gradually moved into Street Redesign and New Mobility.

### Products, Solutions & Services

Three flagship software products:

- **Public Transit** - Allows visualization of transit data through datasets such as origin-destination data, commutes, place of interest, cost and population
- **Streets** - Allows street redesign with cross-section and plan view, comprising elements such as traffic-calming programs, corridor studies etc.
- **New Mobility** - Manages scooters and bikes, shapes policies, and enforces regulations

### Business Model

Remix offers a web-based platform for cities/municipalities through licensing. The cost of annual license also includes multiple users for the license and it monetizes through subscription-based services.

### Key Takeaways

In terms of **Visualization**, it shows available shared mobility assets in a specific area (e.g. California, US). Considering **Supervision and Operation**, it allows an overview of traffic flow,

thereby helping to coordinate the availability of shared mobility assets per area and considering **Analysis and User in Planning**, it enables the use of database information to analyze patterns and city flows.

## TransLoc

TransLoc provides predictive models to simulate rider demand and route planning along with fleet management reports, arrival prediction.

### Overview

Founded in 2004. In 2018, Ford acquired TransLoc, hence it is now a subsidiary of Ford Mobility. The headquarters are located in Durham, North Carolina (USA).

In 2018, the total revenue represented \$5.4M. TransLoc currently provides technology solutions in the Microtransit space. It offers real-time interactive maps, fleet management reports, arrival predictions, passenger information kiosks, and text-based arrival predictions.

Launched **Rider and Traveler app** in 2014 to cater to mobility needs of riders and travelers, followed by partnership with Uber for **last mile delivery** from bus stop in 2016; in 2017, it launched **Architect** with Google for transit agencies, and **Microtransit app & simulator** in 2017.

In 2020 TransLoc, DoubleMap, and Ride Systems unify as one company under the name, TransLoc.

### Products, Solutions & Services

Three key solutions:

- **On Demand** – Provides mobility services to transportation authorities (such as state powered cab service), etc.
- **Microtransit Simulator** – Uses big data analytics to plan, simulate and analyze the impact of adding a new route or changing an existing route
- **Architect** – Enables the agencies to easily create and update fixed-route stops, trips, and shapes to save transit time & money

### Key Takeaways

Considering **Visualization**, it offers real-time passenger information services including, live regional transit map, bus tracking mobile app (e.g. Florida, US) and regarding the **Pricing Dynamic**, it offers predictive models to simulate rider demand and fleet operations.

## Rydies

Rydies provides real time updates regarding parking and parking spaces for bicycles, free-float and station-bound bike-sharing and charging stations for e-bikes, enabling people to avail bicycles and e-bikes to cover short distances easily.

### Overview

Founded in 2016, in Hanover (Germany).

Rydies is a platform and B2B marketplace, which digitally connects information and booking functions related to bicycles and e-bikes, offering its customers complete and interconnected package for mobility and connections. Started as manual bike rental company, it evolved as online booking platform for bicycles and e-bikes; lately, it has invested in digitization of parking and bike path infrastructure for better customer service.

### Products, Solutions & Services

Two key modules:

- **Operator module** – Enables mobility operators to integrate their services via API, widgets or white label integrators and monitors data regarding micromobility assets and their usage
- **User module** – Allows citizens to visualize location of e-bikes and book online seamlessly

### Business Model

For B2C users, Rydies offers a free software and earns revenue from in-app advertisement. The basic version costs €200 and hides all ads while premium version costs €250 for additional proximity search and filter by types of bikes.

### Key Takeaways

To ensure **Real Time Data Monitoring**, the collaboration of Rydies and Lumiguide drives the initiative around offering availability of bicycle parking spaces in real time. Regarding **Data Monetization**, operators of parking station can leverage data to manage their station efficiently. In terms of **Dashboard Options**, Rydies provides operator module to visualize and monitor availability and location of assets.

## Vianova

Vianova enables better integration and collaboration between cities and connected transportation services, by integrating all forms of mobility within their urban space, in order to foster more livable and breathable streets.

## Overview

Founded in 2018, in Paris (France).

Currently collaborates with multiple partners across cities and operators allowing cities to facilitate the integration, comparison and analysis of mobility data as well as to monitor mobility operator’s compliance with their local laws (fleet sizes, parking rules, traffic zones, etc.).

## Products, Solutions & Services

Two flagship solutions:

- **Data Insights** – allows real-time visualization of vehicles’ location and monitors the evolution of fleet sizes, services utilization and number of trips, by each provider as well as receives alerts for safety hazards and sends service request
- **Mobility Polices** – dynamically assigns, customizes and implements geo-fenced policies with multiple rules (parking, riding, speed, distribution, among others) and monitors regulations compliance with city policies, due to shared performance metrics

## Key Takeaways

In terms of **Real Time Data Visualization**, it helps to digest and make good use of complex mobility data (fleets sizes, services utilization and number of trips), by visualizing the daily transportation operations within an urban space. When it comes about **Regulation**, this platform monitors all mobility services' activity to ensure regulations compliance, identifying new transit needs compared to the existing infrastructure.

## Competitor Comparison

After analyzing each competitor individually, it is possible to cross data<sup>19</sup> in order to compare to have a general perspective on their micromobility offer and main key aspects (Table 1).

**Table 1** – Competitor comparison

Competitor	Foundation & HQ	Mobility Solutions	Presence/ Locations	Customers	Key attributes
Remix	2014, San Francisco, USA	<ul style="list-style-type: none"> <li>• Public Transit</li> <li>• Streets</li> </ul> New Mobility	Worldwide (Sweden, Ireland, USA, Canada, etc.)	Local Governments (Over 340 cities)	<ul style="list-style-type: none"> <li>• Visualization</li> <li>• Supervision and Operation</li> </ul> Analysis and User in Planning
TransLoc	2004, Durham, USA	<ul style="list-style-type: none"> <li>• On Demand</li> </ul>	USA	Local Governments	<ul style="list-style-type: none"> <li>• Visualization</li> </ul> Dynamic Pricing

<sup>19</sup> Deloitte analysis, based on the available information about the competitors



		<ul style="list-style-type: none"> <li>• Microtransit Simulator</li> </ul>		<ul style="list-style-type: none"> <li>• Transit Agencies</li> <li>• Universities</li> <li>• Airports &amp; Hotels</li> <li>• Universities</li> </ul>	
Rydies	2016, Hanover, Germany	<ul style="list-style-type: none"> <li>• Operator Module</li> <li>• User Module</li> </ul>	Europe (Finland, the Netherlands, Germany, etc.)	<ul style="list-style-type: none"> <li>• Bicycle renting Operators</li> <li>• Sharing, parking &amp; charging Operators</li> </ul>	<ul style="list-style-type: none"> <li>• Real Time Data Monitoring</li> <li>• Data Monetization</li> <li>• Dashboard Options</li> </ul>
Vianova	2018, Paris, France	<ul style="list-style-type: none"> <li>• Data Insights</li> <li>• Mobility Policies</li> </ul>	Europe (Portugal, Switzerland, Belgium, France, UK, etc.)	<ul style="list-style-type: none"> <li>• Local Governments</li> <li>• Sharing Operators</li> </ul>	<ul style="list-style-type: none"> <li>• Visualization</li> <li>• Regulation</li> </ul>

**Vianova, Rydies and Remix can be highlighted as the platforms that aid in real-time visualization and operation of the micromobility in cities.**

**Remix has a particular focus on the analysis and data-driven planning of the mobility ecosystem**, bringing together multiple mobility modes and not focusing exclusively on micromobility.

**Rydies focuses more on the aggregation and real-time visualization and booking** of the micromobility assets from different providers.

Finally, **Vianova provides a specific emphasis on the regulatory aspects of the public spaces**. It provides a tool to apply policies for the parking of micromobility assets, together with smart tracking which monitors compliance of the applied policies.

# Data Standards & their contribution towards regulation

Data standards are an essential building block not only for the mobility ecosystem but also for data in general. Apart from improving the quality of the data generated by different sources, data standards **enable a seamless development of solutions** that can be easily adapted to any source that has information organized using a specific data standard, without needing customization for each data source.

Working with mobility providers that have adopted a data standard enables a far easier regulation of the different providers, as data can always be expected in the same format.

**In the mobility domain, there are three main developed data standards: Mobility Data Specification (MDS), General Transit Feed Specification (GTFS) and General Bikeshare Feed Specification (GBFS).**

## MDS

The Mobility Data Specification (MDS) is a mobility data standard, intended to be used only by regulators, and not the public in general.

The standard was first developed in 2018 by the Los Angeles Department of Transportation (LADOT), and started to be managed in 2019 by the Open Mobility Foundation, whose members include cities such as Los Angeles, Seattle and San Francisco.

MDS standardizes communication and data sharing between cities and private mobility providers, such as e-scooter and bike share companies. This allows cities to share and validate policy digitally, enabling vehicle management and better outcomes for residents. Moreover, it provides mobility service providers with a framework they can re-use in new markets, allowing for seamless collaboration that saves time and money.

MDS is currently comprised of three distinct components: **provider**, **agency** and **policy**.

The **provider** component is intended to be implemented by mobility providers and consumed by regulatory agencies. It allows private mobility companies to report data to cities on the number, location, status, and ride history of devices in use.

The **agency** component is intended to be implemented by regulatory agencies and consumed by mobility providers. It allows for real-time updates and collaboration between city officials and providers when complex city transportation problems demand dynamic solutions.

The **policy** component is intended to be implemented by regulatory agencies and consumed by mobility providers. It allows cities to set rules for how and where different vehicles can operate, how many can operate, and other high-level policy initiatives.

## GTFS

The General Transit Feed Specification (GTFS) defines a common format for public transportation schedules and associated geographic information. GTFS feeds let public transit agencies publish their transit data and developers write applications that consume that data in an interoperable way.

TriMet in Portland, Oregon, along with Google, was one of the first public agencies to try and tackle the problem of online transit trip planners through the use of open datasets that are shared with the general public. TriMet worked with Google to format their transit data into an easily maintainable and consumable format that could be imported into Google Maps. This transit data format was originally known as the Google Transit Feed Specification, but was later in 2010 changed to the General Transit Feed Specification to accurately represent its use in many different applications outside of Google products.

The GTFS specification defines a number of different data files that describe the transportation system, such as the stops, routes, schedules, among others. Detailed information on the GTFS standard is provided in Table 2 below.

**Table 2** – GTFS standard files<sup>20</sup>

Filename	Required	Defines
agency.txt	Required	Transit agencies with service represented in this dataset.
stops.txt	Required	Stops where vehicles pick up or drop off riders. Also defines stations and station entrances.
routes.txt	Required	Transit routes. A route is a group of trips that are displayed to riders as a single service.
trips.txt	Required	Trips for each route. A trip is a sequence of two or more stops that occur during a specific time period.
stop_times.txt	Required	Times that a vehicle arrives at and departs from stops for each trip.

<sup>20</sup> GTFS. (2022, January 28). Best Practices for GTFS. Retrieved from General Transit Feed Specification: <https://gtfs.org/best-practices/>

calendar.txt	Conditionally required	Service dates specified using a weekly schedule with start and end dates. This file is required unless all dates of service are defined in calendar_dates.txt.
calendar_dates.txt	Conditionally required	Exceptions for the services defined in the calendar.txt. If calendar.txt is omitted, then calendar_dates.txt is required and must contain all dates of service.
fare_attributes.txt	Optional	Fare information for a transit agency's routes.
fare_rules.txt	Optional	Rules to apply fares for itineraries.
shapes.txt	Optional	Rules for mapping vehicle travel paths sometimes referred to as route alignments.
frequencies.txt	Optional	Headway (time between trips) for headway-based service or a compressed representation of fixed-schedule service.
transfers.txt	Optional	Rules for making connections at transfer points between routes.
pathways.txt	Optional	Pathways linking together locations within stations.
levels.txt	Optional	Levels within stations.
feed_info.txt	Conditionally required	Dataset metadata, including publisher, version, and expiration information.
translations.txt	Optional	Translated information of a transit agency.
attributions.txt	Optional	Specifies the attributions that are applied to the dataset.

## GBFS

The General Bikeshare Feed Specification, known as GBFS, is a public, open data standard for shared micromobility. GBFS makes real-time data feeds in a uniform format publicly available online, with an emphasis on findability.

Under NABSA’s leadership, the General Bikeshare Feed Specification (GBFS) Version 1 was developed by a team of bikeshare system owners and operators, application developers, and technology vendors. Over 290 bikeshare and scooter systems worldwide have adopted the GBFS open data standard since its release in November 2015.

GBFS is intended as a specification for real-time, read-only data – any data being written back into individual bikeshare systems are excluded from this specification. The specification has been designed with the following concepts in mind:

- Provide the status of the system at this moment
- Do not provide information whose primary purpose is historical
- The data in the specification is intended for consumption by clients intending to provide real-time (or semi-real time) transit advice and is designed as such

The GBFS standard provides the information described in Table 3 below.

**Table 3** – GBFS standard required information<sup>21</sup>

File Name	Required	Defines
gbfs.json	Yes <i>(as of v2.0)</i>	Auto-discovery file that links to all of the other files published by the system.
gbfs_versions.json <i>(added in v1.1)</i>	Optional	Lists all feed endpoints published according to versions of the GBFS documentation.
system_information.json	Yes	Details including system operator, system location, year implemented, URL, contact info, time zone.
vehicle_types.json <i>(added in v2.1-RC)</i>	Conditionally required	Describes the types of vehicles that System operator has available for rent. Required of systems that include information about vehicle types in the free_bike_status file. If this file is not included, then all vehicles in the feed are assumed to be non-motorized bicycles.
station_information.json	Conditionally required	List of all stations, their capacities and locations. Required of systems utilizing docks.
station_status.json	Conditionally required	Number of available vehicles and docks at each station and station availability. Required of systems utilizing docks.

<sup>21</sup> GitHub. (2022, January 28). NABSA - General Bikeshared Feed Specification (GBFS). Retrieved from GitHub: <https://github.com/NABSA/gbfs/blob/master/gbfs.md#files>

free_bike_status.json	Conditionally required	(as of v2.1-RC2) Describes all vehicles that are not currently in active rental. Required for free floating (dockless) vehicles. Optional for station based (docked) vehicles. Vehicles that are part of an active rental must not appear in this feed.
system_hours.json	Optional	Hours of operation for the system.
system_calendar.json	Optional	Dates of operation for the system.
system_regions.json	Optional	Regions the system is broken up into.
system_pricing_plans.json	Optional	System pricing scheme.
system_alerts.json	Optional	Current system alerts.
geofencing_zones.json (added in v2.1-RC)	Optional	Geofencing zones and their associated rules and attributes.

# Regulating micromobility

**The success rate in adopting micromobility options to navigate through traffic-clogged cities is shaping a new mobility reality for commuters and visitors. New ways of people moving are indeed transforming city landscapes and metropolitan transportation.**

However, not only positive factors are associated with spread of these vehicles in the city; public complaints and chaos come along. This fact inevitably represents **urging and pressing challenges for cities and local authorities towards regulatory frameworks and policies**, to ensure public safety and the correct use of public space, to make these vehicles as a reliable part of the transportation network, protecting riders (and non-riders, equally).

The majority of micromobility providers are private companies, hence the importance of defining the legal framework and regulation scenarios on which they will set their operations, aiming at maximizing public benefit.

To **organize the market and keep public spaces neat through basic legal regulation**, local authorities should bear in mind the need of infrastructure investments to promote safe micromobility practices, equitable practices among different operators, favorable fee structures, public engagement for a correct use of these vehicles, data management, and technologies to ensure greater control over fleets (ex: geo-fencing).

Nevertheless, before considering business operations, parking option, street design, parity in providing access to the micromobility network, **local governments need to first focus on reflecting, designing and establishing overall provisions, like basic legal framework and other regulations that allow these services and vehicles to operate in their communities.**

In fact, the speed at which many cities in Europe and in the USA are experiencing the increased popularity of e-scooters highlighted (and still does) **the lack of both local and national legal frameworks, policies and norms to regulate the micromobility ecosystem.**

Over the last years, cities are reacting towards this need in very different ways, lacking some guidance or common standards. For example, in Europe, local authorities are taking several different actions<sup>22</sup>:

- **Germany:** e-scooters are allowed on public roads if the maximum speed does not exceed 20 km/h, the vehicle is equipped with front lights, side reflectors, two brakes and a bell (or similar);

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<sup>22</sup> Twisse, F. (2020, August 5). *Overview of policy relating e-scooters in European Countries*. Retrieved from Eltis - The Mobility Observatory: <https://www.eltis.org/resources/case-studies/overview-policy-relating-e-scooters-european-countries>

- **Sweden:** e-scooters must be equipped as the German ones and, in addition, riders who are younger than 15 years old, must wear a helmet;
- **Belgium:** e-scooters are allowed on public roads if the speed limit is set at 25 km/h;
- **Spain:** the maximum speed limit is also set at 25 km/h and e-scooters must have an insurance.

Even though guidelines and regulations are, most of the time, local there are some standards to retain:

- **Infrastructures** on which these vehicles are allowed to be used (bike lanes, roads, streets);
- **Compliance with general safety rules** (recommendation on wearing a helmet, lights, reflectors, brakes);
- Establishment of **minimum age limits** that are allowed to ride an e-scooter;
- **Training requirements** (driving license);
- **Only one rider per vehicle.**

**In Portugal, e-scooters' riders are not obliged to possess driving license, however they still have to comply with traffic rules and be over 18 years old**, either to safeguard good practices when using it, or to safeguard road and pedestrians safety. In 2018, according to Polícia de Segurança Pública (PSP), 1.180 accidents were registered involving both e-scooters and electric bikes<sup>23</sup>.

**Considering the Portuguese "Código da Estrada", according to the 112<sup>th</sup> article, e-scooters are subject to the same rules as bikes and other cycles.**

Hence, it is mandatory to comply with traffic rules, driving cannot exceed 25 km/hour, riders cannot drive on the sidewalks (only on the streets and bike lanes or other appropriate paths) and although recommended, helmet use is not mandatory. To conclude, it is forbidden to drive under the influence of alcohol or drugs.

Considering these examples, it is possible to understand **the importance of establishing legal common ground to regulate micromobility, leveraging synergies between cities and operators.**

Above all, it is extremely important that **cities (and operators) monitor, analyze and assess the impacts of establishing certain measures in order to understand and identify best outcomes and practices**, to make the necessary adjustments.

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<sup>23</sup> Caixa Geral de Depósitos, S.A. (2019, August 20). *Regras para utilizar as trotinetes elétricas*. Retrieved from <https://www.cgd.pt/Site/Saldo-Positivo/mobilidade/Pages/trotinetas-eletricas.aspx>



# Conclusion

Cities want to reduce dependence on cars, users want the most convenient, cost-effective point-to-point solution and operators and services' providers want to maximize usage, and profitability of its assets, while guaranteeing public safety and public space quality.

**Micromobility options arise as one powerful “tool” that both private and public companies have to accelerate the sustainable urban mobility transformation, despite the multiple business models and governmental policies challenges.**

Distinct solutions to better manage the distribution of micromobility assets in public spaces are appearing in order to help cities manage and regulate this new transportation mode. **These solutions, together with a comprehensive set of data standards, will greatly help the growth and evolution of the micromobility ecosystem in a scalable, robust and organized manner.**

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