SHARED MOBILITY DATA
A PRIMER FOR OREGON COMMUNITIES

PREPARED FOR THE OREGON DEPARTMENT OF TRANSPORTATION

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Purpose

This document aims to provide communities in Oregon, in particular cities, counties, transit agencies, metropolitan planning organizations, and other local entities, with information and resources for shared mobility data policies and practices.

This Primer is not a comprehensive resource. It is a starting point for preparation and planning in advance of the deployment of shared mobility services in their communities.

Overview

Transportation options are growing in Oregon communities as they are across the world. In addition to increased public transit service made possible by the Statewide Transportation Improvement Fund (STIF), jurisdictions across Oregon are seeing new services popping up, often without notice. These shared mobility services include ride sourcing, bike share, car share, e-scooter share, and microtransit.

Shared mobility transportation options typically operate through web-based technologies (e.g., mobile apps or websites). Just by using these platforms, users share a variety of personal data about the users and their travel patterns. Just as these companies will use this data to improve their product and for marketing, public agencies have the opportunity to use this data to support transportation planning and regulatory decisions; at the same time, the collection, storage, and use of the data may also raise concerns for consumers, providers, and jurisdictions themselves.

Why This Matters

Public demand for shared mobility is growing, as is our understanding of how it fits into the broader picture of transportation solutions in Oregon communities. In the course of their operation, shared mobility companies collect a large amount of data about their users and travel patterns. Local jurisdictions can establish guidelines for how companies use this data, and also what data these companies need to share with the jurisdiction. In many jurisdictions, a condition of approval for shared mobility companies to operate within their boundaries is a data sharing and management agreement.

For jurisdictions, having access to shared mobility data allows them to see travel patterns in their communities, make responsive transportation planning decisions, ensure oversight

of shared mobility companies operating in the public right of way, and monitor equity impacts of these services.

Glossary of Shared Mobility Data Terms
Shared Mobility Data Primer

The following are common terms related to shared mobility data. Some terms have definitions that go beyond the scope of shared mobility data, but for brevity, this glossary does not include those broader definitions.

Application Programming Interface (API)
A tool that enables data transmission between software products. For shared mobility, APIs allow access to shared mobility data as published by a shared mobility provider.

Data Aggregation
Data points grouped into a set. For shared mobility, data aggregation can be applied to user trips, vehicle locations, user demographics, or other data points generated by shared mobility operations.

Data Anonymization
The removal of personally identifiable information (PII) from a data point or set of data points.

Data Specification/Open Data Specification
A standardized way to create, define, and organize data in order to ensure consistency and interoperability. A data specification is considered "open" if:
- It is free and accessible to anyone;
- It is developed by a community that allows participation from a wide range of stakeholders, whether industry professionals, government entities, academics, or the general public;[1] and
- Its community has a transparent and democratic decision-making process.

General Bike share Feed Specification (GBFS)[2]
Open data specification that generates public-facing, real-time information about shared mobility vehicles, specifically bike share and e-scooter share at this time, but future

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[1] https://transparencee.org/analysis/data-standards-what-are-they-and-why-do-they-matter/
[2] Current version of the specification is available at https://github.com/NABSA/gbfs/blob/v2.0/gbfs.md

versions may include car share, and their availability. The North American Bikeshare Association (NABSA) originally developed GBFS in 2015.

General Transit Feed Specification (GTFS)

The data 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.

Micromobility

Shared mobility services that employ smaller vehicles such as bicycles and scooters for short-range trips.

Mobility Data Specification (MDS)[3]

Open data specification that produces non-public shared mobility data for jurisdictions to help them manage the public right of way. MDS differs from GBFS in that it generates data on vehicle *usage*, as opposed to just location and availability.

Open Data

Data that is non-proprietary, free, and available to anyone for re-use and redistribution.

Personally Identifiable Information (PII)

Data that can be connected to specific individuals. This includes geospatial data such as trips taken. PII is commonly protected by data aggregation and anonymization.

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[3] Current version of the format is available at https://github.com/openmobilityfoundation/mobility-data-specification/releases/tag/0.4.1

Shared Mobility or Shared Use Mobility (SUM)

Transportation services that users share rather than own. For the purposes of this Primer, these services include ride sourcing (e.g., transportation network companies (TNCs), such as Uber and Lyft); bike share; care share; e-scooter share; and microtransit, each defined below.[4]

Ride sourcing/transportation network companies (TNCs)

Use of online platforms to connect passengers with drivers and to automate reservations, payments, and customer feedback. While TNCs were the first to deploy this technology on a large scale, similar applications have emerged in many areas that connect passengers with taxicabs.

Bike share

Short-term bike rental, usually for periods of an hour or less. Use of bike share systems usually requires a membership, which can range from a single ride or several days to an annual membership). Technology-enabled public bike sharing provides real-time information about the location of bikes and, where applicable, bike docking stations.

Car share

A service that provides members with temporary access to an automobile. Major care sharing business models include:

- Traditional round-trip, which requires users to borrow and return vehicles at the same location;
- One-way or free-floating, which allows users to pick up a vehicle at one location and drop it off at another; and
- Peer-to-peer (p2p), which allows car owners to earn money when they are not using their vehicles by renting them to other car share members.

E-scooter share[5]

Typically free-floating fleets of motorized scooters available to users by the minute or hour.

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[4] Except for e-scooter share, shared mobility service definitions adapted from TCRP Research Report 188, accessible at http://www.trb.org/Main/Blurbs/174653.aspx.

[5] https://sharedusemobilitycenter.org/wp-content/uploads/2016/10/Reference-Guide-Editsweb-version-10.24.2016.pdf

Microtransit

Multi-passenger transportation services, similar to a dial-a-ride, that are IT-enabled and serve passengers using dynamically generated routes. Passengers may be expected to make their way to and from common pick-up or drop-off points. Vehicles can range from large SUVs or vans to shuttle buses. Because they provide transit-like service on a smaller, more flexible scale, these new services have been referred to as microtransit. *Note: microtransit should not be confused with autonomous shuttles that operate along a predetermined route and may operate without a driver.*

Shared Mobility Data

Information generated in the operation of shared mobility services. This may include user trips taken, vehicle locations, fleet sizes, and financial transactions.

Shared Mobility Provider

An entity that operates a shared mobility service. Uber, Lyft, Lime, and Zipcar are examples of shared mobility providers.

Third Party Application

Software developed by an entity other than a shared mobility provider or implementing jurisdiction that uses data generated by shared mobility services. Data may be used to display user information (e.g., vehicle availability) or conduct data analysis.

Chapter 1: Understanding Shared Mobility Data
Shared Mobility Data Primer

Purpose of this chapter

This chapter discusses GBFS and MDS - the two major shared mobility data specifications. As of the summer of 2020, these specifications are used only for micromobility, and not for other shared mobility modes like ride sourcing and microtransit. However, this could change as the operation of these services as well as the specifications themselves evolve.

To best understand mobility data it is important to define a few key terms. The following sections use GTFS--a well-established data specification used to display information about public transit services--as an example to help contextualize these terms.

What is a data specification?

A data specification standardizes how data is created, defined, and organized in order to ensure consistency and interoperability. Just as someone crossing a street can rely on signage having certain universal definitions wherever they are (e.g., a red light means stop; a green light means go), so too can someone using standardized data rely on a level of predictability in how it is defined. One of the applications of GTFS, for example, is to provide a standardized way to organize traveler-facing public transit data. This enables third-party[6] apps like Transit and Google Maps to display transit information from hundreds of agencies consistently because their data follows a shared format. Without a data specification such as GTFS, it would be unfeasible to consolidate and represent information at this scale, since there would be as many unique representations of data as there are agencies.

What is an *open* data specification?

A data specification is considered "open" if:
- It is free and accessible to anyone;

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[6] In this case, "third-party" refers to the app's intermediary role in delivering information from transit agencies to the public.

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- It is developed by a community that allows participation from a wide range of stakeholders, whether industry professionals, government entities, academics, or the general public;[7] and
- Its community has a transparent and democratic decision-making process.

GTFS is an open data specification because it meets these criteria. Anyone can view the text of the specification, the community allows everyone to contribute to the development process and participate in related discussions, and that process is well-defined and consensus-based.

What is open data?

Open data is information which is non-proprietary, free, and available to anyone at no cost. Open data can come in many forms, from certain public records produced by government entities, to the crowd-sourced mapping data of OpenStreetMap.org.[8] In the case of GTFS, many transit agencies regularly publish their datasets on websites like OpenMobilityData,[9] making them publicly and freely accessible (open).

1. GTFS is a **data specification**.
2. GTFS is **openly** available to use.
3. GTFS producers create **open data** by making their datasets available for public consumption.

GBFS

This open data specification was originally developed by the North American Bikeshare Association (NABSA) in 2015.[10] Shared mobility providers--specifically bike share and e-scooter share at this time--produce GBFS data which generates public-facing, real-time information about shared mobility vehicle locations and their availability. Jurisdictions can require shared mobility providers to make their GBFS data available to third-party applications like Transit or Google Maps so that this information is displayed publicly for travelers. If this data were not made available, an individual would need to download an application for each shared mobility company operating in their area to see the full picture of available vehicles.

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[7] https://transparencee.org/analysis/data-standards-what-are-they-and-why-do-they-matter/

[8] https://www.openstreetmap.org/about

[9] https://transitfeeds.com

[10] https://github.com/NABSA/gbfs

Because GBFS is oriented toward providing travelers with real-time information about their options, it does not include historical data or data about vehicle usage. For example, GBFS cannot show the path of travel between the start and end points of a single trip.

To better understand the function of GBFS, consider the following illustration:

Susan's Trip	GBFS Details
1. Susan wants to ride an e-scooter to drop off a package at a nearby post office, so she opens a trip planning app. A map shows the location of all currently available shared mobility vehicles. Susan sees that the only vehicle within walking distance is a ZippyRide e-scooter, 100 feet away. She also sees details specific to the vehicle, such as price per minute and battery level.	The scooter Susan sees on the app's map exists as a data point in the ZippyRide GBFS dataset, which Susan's trip planning app of choice consumes and then displays publicly. If ZippyRide did not publish their GBFS data to Susan's app, she would not have seen the closest option for her trip. (She would have instead needed to use an app owned and developed by ZippyRide itself or may have traveled farther to access a vehicle from a different shared mobility provider.)
2. Susan reserves the ZippyRide e-scooter* and begins her trip to the post office. * Depending on the GBFS dataset, a user may be able to navigate to the e-scooter's app from the trip planner to book a ride.	Only **available** scooters exist in the ZippyRide dataset, so Susan's scooter disappears from the view of other app users once she reserves it. Any scooters currently in use or offline (due to maintenance or redistribution) are **not** represented in GBFS datasets.
3. Susan arrives at the post office and ends her trip with the scooter.	Now that Susan is finished with the scooter, it once again appears on the app and is available for others to use, this time with a different ID.* * To mitigate privacy concerns, vehicles are assigned new IDs after use. This makes it more difficult to reconstruct individual trips.

GBFS is "developed and maintained by the community of producers and consumers."[11] All major shared mobility providers use the specification, and all major trip planning applications ingest GBFS data. Because it is an open data specification, anyone can participate in its continuing development, and anyone producing or consuming GBFS can vote on changes to the specification.

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[11] https://github.com/NABSA/gbfs

MDS

This open data specification was developed by the Los Angeles Department of Transportation (LADOT) in 2018 and is now managed by Open Mobility Foundation (OMF).[12] MDS produces non-public shared mobility data for jurisdictions to help them manage the public right of way.[13] This data includes information on vehicle *usage*, such as historical trip data or status changes due to maintenance.[14] While GBFS is user-focused, the primary uses for MDS are to regulate shared mobility operators (e.g., determining whether they are meeting permit requirements), support understanding and analysis of the transportation system, and inform transportation planning. Jurisdictions can pick and choose which components of MDS to use, as it is designed to be a "modular kit-of-parts."[15] Over 80 cities worldwide currently use MDS including Los Angeles, Santa Monica, and Austin.

MDS consists of three Application Programming Interfaces (APIs):[16]

Provider

- Allows jurisdictions to pull historical vehicle and trip data from the shared mobility provider.
- Of the three APIs, its implementation is the least complex.
- It is the most commonly used API.[17]

Policy

- Allows jurisdictions to automatically publish operating rules—such as vehicle caps and speed limits—to shared mobility providers instead of communicating them manually.[18]
- It is the newest API, so fewer software tools exist to assist in its implementation.

Agency

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[12] https://github.com/openmobilityfoundation/mobility-data-specification

[13] Populus Technologies, Inc. (2020). A Practical Guide to Mobility Data Sharing and Cities. Retrieved from: https://www.populus.ai/resources/white-papers

[14] Ibid.

[15] https://github.com/openmobilityfoundation/mobility-data-specification

[16] https://github.com/openmobilityfoundation/governance/blob/main/technical/Understanding-MDS-APIs.md

[17] https://www.ridereport.com/blog/what-is-mds-questions

[18] https://github.com/openmobilityfoundation/mobility-data-specification/tree/main/policy

- Allows jurisdictions to conduct real-time monitoring of shared mobility operations.
- Implementation requires high technical capacity, and few software vendors offer support.
- Less commonly used due to the privacy concerns surrounding the real-time data of individual trips it produces.[19] (For example, Agency could reveal in real-time the start and end points of a trip from a residential complex to a reproductive health care clinic, political rally, or other sensitive location.)

While MDS is not a public-facing specification, its development is open to the extent that anyone can access and contribute ideas for the specification on GitHub. Ultimately, however, it is the OMF board of directors alone who vote on any final decision regarding changes to the specification.[20]

Implications for Jurisdictions

Having access to shared mobility data allows jurisdictions to make responsive transportation planning decisions related to these services, ensure oversight of shared mobility companies operating in the public right of way, and monitor equity impacts of these services.[21] **Many municipalities have allowed shared mobility companies to operate within their jurisdictions on the condition that they share this data.** Data requirements in these agreements--e.g., providing GBFS and/or MDS datasets--depend on the unique needs and goals of the jurisdiction.[22]

GBFS data provides an "at-a-glance" overview of a shared mobility program in real-time and comes with fewer privacy concerns since it does not collect detailed trip patterns.[23] However, jurisdictions will not find GBFS sufficient for regulation of the services. MDS, which is more robust and includes the ability for jurisdictions to retain data for historical analysis, can fill this gap. But privacy advocates, including the Electronic Frontier Foundation and the Center for Democracy and Technology, have voiced concerns about

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[19] https://www.ridereport.com/blog/what-is-mds-questions

[20] https://github.com/openmobilityfoundation/mobility-data-specification/blob/main/ReleaseGuidelines.md

[21] https://nacto.org/wp-content/uploads/2019/05/NACTO_IMLA_Managing-Mobility-Data.pdf

[22] See Chapter 2: Policy Development for further guidance on creating data sharing agreements as part of shared mobility policy development.

[23] It is technically possible to capture GBFS data and store it historically, but with the implementation of rotating vehicle ids, it is much harder.

MDS, stating that governments or third parties acting with malicious intent could use it to track individuals.[24]

Jurisdictions will need to balance the data collection necessary to manage the public right of way and their responsibility to maintain privacy protections. Small and rural jurisdictions in particular will need to closely consider the privacy concerns of MDS when planning for shared mobility services, since it is more difficult to anonymize data gathered from smaller population sizes. That is, the smaller the pool of users, the fewer trips that appear in the data, making it easier to narrow down a specific individual's travel behavior (for example, between a known person's residence and their workplace).

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[24] https://ggwash.org/view/77285/mobility-data-standard-scooters-bikes-autonomous-vehicles-uber-lyft-ddot-los-angeles

Chapter 2: Policy Development
Shared Mobility Data Primer

Purpose of this chapter

A successful shared mobility program requires clear goals and objectives, and jurisdictions need data to determine whether the program is meeting these goals and objectives. Jurisdictions have both an opportunity to learn from this data and a responsibility to ensure that data collection, storage, retention, sharing, and analysis do not compromise users' personal privacy. Developing policies that address these issues should be a priority for communities looking to implement shared mobility programs in order to prepare for partnerships with shared mobility providers.

Recommended approach

In planning for a shared mobility program, the following incremental steps are recommended:

1. Lay the groundwork.
    -   Learn the local, state, national, and international[25] policies and regulations related to shared mobility data, including the Freedom of Information Act and state sunshine laws.[26]
    -   Review data practices of other municipal departments and agencies (e.g., public health, public works, or criminal justice departments). The jurisdiction may already have policies and regulations applicable to shared mobility data.
    -   Train relevant staff on data specifications, data standards, and open source data, in particular GBFS and MDS.[27]
    -   Learn about the connections between shared mobility data and PII.
    -   Engage the community of potential shared mobility users to understand concerns about shared mobility data issues. Information gathered from this

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[25] The European Union's General Data Protection Regulation (GDPR) applies to companies serving persons from the EU but within the U.S. See https://gdpr.eu/compliance-checklist-us-companies/

[26] Oregon's Sunshine Committee: https://www.doj.state.or.us/oregon-department-of-justice/public-records/public-records-reform/oregon-sunshine-committee/

[27] Chapter 1 of this Primer provides an overview of data standards and specifications including GBFS and MDS.

engagement will inform how to tailor policies that address these concerns as much as possible while meeting the jurisdiction's needs.

2. Establish the purposes for shared mobility data using these as a guide:
   - Clarify the overall objective of the shared mobility program
   - Determine how mobility data can benefit the jurisdiction's program evaluation and transportation planning
   - Consider how equity will be incorporated into the program and what data is needed to measure equity outcomes
   - Identify any conflicts between the data needed to measure success and ensuring protection of PII?

3. Clearly define shared mobility data scope and protection, using these questions as a guide:
   - What data will mobility providers be required to share with the jurisdiction?[28]
   - How often will this data be provided, and in what format(s)?
   - Will data be stored on a government server, or by a third party?
   - How long will data be retained?
   - Who will have access to the data shared?
   - How will the jurisdiction use the data?
   - How will these decisions be communicated to constituents?

4. Draft shared mobility data policies.
   Formalize the goals for shared mobility data (Steps 1-3). The decision tree on page 18 and the MOD Learning Center[29] are two useful resources for this process. Potential strategies include:
   - Adopt ordinances and/or administrative rules.
   - Create a framework for data sharing agreements.[30] Certain details may need to be tailored based on individual shared mobility projects and vendors, so the framework should allow for some flexibility.

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[28] See Chapter 3: Good Practices for some examples of commonly required data points and the Mobility Data Collaborative's *Data Sharing Glossary and Metrics for Shared Mobility* for an in-depth review, accessible at https://mdc.sae-itc.com/#work

[29] https://learn.sharedusemobilitycenter.org/

[30] See the Mobility Data Collaborative *Guidelines for Mobility Data Sharing Governance and Contracting*, accessible at https://mdc.sae-itc.com/#work

- Include data collection, storage, retention, and sharing requirements in shared mobility vendor permitting requirements.
- Draft a declaration of principles that guide the internal use, oversight, and public release of shared mobility data.[31]

[31] https://theodi.org/article/how-to-write-a-good-open-data-policy/

Decision Tree

The orange circles indicate the starting and ending points for the decision process, beginning with the objectives agencies must determine before a data agreement can be reached. The green boxes represent actions and decisions on a project level, and the blue boxes represent decisions on a policy level.
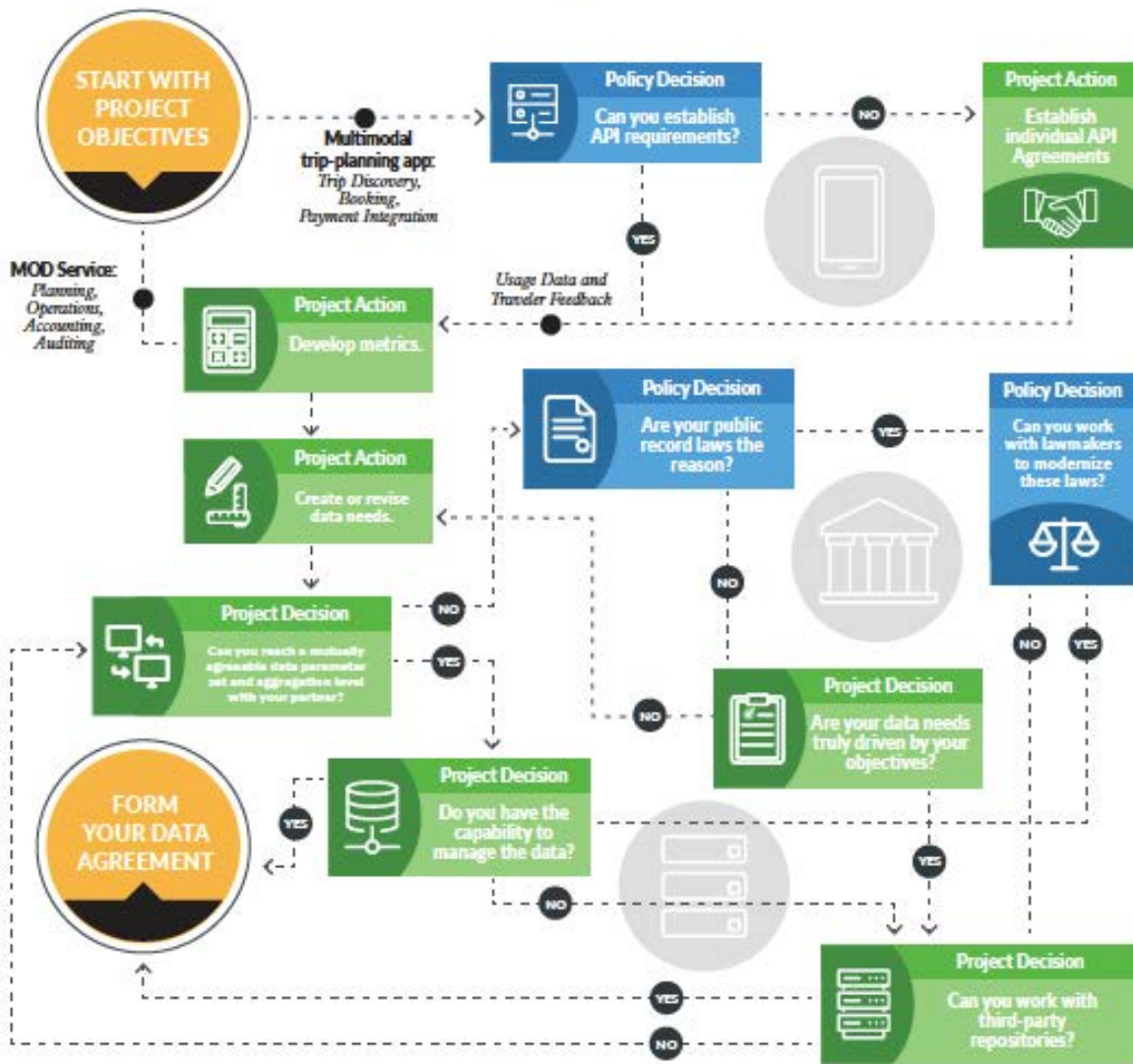
Framework for shared mobility project and policy decision making. Source: Objective-driven Data Sharing for Transit Agencies in Mobility Partnerships, Shared Use Mobility Center

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Chapter 3: Recommended Mobility Data Practices
Shared Mobility Data Primer

Purpose of this chapter

Based on a review of current research and case studies, the following are recommended practices for shared mobility implementation to support jurisdictions' data-related policies [32] Because many shared mobility services are still in their nascent stages in the U.S., and certain practices may be more appropriate for some communities than others, these are presented as "good" rather than "best" practices.

1: Strategic Requests for Proposals (RFPs)

Implementing a shared mobility program gives jurisdictions the advantage of shaping the program to meet their needs and helps prepare for "surprise deployments" of shared mobility services in their neighborhoods. [33] Detailed RFPs enable jurisdictions to be intentional in what they seek, and should include specific data requirements for providers. Below are some examples of data points commonly specified in RFPs:

- Rides requested and completed
- Pick up and drop off locations
- Trip lengths (distance and time)
- Fleet size
- Vehicles in operation
- Wait times
- ADA trips
- Trip prices
- User demographics

Data points can be either *required* or *desired*, depending on their importance to the jurisdiction's goals. Such an approach leaves flexibility to strike a balance between setting requirements that are too strict or specific -- thereby potentially discouraging certain vendors from applying -- and ensuring the jurisdiction is provided necessary data needs for the program.

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[32] See Chapter 2: Policy Development
[33] See pg. 25 of https://www.nlc.org/sites/default/files/2019-04/CSAR_MicromobilityReport_FINAL.pdf

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2: Pilot Programs

These RFPs are often solicitations for participation in pilot programs. Pilots enable jurisdictions to gather data to monitor and evaluate the implementation of shared mobility services without committing to certain companies or long-term programs. Jurisdictions can then apply lessons learned to shared mobility programs going forward (which may result in extending the pilot). Particularly for shared mobility data, a pilot program can get answers to:

- Is the jurisdiction receiving the data needed for program evaluation, and in a timely manner?
- Is user privacy adequately protected?
- If performing data management and analysis internally, is there adequate staffing? If using a third party to manage data, what are the pros and cons of that partnership?
- Are the right number of vehicles being deployed?
- Are the right number of providers being allowed to operate?
- Is there the right mix of transportation options available for travelers?
- Are operators complying with permit regulations? If not, why not?

3: Codified Data Requirements

Jurisdictions may use ordinances and/or policies regarding shared mobility (including shared mobility data). A common approach is to establish data requirements prior to implementation of a pilot and/or use pilot programs to shape new ordinances and policies. Including data requirements in code regulations can ensure

As of September 2020, the only shared mobility data requirements that have been included in Oregon cities' municipal codes (other than in Portland) are:

> *"TNCs shall maintain records of all trips made by all drivers for at least one year from the date of the trip. The data may be aggregated and/or anonymized, and shall include, at minimum, the locations by ZIP code of trip origination and destination, vehicle miles traveled, trip origination and completion times, trip duration, and passenger wait times from a driver's acceptance of a request to passenger pick-up. The City may require a TNC to enter a data sharing agreement in order to receive a license."*

Although jurisdictions could make simple modifications to this language to include shared mobility services beyond TNCs, establishing more robust requirements of shared mobility providers will likely be more effective. Some examples of requirements that small-to-medium sized cities in the U.S. have adopted in municipal codes are provided as a table in the Appendix. The goals of a SUM program, and the context in which that program is being

implemented, should determine specific requirements; it may even be practicable to determine some of those details during negotiations with vendors.

4: Using Open Data Specifications

Requiring use of open data specifications such as GBFS (which enables users access to mobility device locations and a variety of third party apps) and MDS (which supports municipalities in their regulation and analysis of shared mobility services) is crucial to the success of a shared mobility program. (See Chapter 1 for a more information.)

5: User Surveys

Standard data collected by shared mobility providers does not include detailed information about users that a jurisdiction may need to measure program success. For example, meeting equity goals likely requires demographic information (e.g., race/ethnicity, income, age, disability status), requiring supplemental data best collected through user surveys. Qualitative data may also be important, such as the type of information Populus [34] has collected for municipalities through user surveys, answering:

- What transportation options would people use if the new mobility service were not available?
- Do people feel safe using these new services?
- Why are citizens not using these services?
- How do these services affect other transportation choices, such as vehicle ownership, use of transit, or other modes?

Surveys should be optional and anonymous so they do not introduce additional privacy issues. Transportation for America (a transportation policy-focused advocacy organization) recommends conducting surveys annually or once each permitted period. [35]

6: Privacy Risk Assessments

Privacy protection is vital for shared mobility data. A successful program depends on the public's trust that using shared mobility services will not compromise their privacy or personal safety. Assessments of potential ways user privacy could be compromised, and

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[34] Populus Technologies, Inc. (2020). A Practical Guide to Mobility Data Sharing and Cities. Retrieved from https://www.populus.ai/resources/white-papers
[35] https://playbook.t4america.org/data/

strategies to mitigate this risk, provide the tools to support a jurisdiction's due diligence.[36] The matrix below provides a model of how to assess these risks.[37] The National Institute of Standards and Technology provides a Privacy Framework[38] that provides recommended guidance in more detail.

Severity of impact		Remote	Reasonable possibility	More likely than not
	Serious harm	Low risk	High risk	High risk
	Some impact	Low risk	Medium risk	High risk
	Minimal impact	Low risk	Low risk	Low risk
		Likelihood of harm		

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[36] See the Mobility Data Collaborative's *Guidelines for Mobility Data Sharing Governance and Contracting,* accessible at https://mdc.sae-itc.com/#work

[37] Taken from *Data Protection Impact Assessments,* accessible at https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/accountability-and-governance/data-protection-impact-assessments/#:~:text=At%20a%20glance,a%20high%20risk%20to%20individuals.&text=identify%20any%20additional%20measures%20to%20mitigate%20those%20risks.

[38] NIST Privacy Framework: A tool for improving privacy through enterprise risk management. January 2020. Accessible at https://www.nist.gov/system/files/documents/2020/01/16/NIST%20Privacy%20Framework_V1.0.pdf

7: Using Shared Mobility Data to Manage Sidewalk Space

A common concern in neighborhoods is the interaction between vehicles (e-scooters in particular) and sidewalk space. While the availability of these services can remove mobility barriers for some citizens, their presence on sidewalks and streets can *create* barriers for pedestrians without proper regulation. Shared mobility data can be part of a jurisdiction's plan to regulate ADA compliance and conduct responsive planning to protect accessibility for people with disabilities. On the next page are use cases for each.

Regulation	Responsive Planning
Jurisdictions can address ADA concerns by publishing accessibility rules to providers through the Policy API of MDS. The City of Charlotte, NC responded to a community request to eliminate e-scooter parking in the area surrounding a resource center for the blind. This would remove the possibility of shared mobility vehicles creating tripping hazards for people accessing the center. The city directed the shared mobility provider to geofence (draw a digital boundary for) that area, which prohibited riders from parking their e-scooters there.	Through analyzing real-time vehicle locations (GBFS) and/or historical vehicle status data (MDS), jurisdictions can determine where parked SUM vehicles are blocking accessibility and respond by adding dedicated parking areas based on where those problematic drop-offs occur. The City of Portland further enforces these parking restrictions by issuing tickets to the SUM provider, who then charges users directly.

Chapter 4: Third-Party Data Analysis Tools
Shared Mobility Data Primer

Purpose of this chapter

To ensure that shared mobility data is useful, jurisdictions need to turn raw data into readable formats. There are various third-party tools available for this purpose that can be purchased from private companies. However, open-source resources are also available, allowing jurisdictions to control and analyze shared mobility data (requiring more technical capacity from jurisdiction staff). This chapter explains how to begin understanding the resources that currently exist and how other jurisdictions are using them. Much of the following is contained in the *Metro Micromobility Dashboard - research technical memorandum*.[39]

Table 4.1 provides a list of data dashboards offered by private companies that allow for user-friendly data management. These vary in price, services, user support, and modularity/flexibility. All of them support both GBFS and MDS formats; however, support for the Agency API of MDS is less common.

Features that jurisdictions should prioritize are:
- Cost (whether it is ongoing or one-time),
- Data retention and ownership policies,
- The type of data sharing agreements the company allows, and
- The level of support offered to ensure data quality.

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[39] As of publication of this paper, neither ODOT nor Metro had yet made this data publicly available.

Table 4.1: Overview of selected shared mobility data management products

Company/ Tool	Distinguishing features	Cost	Example jurisdictions
Ride Report	• Most affordable offering • Data auditing • No historical trip/route data analysis	• Free version with limited features • Premium version: ~$20k a yr	• Portland • Durham • Austin • Orlando
Populus	• Developed by well-known transportation research firm • Greatest number of features • User survey administration, equity analysis, complaint analysis, car sharing data	• Free version with limited features • Tier 1 premium version: $2k a mo./$20k a yr • Tier 2 premium version: $25k a yr	• Chicago • Baltimore • Indianapolis • Arlington County • Omaha
Remix	• Most expensive offering • Follows closely behind Populus in number of features • Offers other tools, including a transit planning platform and a street design platform, which can be integrated with the dashboard	Not available	• Los Angeles • Columbus • ODOT transit planning platform • Portland street design platform
Stae	• Newer offering • Shared micromobility dashboard is part of suite of civic data management tools offered • Flexibility in how jurisdictions choose to implement tools • Can be configured to include an open data portal	Not available	• Evanston • Louisville
Passport	• Newer offering • Equity analysis • 24/7/365 customer service	Not available	• Charlotte • Detroit • Omaha
Mobility Metrics	• Open-source • "Some assembly required," no dedicated customer support • Historical data analysis comparable to its proprietary counterparts • Fewer features overall (notably, it does not have a real-time map)	Free	• San José

Chapter 5: Information Resources

Shared Mobility Data Primer

Purpose of this chapter

This Primer functions as only an informational first step for jurisdictions looking to understand the core issues of shared mobility data. Therefore, this chapter lists resources that may be helpful in supporting the implementation of a shared mobility program (listed alphabetically):

A Practical Guide to Mobility Data Sharing & Cities[40]

Populus Technologies, Inc. (2020)
This guide is useful to inform goals for a city's use of shared mobility data. Use cases that shared mobility data can support include:
- Monitoring compliance with fleet size and service area requirements
- Analysis of equity outcomes, e.g. utilization in priority areas
- Performance-based management to evaluate program success
- Planning for bike/scooter lane infrastructure, parking areas, pick up/drop off areas, and curb management

The guide also provides an overview of data sharing and analysis methods as well as privacy-related challenges.

Data Sharing Glossary and Metrics for Shared Mobility[41]

Mobility Data Collaborative (2020)
An extensive collection of shared mobility terms and metrics to consider applying to shared mobility program evaluation. The document focuses specifically on vehicle and trip data and includes formulas for calculating recommended metrics.

Guidelines for Mobility Data Sharing Governance and Contracting[42]

Mobility Data Collaborative (2020)
Provides 10 distinct guidelines for developing data sharing agreements in a way that addresses the goals of the public sector, shared mobility providers, and users.

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[40] https://www.populus.ai/resources/white-papers
[41] Access via https://mdc.sae-itc.com/#work
[42] Ibid.

Leveraging Data to Achieve Policy Outcomes[43]

New Urban Mobility Alliance (NUMO) (2020)
Online resource providing guidance for cities to use shared mobility data to achieve outcomes in the areas of equity, safety, and environment. It proposes a variety of metrics to evaluate progress towards these outcomes and the data required to do so.

Managing Mobility Data[44]

National Association of City Transportation Officials & the International Municipal Lawyers Association (2019)
This document recommends four principles to adhere to for managing shared mobility data:
1. Public Good - data is required because shared mobility providers operate on public streets and government has a role to ensure safety, mobility, and equity outcomes.
2. Protected - shared mobility data should be treated as PII.
3. Purposeful - cities should be clear about their aims for data use.
4. Portable - open data standards and agreements that allow cities to own, transform, and share data without restriction.

Objective-driven Data Sharing for Transit Agencies in Mobility Partnerships[45]

Shared Use Mobility Center (2019)
A white paper supported by the Federal Transit Administration's Innovation and Knowledge Accelerator (IKA) program, this resource emphasizes the importance of linking data sharing to project objectives. It includes a decision tree (provided on page 16 of this primer) to use when developing a data sharing agreement at both the project and policy level.

Shared Mobility Playbook[46]

Transportation for America
Presented as an interactive website, this practical resource provides a set of national standards for shared mobility data collection and use. It includes recommendations for ensuring data quality and privacy, such as regular data audits. Case studies are also included.

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[43] https://policydata.numo.global/
[44] https://nacto.org/wp-content/uploads/2019/05/NACTO_IMLA_Managing-Mobility-Data.pdf
[45] https://sharedusemobilitycenter.org/wp-content/uploads/2020/04/SUMC_IKA_DataSharingforTransitAgencies.pdf
[46] https://playbook.t4america.org/data/

Shared Use Mobility Toolkit for Cities[47]

Shared Use Mobility Center (2016)

This toolkit provides definitions of shared mobility options, an overview of shared mobility program trends and case studies (as of 2016), reference to online tools, and recommended policies for cities to adopt. Most relevant to shared mobility data is the following recommendation: "Require that shared mobility operators share data so cities can assess their impact and integrate new services into their transportation plans."

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[47] https://sharedusemobilitycenter.org/wp-content/uploads/2016/07/SUMC-Toolkit-Final-Report.pdf

Appendix

Table A-1: Sample codified SUM rata requirements from select small-to-medium communities

Jurisdiction	SUM Services	SUM Data Regulation Code Language

College Park, Georgia[48]
 	
 Pop: 15,212
	Dockless Bike Share	**Sec. 16-51. - Sharing of data.**
		(a)Permitted operators shall provide the city with real-time information on the entire College Park fleet through a documented application program interface (API). The operator is directly responsible for obtaining an API key from the city to which they will publish the data described herein. Operators are required to make the API endpoint available for public consumption. The data to be published to the city's API will include the following information in real time for every shareable dockless mobility device parked in the College Park operational area:
		   1) Point location;
		   2) Device identification number;
		   3) Type of device;
		   4) Fuel level (if electric).
		
		(b)The City of College Park shall be authorized to display and publish real-time data provided via the API described herein.
		
		(c)All permitted operators shall provide the following anonymized data for each trip record to inform and support safe and effective management of the shareable dockless mobility device system, and for transportation planning efforts. Data will be submitted to the city via the API:
		   1) Company name;
		   2) Type of device ("standard" or "electric");
		   3) Trip record number;
		   4) Trip duration;
		   5) Trip distance (in feet);
		   6) Start date;
		   7) Start time;

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[48] Retrieved from https://library.municode.com/ga/college_park/codes/code_of_ordinances?nodeId=PTIICOOR_CH16STSI_ARTIIRISH

Table A-1: Sample codified SUM rata requirements from select small-to-medium communities

Jurisdiction	SUM Services	SUM Data Regulation Code Language
College Park, Georgia (cont.)		8) End date; 9) End time; 10) Start and end location; and 11) Device identification number. (d)All permitted operators will provide the following device availability data for oversight of parking compliance and device distribution by minutes via the API: 1) GPS coordinate; 2) Availability duration (in minutes); 3) Availability start date; and 4) Availability start time. (e)All permitted operators shall distribute a customer survey, to be provided by the city, prior to the end of their first permit year. (f)All permitted operators shall keep a record of maintenance activities, including, but not limited to, device identification number and maintenance performed. These records shall be sent to the city's public works director weekly. (g)All permitted operators will keep a record of reported collisions. These records will be sent to the city public works director weekly. (h)All permitted operators will allow the city to temporarily install ten (10) mounted GPA trackers on a random sample of devices for research and trip analysis purposes. Trip data will be anonymous. (i)All permitted operators shall report the aggregated breakdown of customers by gender and age monthly. Age will be reported into these age groups: under 5, 5—17, 18—24, 25—34, 35—44, 45—54, 55—64, 65 and over. (j)All permitted operators agree to the city using a third-party researcher for evaluation of the shareable dockless mobility device program. Data will be shared with the third-party researcher only for the purposes of evaluation and/or enforcement of the requirements of the permit.

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Table A-1: Sample codified SUM rata requirements from select small-to-medium communities

Jurisdiction	SUM Services	SUM Data Regulation Code Language
College Park, Georgia (cont.)		(k)Operators shall report the total number of complaint, total number of complaints resolved and number of complaints by type (i.e., blocking sidewalk, private property trespass, vandalism, inoperable device, etc.). Said report shall be submitted on a bi-weekly basis. **Sec. 16-53. - Protect personal data and privacy.** Operators should clearly communicate to the public and to the city what personal information is being collected about users, how it is being used, and for how long. The shareable dockless mobility device permit shall include a standard reporting form for this information, and the responses should be available on the city's website.
Emeryville, California[49] Pop: 12,104 Emeryville, California (cont.)	Dockless Bike Share	Operators shall provide the City real-time access to data showing the location of all their Devices. **4- 13. 09. Personal Data and Privacy.** a) Operators must clearly communicate to the public and to the City what personal information is being collected about Users, how it is being used, and for how long. The Dockless Shared Mobility Permit shall include a standard reporting form for this information, and the responses should be available on the City' s website. b) Operator must employ an electronic payment System that is compliant with the Payment Card Industry Data Security Standards (PCI DSS), and provide proof of compliance. c) Operator must produce a Privacy Policy that complies with the California Online Privacy Protection Act (CaIOPPA) and any data protection laws applicable to minors, and further, expressly limits the collection, storage, or usage of any personally identifiable information to the extent absolutely required to successfully accomplish the provision of the Dockless Shared Mobility System. **4- 13. 10. System Data and Reports.**

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[49] Retrieved from http://www.ci.emeryville.ca.us/DocumentCenter/View/11635/19-005-_-Dockless-Shared-Mobility-Systems-_-Adopted-04_02_2019

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Table A-1: Sample codified SUM rata requirements from select small-to-medium communities

Jurisdiction	SUM Services	SUM Data Regulation Code Language

		a) Operators shall make real-time data available to the City and designated third parties via the data standard developed by the North American Bikeshare Association, known as the "Mobility Data Specification (MDS)," or similar standard as determined by the City.
		
		b) Operators must provide quarterly reports to the City on key performance indicators, including, but not limited to, the following:
		  1) Utilization rates
		  2) Total trips by day of week and time of day
		  3) Origins and destinations
		  4) Routes
		  5) Trips per Device by day of week, time of day
		  6) Average trip distance
		  7) Device maintenance reports including battery life and disposition
		  8) Incidents of theft and vandalism
		  9) Number of complaints
		  10) Call volume, wait time, and call abandonment rates
		  11) Crash information
		  12) Payment method information
		  13) Rebalancing information
		  14) Outreach activities completed
		  15) Number of free or discounted helmets distributed
		  16) Number of Users taking advantage of low- income discount
		  17) Number of discounted rides taken
		  18) Number of account suspensions or revocations, including reason for the action.
		
		c) Operators must provide reports on a quarterly basis or at other intervals as agreed upon by the Operator and the City.

Appendix

Table A-1: Sample codified SUM rata requirements from select small-to-medium communities

Jurisdiction	SUM Services	SUM Data Regulation Code Language
West Lafayette, Indiana[50] Pop: 48,308	Dockless bike share E-scooter share	**Section 7.14.160 EMPV[51] data sharing.** A. Enterprises shall cooperate with the City in the collection and analysis of aggregate data concerning its operations. The Enterprise shall provide a monthly report to the Administrative Officer that contains the following: 1) the maximum number of EMPV in use by Users at any time in the previous month; 2) the total number of Users in the previous month; 3) the total number of EMPV(s) in service for the previous month; 4) the average number of rides per EMPV perday; 5) a comprehensive list of crashes reported in the previous month, including locations and times; 6) maintenance records and data; 7) anonymized aggregate data in the form of heat maps showing routes, trends, origins, and destinations, including trips into the City from other jurisdictions; 8) anonymized trip data that include the origin and destination, trip duration distance and data and time of the trip; 9) reported issues and complaints from Users and the general public; 10) Anonymized banned User information; 11) A summary of any educational events conducted by the Enterprise; and 12) the number of local employees and contractors that maintain a consistent and regular presence in Tippecanoe County. B. Enterprises shall provide other reports at the Administrative Officer's request. C. The Administrative Officer shall have access to an Enterprise's data that accurately depict the location of all EMPV in Tippecanoe County at any one

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[50] Retrieved from https://www.lafayette.in.gov/AgendaCenter/ViewFile/Item/11642?fileID=24847
[51] Electric or Motor Powered Vehicles

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Table A-1: Sample codified SUM rata requirements from select small-to-medium communities

Jurisdiction	SUM Services	SUM Data Regulation Code Language
		time. Such data that are required to be disclosed under this subsection shall be real-time or semi-real-time EMPV location data via a publicly accessible API.
Santa Monica, California[52] Pop: 91,411	Dockless Bike Share E-scooter Share	**3.16 Data Sharing & Reporting** Operators must provide accurate data through a publicly accessible Application Programming Interface (API) that meets the requirements of the General Bikeshare Feed Specification (https://github.com/NABSA/gbfs). It is desirable that Operators make the API endpoint available to the public for viewing data, querying data, and mapping. The Operator should not change the API URL without notifying the City with at least 30 days' notice. **3.16.1 Mobility Data Specification ("Specification")** Operators shall provide a City-accessible Application Programming Interface (API) that provides the data outlined within, and meets the Specification of, the City of Los Angeles Mobility Data Specification (Mobility Data Specification) as published online at http://github.com/CityOfLosAngeles/mobility-data-specification. The City may, in its sole discretion, release subsequent versions and/or updated versions of the Specification and require operator to use the most current version by releasing an automatic update and/or disabling support for the previous version. The City is permitted to use all data the operator provides in accordance with the Mobility Data Specification, including, but not limited to, displaying real-time data and real-time device availability data to the public. The Operator may not change the API URL without notifying the City with at least 30 days' notice. Operators must provide a standardized dashboard interface to support the City in

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Table A-1: Sample codified SUM rata requirements from select small-to-medium communities

Jurisdiction	SUM Services	SUM Data Regulation Code Language

Santa Monica, California (cont.)		viewing data, querying data, and mapping.
		
		Personal information must be protected by the Operator, and data should be anonymized regarding user information. Summarized program performance information in memos or updates may be shared with the public. Detailed data will be protected to the extent permitted by law.
		
		Notwithstanding the returned results of any of the Mobility Data APIs, it shall be the sole responsibility of the Operator to comply with the City's Program requirements listed herein. Failure to maintain consistantly accurate and real-time data could result in permit suspension unitil the issues identified by the city are resolved.
		
		3.16.2 Reporting
		Operators must provide accurate weekly summaries to the City describing customer and staff incidents, injuries, system operation, system use, reported complaints, customer service responses, and system maintenance. Reports will be provided to the City in the format defined by the City.
		
		A monthly dynamic cap report must be submitted to the City on the second business day of each month following the program launch to allow the City to assess and potentially adjust fleet deployment quantities. Once service quantities and usage levels are better understood, the City may elect to extend the dynamic cap reporting timeframes.
		
		Operators shall assist and participate in the formal evaluation of the Pilot Program, including provision of data and information to inform subsequent City ordinances and programs.
		
		3.16.3 System Reports
		Anonymized data reports to the City are required weekly for the following municipal-level data:
		    (a) Total users in system by month
		    (b) Trip number by day, week and month

Table A-1: Sample codified SUM rata requirements from select small-to-medium communities

Jurisdiction	SUM Services	SUM Data Regulation Code Language
Santa Monica, California (cont.)		(c) Detailed, aggregate trip origin/destination information (d) Trip length and time (e) Hourly fleet utilization with trip origin or destination in Santa Monica and within the Downtown area* (f) Hourly device quantities within Santa Monica and within the Downtown area* The City may elect to adjust the reporting timeframes and format in its sole and complete discretion. **3.16.4 Surveys** Operators shall survey users within the first 3 months, and every 6 months subsequently to provide information to the City for future planning, including asking users what mode of transportation was replaced for the use of a shared mobility device. Survey questions shall be consistent among Operators and determined in coordination with the City. **3.16.5 Use of Data** Operators are required to follow all local, state, and federal laws and regulations with respect to personally identifiable information and credit card information. It is strongly preferred that Operators do not resell users' personally identifiable information. If the Operator engages in such a practice, then it is required that a) this is communicated clearly and transparently to users, and b) users have a clear means of opting out if they do not want their data sold. Auto renewal billing procedures should comply with state and federal laws and regulations. **3.16.6 Data Security** Operators must protect users' personal information. Finance transactions must be secure and PCI compliant. Operators should provide their most recent 3rd party PCI audits to the City quarterly. Personal data should be protected using industry accepted encryption, and customer permission should be sought before sharing data with a third party.

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Appendix