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A Scoot, Skip, and a JUMP Away:
Learning from Shared Micromobility Systems in San Francisco

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16. Abstract

In 2018 electric powered shared scooters and stationless electric bikeshare proliferated throughout the United States. Many cities have begun to experiment with new permitting systems and regulations for these vehicles. To date, there is scant academic literature on how well scooter and stationless bikeshare permits have helped cities achieve their transit, sustainability, and equity goals.

San Francisco was one of the first cities in the United States to create permit systems for stationless bikeshare and scooter companies. This research evaluates scooters and stationless bikeshare use as a first/last mile transit option, reductions in vehicle miles traveled (VMT), and equity of utilization. The author evaluates these systems using a mixed methods approach and primary data collected by the San Francisco Municipal Transportation Agency (SFMTA) as part of its pilot permit programs.
Results indicate that the two travel modes substantially support transit usage, both by connecting riders to transit and by replacing automobile trips. Shared e-bikes reduce VMT significantly more than scooters by replacing more and longer auto trips. Scooters are more likely to reduce VMT by connecting riders to transit. Rider demographics for both travel modes do not demonstrate improved equitable utilization as compared to traditional, personally owned bikes at this time.

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Acronyms and Abbreviations

ACS	American Community Survey
API	Application program interface
EMS	Emerging Mobility Service
MDS	[Mobility Data Specification](#)
PII	Personally identifiable information
SFCTA	San Francisco County Transportation Authority
SFMTA	San Francisco Municipal Transportation Agency
TNC	Transportation Network Company (e.g. Uber, Lyft)
VMT	Vehicle miles traveled

A Scoot, Skip, and a JUMP Away:

Learning from Shared Micromobility Systems in San Francisco

Executive Summary

This research uses San Francisco's Transit, Sustainability, and Equitable Access Emerging Mobility Guiding Principles as a framework to answer questions about stationless bikeshare and scooters using data collected during San Francisco's stationless bikeshare and scooter pilots and secondary sources.

It's been less than a year since stationless bikeshare and scooters exploded onto city streets across the country. The SFMTA was one of the first cities to permit stationless bikeshare. For scooters, it was the first city in the country to issue permits. It was also the first city to internally collect, verify, and build dashboards for stationless device data in the Mobility Data Specification (MDS) format.

The literature on the impact of stationless bikeshare and scooter systems on on our transportation systems is sparse to nonexistent. This research fills in gaps in the literature using a mixed methods approach and data collected from the SFMTA's pilot programs to answer questions related to transit, sustainability, and equitable access.

Key Findings

Finding 1: Scooters are frequently used as a first/last mile connection.

Finding 2: Stationless (electric) bikeshare is frequently used to replace longer trips, especially by automobile.

Finding 3: Stationless (electric) bikeshare replaces much more VMT per device than scooters

Finding 4: Scooters have more potential to decrease VMT in combination with transit usage.

Finding 5: Scooter and stationless bikeshare have similar user demographics compared to available personally owned bike ridership data.

Finding 6: Ensuring that an emerging mobility operator's vehicles are available in a Community of Concern is not sufficient to ensure equitable access

Recommendations

Transit Recommendations
1. Prioritize providers and permit regulations that support transit and other forms of sustainable transportation. Emphasize scooters and stationless bikeshare as a first/last mile transit connection.
   a. Integrated trip planning
   b. Integrated payments
   c. Bundled purchase of transit passes with service

Sustainability Recommendations
2. Require better data collection on non-revenue VMT and research strategies to reduce non-revenue VMT to form best practices.
3. Partner with researchers to study lifecycle GHG emissions and how they compare to auto life cycle emissions.

Equitable Access Recommendations
4. Promote equitable access by signing up Muni Lifeline pass holders and coordinate with other agencies to enroll more residents in low income plans (ex: coordinate with public housing/affordable housing agencies)
5. Conduct further research on why certain groups don't utilize the service. Devices are relatively available and affordable; why the large disparity in use by gender, race, and income?

Introduction

In 2018 electric powered shared scooters (scooters) and stationless shared electric bikes (stationless bikeshare) proliferated throughout the United States. In response, many cities have begun to experiment with new permitting systems and regulations to regulate and manage scooters and stationless shared electric bikes (devices) within public right-of-way.

San Francisco was one of the first cities in the United States to create a permit systems for stationless bikeshare and then scooters. San Francisco's preeminence within new and emerging mobility technologies places the city as a leader in this space. The centrality of the city within the tech industry has positioned the San Francisco Municipal Transportation Agency (SFMTA) as an innovator in policy, regulation, and management of new and emerging mobility out of necessity.

This research investigates and evaluates scooter and stationless bikeshare systems' use as a first/last mile transit option, effect on vehicle miles traveled (VMT), and users' demographic information. This research uses the San Francisco Emerging Mobility Services and Technologies Guiding Principles of Transit, Sustainability, and Equitable Access as an evaluation framework. The SFMTA provided the data used in this research. The agency collected the data for its stationless bikeshare and powered scooter share pilot permit programs.

Research Questions

Transit
Do scooters and stationless bikeshare serve as a complement or competitor to transit? To what extent?

Sustainability
What are the approximate effects of scooters and stationless bikeshare on the number of vehicle miles traveled (VMT)?

Equitable Access
How does the demographic profile of scooter and stationless bikeshare users

compare to the communities in which they operate? Are operators adequately serving Communities of Concern?

Framework of Analysis

The questions guiding this project are derived from SFMTA's Emerging Mobility Guiding Principles, pilot evaluation criteria, and various common themes of concern across cities. I develop metrics using the Emerging Mobility Guiding Principles to measure how well the SFMTA's permitting structure lead to outcomes consistent with those goals.

San Francisco's Emerging Mobility Guiding Principles
Guiding Principles used as a research framework

Transit
"Emerging Mobility Services and Technologies must support, rather than compete with public transit services, must account for the operational needs of public transit and encourage use of high-occupancy modes."

Sustainability
"Emerging Mobility Services and Technologies must support sustainability, including helping to meet the city's greenhouse gas (GHG) emissions reduction goals, promote use of all non-auto modes, and support efforts to increase the resiliency of the transportation system."

Equitable Access
"All people, regardless of age, race, color, gender, sexual orientation and identity, national origin, religion, or any other protected category, should benefit from Emerging Mobility Services and Technologies, and groups who have historically lacked access to mobility benefits must be prioritized and should benefit most."

Figure 1: SFMTA Emerging Mobility Guiding Principles Framework
This research uses the three guiding principles of Transit, Sustainability, and Equitable Access as a framework for evaluating the city's stationless bikeshare and scooter systems

Variables of Interest

Guiding Principle	Variable of Interest	Unit of Analysis
Transit	First/last mile transit connections Transit trip replacement	Share of scooter and stationless bikeshare trips connecting to or replacing a transit trip.
Sustainability	Vehicle Miles Traveled (VMT)	Estimated change in Vehicle Miles Traveled (VMT). Measure by Transportation Network Company (TNC, e.g. Uber, Lyft), drive alone, and carpool VMT replaced, and additional VMT from system operations. Change in transit VMT is excluded.
Equitable Access	User demographics	Income, race, and gender of scooter and stationless bikeshare users, San Francisco residents, and those whose primary workplace is in San Francisco
	Spatial Access	Percent of device (bike/scooter) availability in Communities of Concern, as defined by the Metropolitan Transportation Commission in 2018.[1]

Table 1: Variables of Interest and Units of Analysis

This research uses a mixed methods approach. Research methods include a user survey and crosstab analysis; quantitative estimates; comparative

descriptive statistics; and content analysis. The Ford GoBike station-based bikeshare system is excluded from this analysis because the city of San Francisco used a procurement process rather than a permit for this system.

Background

In 2018, the SFMTA created two new micromobility pilot permits, the stationless bikeshare and scooter pilot programs. Beginning in January 2018, JUMP Bikes (now owned by Uber) became the sole recipient of the SFMTA's stationless bikeshare permit. Then later that year in May 2018, three unpermitted scooter companies — Bird, Lime, and Spin — released hundreds of scooters onto San Francisco's streets.[2] There was public outcry and fanfare immediately following these launches. In June 2018, the SFMTA ordered all scooter companies off of the streets by sending cease and desist letters to the unpermitted companies. SFMTA staff quickly drafted a pilot scooter permit, and would allow for up to four companies to operate no more than 5,000 total scooters between the companies in San Francisco.

The SFMTA received 12 applications from companies for the permit. After staff and agency leadership received and evaluated the applications, they decided to award two permits to companies Scoot and Skip. The decision was controversial, and some of the companies denied permits have appealed the agency's decision. Lime attempted to obtain an injunction for the permit in court, but the request was denied.

In other parts of California, cities were each managing their own influx of scooters. Bird scooters began first showing up in West LA and Santa Monica in late 2017.[3] Bird's launch began the scooter phenomenon in California. Some cities, like West Hollywood and Beverly Hills, legislated bans on scooter rentals within their city limits in 2018. Santa Monica, the city of LA, and San Francisco have all been collaborating on scooter regulation and data sharing standards.

Los Angeles has coordinated with Santa Monica and San Francisco to create a micromobility data standard. Known as the Mobility Data Specification (MDS), this new data sharing standard is being used by all three cities to gather micromobility data for planning and compliance.[4]
These events coincided with a swift and unprecedented rise in the valuation of scooter companies and heated competition among existing transportation companies to enter the field. Bird Scooters broke the record for the title of a "unicorn", or when a company is valued over one billion dollars before

becoming a publicly traded company.[5] Other notable moves into the micromobility marketplace include Uber's purchase of JUMP Bikes and Lyft's purchase of the largest bikeshare company in the US, Motivate, which operates station-based bikeshare system GoBike. Both of these purchases were publicized in summer 2018. Although Uber (JUMP) and Lyft both applied for scooter permits with the SFMTA, neither was awarded a scooter permit. These two companies, though, now comprise San Francisco's two bikeshare operators.

California is and continues to be the epicenter of new and emerging mobility in the United States. The San Francisco and Los Angeles metropolitan areas are home to Bird, Lime, Scoot, Uber, and Lyft. Beyond its idyllic climate and notorious traffic congestion, California's climate leadership and massive tech industry will likely consolidate California's as a global leader in transportation innovation.

Policy Environment

Stationless Bikeshare and Scooter Permitting

Cities that have permitted or plan to permit micromobility operators may do so for a variety of reasons. Cities may enact permit programs for liability and indemnification purposes. They may be driven by external political pressure, by internal pressure from planners hoping to secure data, or simply to ensure there is not a negative financial impact on the city. All permit programs are an admission by local governments that there is a public benefit to private operations in the public right-of-way. Cities realize that these systems serve the public interest when properly regulated.

San Francisco has already acknowledged such in its Stationless Bikeshare Mid-Pilot Evaluation.[6] The SFMTA 2018 Strategic Plan lays out the City's vision for a safe, equitable and sustainable transportation system.[7] Permitting stationless bikeshare and scooter operators may help the City reach the following goals outline in its strategic plan:

1. Create a safer transportation experience for everyone.
2. Make transit and other sustainable modes of transportation the most attractive and preferred means of travel
3. Improve the quality of life and environment in San Francisco and for the region.

In addition to the SFMTA's strategic goals, the San Francisco County Transportation Authority (SFCTA) and SFMTA collaborated to create a framework for emerging mobility services, which are applicable for both stationless bikeshare and scooters. The city's values are expressed in the recently adopted Guiding Principles for Emerging Mobility Services and Technologies.[8] Of these 10 Guiding Principles, this research will focus on three.

Safety

Transit

Congestion

Equitable Access

Disabled Access

Sustainability

Labor

Financial Imapct

Accountability

Collaboration

Figure 2: SFMTA Guiding Principles for Emerging Mobility Services and Technologies

San Francisco enumerates its sustainability goals in the San Francisco Citywide Climate Action Strategy, with a transportation sector goal of shifting 80% of trips to sustainable modes by 2030.[9] The 2017 Transportation Sector Climate Action Strategy further provides a framework for reducing GHG emissions and to improve the resiliency of the city's transportation system.[10]

Recent work from the California Air Resources Board has documented that California will not meet its climate change goals unless significant reductions in vehicle miles traveled in automobiles are achieved.[11]

Related Policies and Goals

Transit First Policy

San Francisco's voter approved policy codifying and proclaiming that the City's transportation system shall encourage the use of public rights of way by pedestrians, bicyclists, and public transit, and shall strive to reduce traffic and improve public health and safety.

Vision Zero

The City and County of San Francisco adopted Vision Zero as a policy in 2014, committing to build better and safer streets, educate the public on traffic safety, enforce traffic laws, and adopt policy changes that save lives. The goal is to create a culture that prioritizes traffic safety and to ensure that mistakes on our roadways don't result in serious injuries or death. The result of this collaborative, citywide effort will be safer, more livable streets as we work to eliminate traffic fatalities by 2024.

Literature Review

The proliferation of scooter and stationless bikeshare systems beginning in early 2018 has prompted cities to respond with new regulations. The literature on the impact of stationless (electric) bikeshare and scooter systems on our transportation systems is underdeveloped. That is to be expected given the recent proliferation of these technologies and the inherent lag in academic publishing.

New literature on the topics studied here is adding to our collective understanding of these systems. This research attempts to add to the emerging literature and bridge gaps that currently exist. Lessons learned from this research are an opportunity for other cities learn from San Francisco's experience as one of the first cities to create a scooter permit program.

Given the relative lack of peer reviewed literature on the subject of studied here, this literature review will be brief and will include research that is relevant to this study but that may not address research questions directly.

This research project and others like it will be important for city officials, transportation planners, and advocates seeking to manage these systems moving forward.

Stationless Bikeshare (Bikeshare/ E-Bike)	**Ford GoBike, LimeBike, JUMP, Lyft** Bike sharing is a system that makes bicycles available to users to access as needed for point-to-point or round-trip trips, traditionally to station kiosks. They are generally unattended and established in dense urban areas. Advances in bike share locking technology have allowed for free-floating or "dockless" bikes within a geographic region. Bike sharing can be privately owned, public, or, most commonly, offered through a public-private partnership.
Scooters (Electric Standing Scooters/ E-scooters)	**JUMP, Lime, Skip, Lyft, Scoot, Spin, Bird** Scooter sharing is the shared-use of a fleet of scooters, typically managed by a third-party. The scooters are often electric. Systems allow for point-to-point trips. Members can rent the scooters by the minute.

[SFCTA Emerging Mobility Definitions](#) and Operators

Transit Literature

The SFMTA is one of the few transit agencies in the United States that managed to maintain or increase transit ridership in 2018. The agency operates San Francisco's Muni system, which in 2018 maintained ridership at 716,000 average weekday boardings.[12] The introduction of stationless bikeshare and scooters in the city did not decrease transit ridership.

Although stationless bikeshare and scooters compete with transit if user switch to a bike or scooter for their trip, it may also serve as a first/last mile transit connection. Campbell and Brakewood studied bikeshare in New York City and found that each 1,000 additional bikeshare docks near a bus route is associated with a 1-2% decrease in bus ridership.[13]

The most comprehensive research on bikeshare and transit to date by Graehler et al found in their statistical analysis that bikeshare and rail had a positive coefficient while bikeshare and rail had a negative coefficient, implying that bikeshare complements rail service and competes with bus service.[14] Because rail trips are, on average, longer than bus trips, bikeshare may more easily replace

these trips, and, in fact, may replace trips where a bus trip was used as a first/last mile connection to rail. Graheler et al also suggest that "It would be reasonable to expect a similar effect from the introduction of electric scooters or similar new modes."

The findings of Graehler et al are consistent with a 2017 analysis of TNC trips and their effect on transit ridership. Clewlow and Mishra found that TNC trips were serving as a complement to passenger rail systems (like BART in the Bay Area) and as a substitute for bus service.[15]

Sustainability Literature

A recent policy brief from UC Davis investigates how an e-bike incentive program may be structured in California. In April, 2019, Fitch suggests that literature focusing on locales outside of California has demonstrated that e-bikes, more than conventional bicycles, are likely to reduce VMT for their owners (up to 50% of car trips).[16] It is likely that e-bikes propensity to replace automobile trips is not specific to personally owned e-bikes, but also e-bikes that are part of station-based or stationless bikeshare systems.

Preliminary data from Uber shows that their JUMP bike stationless bikeshare system in San Francisco (further studied herein) reduces use of the core Uber ridesharing product and was substituted by use of JUMP bikeshare.[17] This research will directly test Uber's claim, but given the company's public announcement, it is likely that stationless (electric) bikeshare systems reduce VMT from TNC trips, in addition to personally owned automobile trips. This is of particular importance in San Francisco, where the SFCTA estimates that 15% of all intra-San Francisco trips are taken by TNC, contributing 570,000 vehicle miles to the city's roads on a typical weekday.[18]

Equitable Access Literature

Most of the literature pertaining to equitable access to bikeshare is focused on the sites of bikeshare stations, and thus is not applicable to stationless systems. While I was unable to find academic literature specifically regarding equitable access for stationless bikeshare and scooter systems, I find a report published by Populus (a mobility data startup) insightful on the topic. Written by former academic and Populus founder Regina

Clewlow, "Measuring Equitable Access to New Mobility: A Case Study of Shared Bikes and Electric Scooters" outlines different ways of measuring equitable access to these new mobility options.[19] The report outlines three different measures of assessing equitable access:

1. Measuring the equitable availability of vehicles
2. Measuring the equitable utilization of vehicles
3. Evaluating compliance with designated mobility zones or hubs.

Preliminary evidence from the Populus report shows that the adoption rates for stationless bikeshare are higher for both white and black Washington D.C. area residents than for traditional bikeshare.

Although neither resource contains literature on the current state of equitable access for stationless bikeshare and scooters, I highly recommend the following documents for those seeking to further understand what strategies cities can use to ensure equitable access to stationless bikeshare, scooters, and other forms of new and emerging mobility.

1. A Framework for Equity in New Mobility
2. Bike Share Station Siting Guide
3. NACTO Guidelines for the Regulation and Management of Shared Active Transportation

Data and Methods

Data Used	
Research Question	Data Source
Transit Do scooters and stationless bikeshare serve as a complement or competitor to transit? To what extent?	SFMTA scooter and stationless bikeshare user surveys
Sustainability What are the approximate effects of scooters and stationless bikeshare on the number of vehicle miles traveled (VMT)?	SFMTA scooter and stationless bikeshare user surveys, Emerging Mobility API Device Data, Emerging Mobility Services (EMS) Permittee Reporting, Secondary Sources
Equitable Access How does the demographic profile of scooter and stationless bikeshare users compare to the communities in which they operate? Are operators adequately serving Communities of Concern?	SFMTA scooter and stationless bikeshare user surveys, Emerging Mobility API Device Data, Emerging Mobility Services (EMS) Permittee Reporting, Secondary Sources

Table 2: Research Questions and Data Used

Methods Used	
Transit	User survey results and crosstabs
Sustainability	VMT calculations
Equitable Access	Comparison of descriptive statistics.

Table 3: Methodology Used by Research Question

Data Sources

Data from new mobility companies is often proprietary and difficult for public agencies and academic researchers to obtain. This research uses data the SFMTA requires from operators necessary to obtain a permit. The agency requires permittees to report on various metrics for compliance and planning purposes (see **Appendix B** for San Francisco's data sharing and reporting requirements).

Much of this data would not be readily available for transportation agencies if not required. Data from the two pilot programs is sufficiently robust to answer the research questions posed here, and other important questions about scooters and stationless bikeshare beyond the scope of this research. The Sustainability and Equitable Access research questions supplement SFMTA required with publicly available data from secondary sources.

User Surveys

The Emerging Mobility Service (EMS) User Survey is a SFMTA-required, permittee-administered user survey used to answer questions about transit, sustainability, and equity unavailable from company reporting or device APIs. This research draws extensively on the user surveys to understand change in travel patterns and the demographic profile of users.

Permittees administered user surveys via email as required by the two SFMTA permits. The SFMTA created and hosted the survey, which asked about trip data and demographic data, including household income, gender, and race (see **Appendix A** for survey questionnaire). Once survey questions had been finalized by the agency, each company (Scoot, Skip, JUMP) administered the survey via email to active users. Survey requirements define active users as anyone who used the respective company's service from one month prior to the beginning of the survey period to the last day of the data collection period. The survey was administered between January 7 and February 5, 2019 and was available in English, Spanish, Chinese, and Tagalog.

Survey respondents who did not answer any of the first 6 questions (travel questions) were excluded from analysis. The number of survey respondents

who answered the first 6 questions was 1,511 out of 63,273 total unique Skip and Scoot users between October and December 2018. Additionally, there were 710 JUMP survey respondents representing San Francisco's stationless bikeshare system users. Including incomplete surveys — anyone who clicked the link to the survey but did not answer all of the first 6 questions — there were 2,221 total responses. The SFMTA required each permittee to obtain a response rate large enough to ensure a minimum 95% confidence level and 4% margin of error. The survey was administered to 100% of active users. Because the survey is not a simple random sample, survey results are subject to selection bias. Furthermore, because a survey respondent could use all three services, there is no guarantee that respondents are not double counted between surveys.

Responses were cleaned by removing email addresses and any other personally identifiable information. Then, responses were coded into new variables. Travel modes were grouped in auto and non-auto modes. Auto modes included driving alone, driving with someone else, ride-hailing (Uber, Lyft), and traditional taxis. Non-auto modes included all other travel modes and "would not have made trip" responses. A low-income category was created by combining household income and household size.

Survey respondents were categorized as low-income if their household size and income qualify them for the SFMTA Muni Lifeline Pass. The Muni Lifeline pass income eligibility is gross annual income (based on household size) at or below 200% of the Federal Poverty level. Income categorizes were regrouped to match the closest income option in the household income survey question. Home zip codes were coded into new categories: San Francisco residents, Bay Area residents (except San Francisco), and "other" for all zip codes outside of the Bay Area. Demographic respondents for those who identified with more than one race were grouped into the variables "mixed race" and "other".

After coding the new variables, the cross tabulations between responses were analyzed in R. Crosstabs were selected to determine a demographic profile of scooter users in San Francisco, to identify any differences in how different groups use the service, and to answer questions related to the Emerging Mobility Guiding Principles. Specifically, questions relate to the

principles of Sustainability, Equity, Transit, and Disabled Access to uncover how scooter use does or does not support the city's goals.

Emerging Mobility API Device Data

The SFMTA requires its permittees to provide access to real time device data via an application program interface (API). The SFMTA requires permittees share data through an API in the Mobility Data Specification (MDS) format. The SFMTA pulls the raw device data from the companies. SFMTA employees set up a system to clean and debug the anonymous device data. The data is stripped of any personally identifiable information (PII) before it reaches the city. The processed data is striped of personally identifiable information (PII) by aggregating trips by time period and geography. Raw data is not stored, and all other SFMTA staff may view the anonymized data through dashboards.

The SFMTA has created trip, status change, and service area APIs. This research uses data from all three APIs. Sustainability research questions are answered by combining average trip length with other data to estimate change in VMT. The Equitable Access research questions use device data pulled from the APIs to determine device availability and the number of trips starting or ending in Communities of Concern.

Emerging Mobility Services (EMS) Permittee Reporting

The SFMTA requires permittees to submit monthly reports on metrics derived from the Emerging Mobility Guiding Principles. The agency validates these reports with real time device data and other municipal data sources, depending on the metric. The Sustainability portion of this research uses non-revenue VMT, total trips, and total revenue miles from company reporting. The stationless bikeshare permit was issued before the SFMTA had established permit metrics based on the Guiding Principles. JUMP (Uber) provided this data to the SFMTA after SFMTA staff requested it. Skip only reports non-revenue VMT for employees, and not independent contractors.

A blank copy of the SFMTA's scooter monthly reporting template in available in **Appendix C**. It is provided as a resource for other cities as an example of metrics tied to city values and goals.

Secondary Sources

Demographic data was compiled for various geographies to compare user demographics from the user survey with the demographics of those who live and work in the various micromobility service areas. Data for population, household income, race, and ethnicity for San Francisco residents was obtained from the US Census Bureau's 2017 5 year American Community Survey (ACS).[20] This dataset was the most recent and detailed demographic dataset available.

Data for those employed in the service areas was obtained using the Census Bureau's OnTheMap online portal. The data is from the 2015 Longitudinal Employer-Household Dynamics dataset (the most recent year available)[21].

New variables were coded from combining survey responses. Auto vs non-auto and transit vs non-transit were coded for the transit and sustainability analysis. A low-income category was coded by combining household size and income. Respondents were coded as low-income using the SFMTA Muni Lifeline Pass income eligibility limits (household income below 200% of the federal poverty line).

Methods

Transit Research Questions

Transit
Do scooters and stationless bikeshare serve as a complement or competitor to transit? To what extent?

The Transit research questions are answered using user survey data, as well as the crosstab between questions 2 and 4 of the user survey (mode shift and connection to transit). To estimate both the number of transit trips scooters and stationless bikeshare replaced and induced, I compared the number of users who would have taken transit but did not with the number that would not have taken transit but instead chained their scooter or stationless bikeshare trip with transit. I use this comparison as a proxy of trips that reduced or added transit trips. These trips represent the upper bound of the ratio of induced transit trips to reduced transit trips.

The lower bound of the ratio takes into account trips where scooters or stationless bikeshare replaced a transit first/last mile connection for trips that ultimately still connected with transit. In these cases, scooters and stationless bikeshare still supported transit, but simultaneously compete with and serve as a complement to transit.

Sustainability Research Questions

Sustainability
What are the approximate effects of scooters and stationless bikeshare on the number of vehicle miles traveled (VMT)?

I measure the sustainability of the stationless bikeshare and scooter systems by estimating their impact on VMT. I use changes in VMT as a proxy for changes in GHG emissions. To calculate estimated change in VMT, I use data gathered from the trips API, user surveys, permittee monthly reporting, and the literature.

The change in VMT is equal to the reduced VMT from auto mode shift plus the VMT need to operate the system. See **Figure 3** for calculation and **Table 4** for adjustment factors and their source.

VMT Calculation Inputs and Sources	
Variables	**Source**
Percentage of trips that would have been taken by autos (TNC, drive alone, or carpool)	User Surveys
Total number of scooter and stationless bikeshare trips	Permittee Monthly Reporting and Trips API
Average trip length	Permittee Monthly Reporting and Trips API
VMT adjustment based on trips shifted away from TNCs, private autos, and carpooling	SFCTA TNCs Today Report
Non-revenue VMT by vehicle type	Permittee Monthly Reporting

Table 4: VMT Calculation Inputs

1. $\Delta\, AutoVMT = AutoVMT\ Reduced\ +\ NonRevenue\ operational\ VMT$

   $AutoVMT\ Reduced\ =$
2. $RevenueMiles \times (\ TNC\% \cdot adjTNC) \times DriveAlone\% \times (\ Carpool\% \cdot adjCarpool)$

Figure 3: Changes in VMT Calculations

Equitable Access Research Questions

Equitable Access

How does the demographic profile of scooter and stationless bikeshare users compare to the communities in which they operate? Are operators adequately serving Communities of Concern?

I answer the Equitable Access research questions by comparing descriptive statistics between user survey respondents and the communities where stationless bikeshare and scooters are available. I look at both travel patterns and demographic profiles to identify differences between survey respondents and the general population. I characterize these differences to establish a baseline understanding of who is using these services. See the "Secondary Sources" in the Data section for a full explanation of the demographic and travel data and how it was processed.

I use API data to compare device availability between Communities of Concern and other parts of the city. I compare the total number of hours devices in Communities of Concern are available with the total number of hours devices were available in the entire city. I aggregate all devices to determine this ratio. I compare it the SFMTA's permit requirement that JUMP and Scoot ensure a minimum 20% of all available device hours are in Communities of Concern. I measure equitable access for Communities of Concern the same way the SFMTA does as part of its permit requirements.

I then consider other ways of measuring and ensuring access to stationless bikeshare and scooters the SFMTA may consider. After measuring physical proximity to an available device, I consider barriers to access that persist even when devices are available nearby.

Results and Analysis

Transit

Transit Guiding Principle

"Emerging Mobility Services and Technologies must support, rather than compete with public transit services, must account for the operational needs of public transit and encourage use of high-occupancy modes."

Transit Results
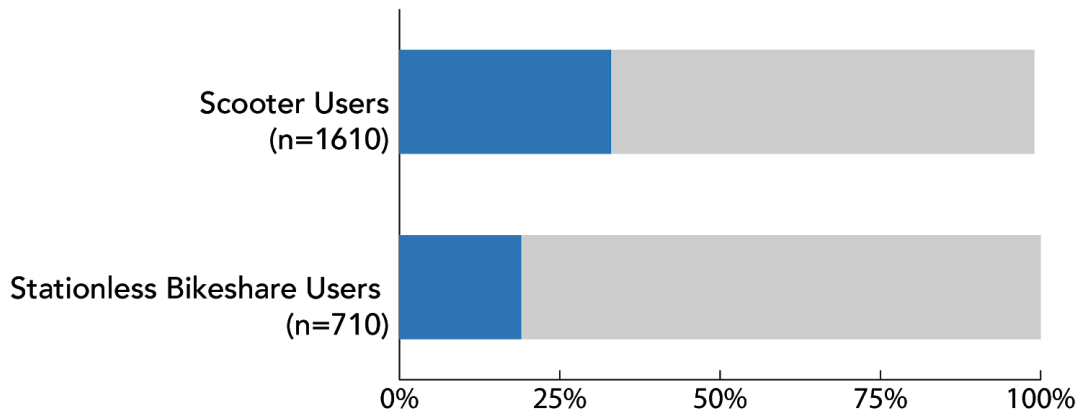
Figure 4: First/Last Mile Transit Trips

Survey results indicate that scooters overwhelmingly support and complement transit more than they compete for riders. Scooters induce new transit trips at nearly 5 times the rate they replace them. Survey data show nearly 30% of all scooter trips induced new transit trips, with scooters serving as a first/last Mile connection. These induced trips are for respondents who would not have taken transit if a scooter wasn't available, but shifted to using scooter and transit for their trip. Only 6% of scooter users would have taken transit for their trip if a scooter wasn't available, once accounting for the connect to transit survey question.

Survey results indicate that scooters are more likely to be used as a first/last mile connection than stationless (electric) bikeshare, which is used for longer trips (**Figure 6**). Stationless bikeshare replaces more transit trips than it induces, but is still used as a first/last mile transit connection for nearly 20% of trips.

Stationless bikeshare has an average trip length of 2.6 miles while scooter trip lengths average less than 1 mile. Median stationless bikeshare trip lengths are 1.9 miles and scooters 0.6 miles. The difference in trip length between the two modes suggest that they are each filling different travel needs.

Although stationless bikeshare replaces more transit trips than it induces, it also is more likely to replace automobile trips (especially TNC trips) than scooters. TNCs have significantly increased congestion in San Francisco, which already has the slowest bus system in the United States.[22, 23] Stationless bikeshare has the potential to alleviate some amount of transit service degradation. These results indicate that scooters and stationless bikeshare support transit ridership, and the promotion of both should be considered as a strategy to increase transit usage.

The SFMTA is unique with the United States in that it functions both as the city's department of transportation and as a public transit operator (Muni and Muni Metro). The agency is tasked with both operating the city's largest transit system and increasing the mode share of all other sustainable travel modes.

In future surveys, the SFMTA should ask the respondent if they rode a scooter or took bikeshare to a rail or bus rapid transit station or to a standard bus station. It is likely that stationless bikeshare interacts with different modes of public transit differently given that TNCs serve as a complement to rail and a substitute for bus ridership.[24]
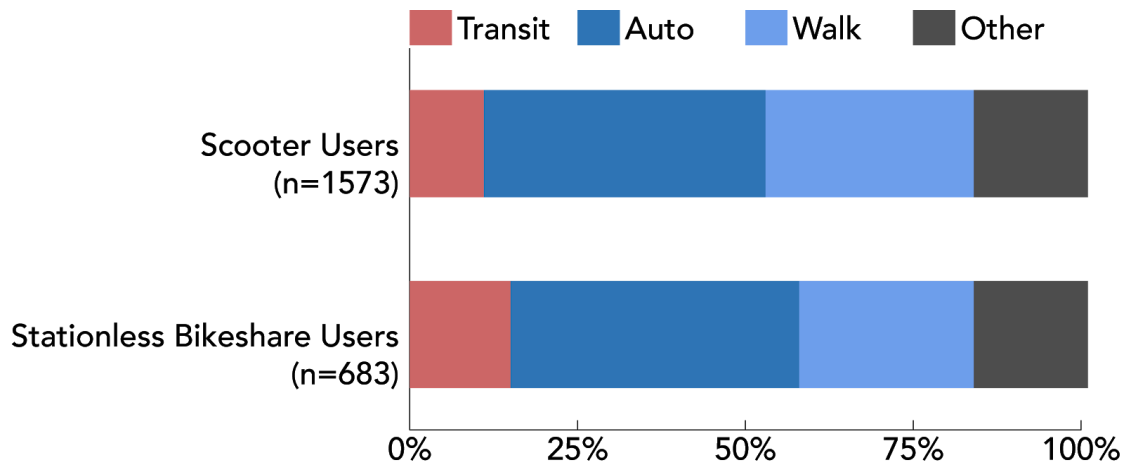
Figure 5: Travel Mode Replacement

Grouped by Transit, Auto, Walk, and Other. See Appendix A for disaggregated results.

Transit Findings

Finding 1: Scooters are frequently used as a first/last mile connection.

Finding 2: Stationless (electric) bikeshare is frequently used to replace longer trips, especially by automobile.

Sustainability

Sustainability Guiding Principle

"Emerging Mobility Services and Technologies must support sustainability, including helping to meet the city's greenhouse gas (GHG) emissions reduction goals, promote use of all non-auto modes, and support efforts to increase the resiliency of the transportation system."

Sustainability Results

Micromobility Category	Permittee/ Operator	Revenue to Non-Revenue Ratio	Auto-VMT Reduced per Revenue Mile	Auto-VMT Reduced Annually
		Ratio. Customer miles traveled vs. auto-VMT from operations	*Auto-miles reduced per customer mile traveled on bike/scooter.*	*Miles. Normalized based on data up to Feb 2019 for JUMP and through April 2019 for Skip and Scoot*
Stationless Bikeshare	JUMP	8.45	0.42	1,033,885
	Skip	5.12	0.33	196,770
Scooters	Scoot	8.56	0.37	48,135
	Total			**1,278,790**

Table 5: Summary of VMT Reduced

Forty percent of scooter trips and 45% of stationless bikeshare trips would have been taken in an automobile had a scooter not been available (**Figure 5**). Both scooters and stationless bikeshare replace TNC trips much more frequently than they displace privately owned auto trips. Results show that frequent riders are more likely to have replaced an auto trip than infrequent scooter riders. Thus it is likely that the 40% of auto mode replacement is a conservative estimate.

	Auto Shift %	TNC Shift %	Drive Alone Shift %	Carpool Shift %
JUMP (stationless bikeshare)	45.16	35.9	7.6	1.2
Skip (scooters)	43.75	36.6	6.1	0.2
Scoot (scooters)	40.16	35.9	3.2	0.5

Table 6: Percent Mode Replacement

From user survey data. Auto shift is the sum of TNC, drive alone, and carpool replacement.

Results indicate that bikeshare and scooters can assist the SFMTA in meeting its goal to increase the city's sustainable travel mode share to 80% by 2030. Both of these modes are considered sustainable by the SFMTA's definition and both reduce auto-VMT within the city, although by different magnitudes. Stationless bikeshare reduces auto-VMT more than scooters do, primarily though longer average trip lengths (**Table 5**). For this analysis, VMT only refers to automobile, truck, or van miles traveled, and not public transit VMT.

Variable	TNC	Carpool Multiplier
VMT Reduction Multiplier	1.27	0.45
Data Source	SFCTA Weekday VMT Multiplier [25]	Assumes 2.2 Average Occupancy

Table 7: VMT Estimate Assumptions

The VMT analysis is preliminary, and over time, VMT reductions are likely to increase. Operators will likely continue to reduce the ratio of revenue miles to non-revenue VMT over time. Scoot and Skip are likely to increase the number of trips taken per device as they roll out newer scooter models with longer lifespans and as trips per device per day continues to increase, following the same trend as stationless bikeshare. Scoot's use of its mopeds to rebalance

its scooter fleet will likely improve. New generations of scooters are planned to include battery packs that may be swapped out on the street rather than taking the device to a warehouse to charge. JUMP's newest generation of bikes just added this feature. JUMP's newest bikes include sensors that self-diagnose maintenance issues, and new scooter models will likely include this technology as well. All three companies are likely to improve user incentive programs to ride the devices to optimized locations for rebalancing, charging, and maintenance.

Furthermore, it is important to consider that the data here for scooter trips was collected primarily during winter months during an unseasonably wet winter for San Francisco. Thus, once summer trips are considered, it is possible that scooter VMT reductions will increase significantly.

2.4

**Stationless Bikeshare
Average Trip Length (mi)**

0.8

**Scooter
Average Trip Length (mi)**
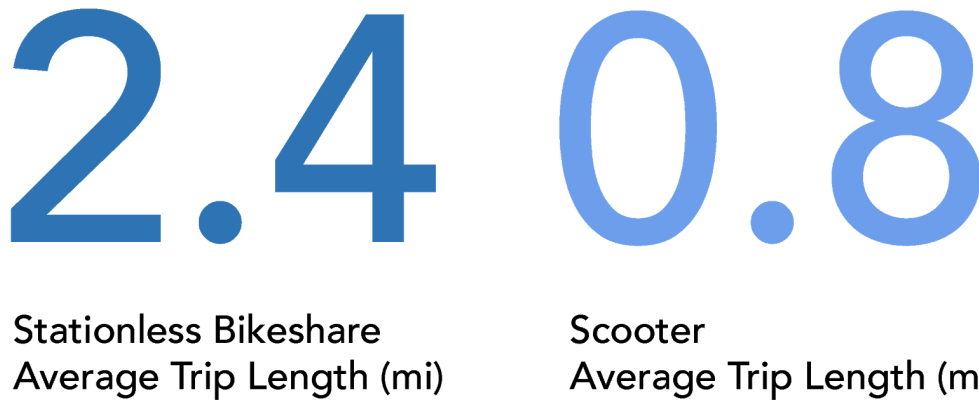
Figure 6: Average trip length and duration for stationless devices
JUMP e-bike average trip length is 3x the average scooter trip length. Data from December 2018 – March 2019.
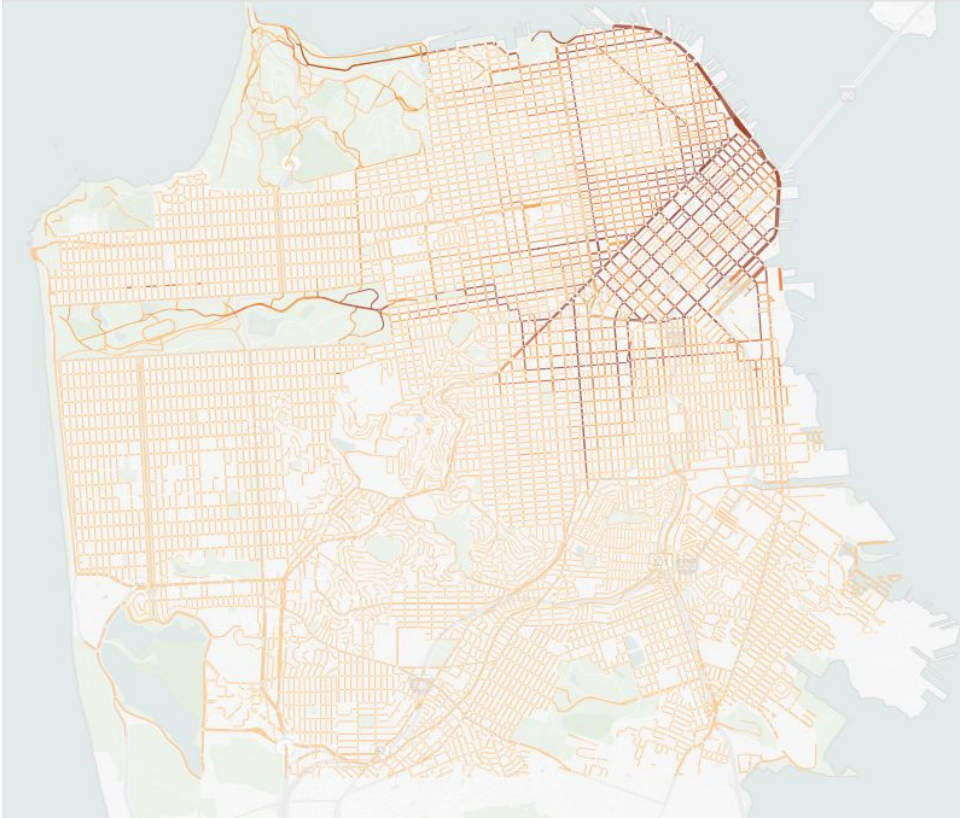
Figure 7: Trips by street segment.

Trips are concentrated in the congested NE quadrant of the city. Darker red represents more trips per street segment.

Sustainability Findings

Finding 3: Stationless (electric) bikeshare directly replaces much more VMT per device than scooters.

Finding 4: Scooters have more potential to decrease VMT in combination with transit usage.

Equitable Access Findings

Equitable Access Guiding Principle

"All people, regardless of age, race, color, gender, sexual orientation and identity, national origin, religion, or any other protected category, should benefit from Emerging Mobility Services and Technologies, and groups who have historically lacked access to mobility benefits must be prioritized and should benefit most."

Equitable Access Results

User survey data indicate that scooter and stationless bikeshare riders skew male, white, and high to very high annual household income (**Table 8**). The demographic profile of San Francisco residents in the city does not explain this skew, nor does the demographic profile of individuals employed in the city. Survey results indicate that the SFMTA will need to augment scooter and stationless bikeshare operations to fulfill its Equitable Access guiding principle. Complete survey results are available in **Appendix A**.

Combined Scooter Service Area User Survey Demographic Analysis			
	Survey Results (n=2,256)	San Francisco Residents (2017 5 year ACS)	Employed in San Francisco (2015 LEHD)
Population	-	864,263	-
Employed	-	233,513	642,375
Households	-	358,772	-
% White	66	47.2	63.2
%White non-Latinx	-	40.8	-
% Black	3	5.3	7.1
% Native American/ Alaska Native	1	0.4	0.7
% Asian/Pacific Islander	17	35	26.0
% Other	4	13	3
% Latinx	7	15	15.4
% Non-Latinx	-	85	84.6
Median Household Income	$100,000-$150,000	$96,265	
% <50k	12	30	-
% <75k	21	41	-

Table 8: Survey Results Demographic Comparison
Due to differences in survey questions from each source, some estimates have been left blank.

 Low income survey respondents (household income less than $50,000-$75,000 annually, dependent on household size) were nearly 20 percentage points lower when compared to all San Francisco residents (**Table 8**). The number of low income plans distributed among all operators was 522 (**Table 9**). ACS data show that 30-40% of all San Francisco households are eligible for these low income plans (**Table 9**). Equitable access could be significantly improved by expanding the number of low income passes. For comparison, 20**%** of GoBike memberships are Bikeshare For All low income memberships.[26]

Low-Income Memberships and			
	User Survey	All San Francisco Residents	Discounted Memberships
Low-Income Discounted Memberships	–	–	JUMP: 226 Scoot and Skip: 296
Eligible for Low-Income Discounted Membership	12-21%	30-41%	–

Table 9: Low Income Passes and Eligible Households

Stationless bikeshare ridership is closer to gender parity (26% female) than scooter ridership (17% female), but neither system is close to gender parity of usage. There is a significant gender gap in usage, both scooters and stationless bike share are further away from gender parity than San Francisco's bike commuters (30% female) (**Table 10**).

Survey results indicate a lack of equitable access, but are not significantly different than San Francisco commuters personally owned, non-electric bikes. Representative bike ridership demographic data is difficult to collect and is often unavailable. Census commute data is used in its place, and includes "taxicab, motorcycle, bicycle, or other means".[27] Survey data indicate that scooters and stationless bikeshare have not increased access and utilization of active travel modes as compared to personally owned bikes in San Francisco (**Table 10**).

Demographics of Scooter/Stationless Bikeshare users compared with San Francisco's Bike Commuters		
	Survey Data (Stationless bikeshare and scooters combined)	ACS Data (all SF)
Male	79%	70%
Female	20%	30%
Median Age	25-34 years of age	34.3 years of age
White	66%	69%
White non-Latino	-	66%
Latinx	9%	14%
Black	3%	2%
Native American/ Alaska Native	1%	0.2%
Asian/Pacific Islander	17%	18%
Other	4%	6%
Two or more races	-	5%

Table 10: Scooters and stationless bikeshare vs. personal bike ownership

Compared with San Francisco 2017 5 year ACS commute to work by bike

Device data obtained from the emerging mobility services API verify that over 20% of all device availability was in Communities of Concern, as required by the SFMTA's permits. The annual household income, race, and gender of riders from survey results indicate that currently "groups who have historically lacked access to mobility benefits must be prioritized and should benefit most" are not yet doing so. There are likely barriers to stationless bikeshare and scooter utilization beyond device availability. Identifying those barriers are generally beyond the scope of this research, with low income membership being the exception.
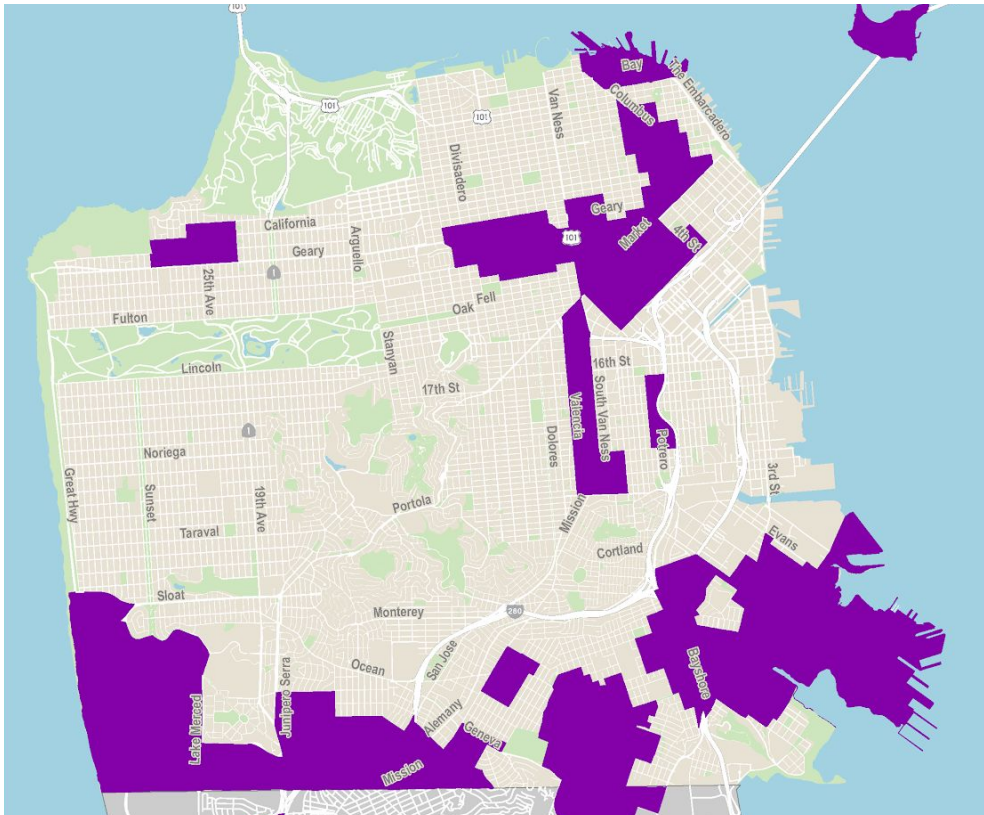
Figure 8: San Francisco Communities of Concern 2018
Communities of Concern are outlined in purple.

Results show that it is insufficient to require devices be available in Communities of Concern to fully realize stationless bikeshare and scooter systems that align with the SFMTA's Equitable Access guiding principle.

Equitable Access Findings

Finding 5: Scooter and stationless bikeshare have similar user demographics compared to available personally owned bike ridership data.

Finding 6: Ensuring that an emerging mobility operator's vehicles are available in a Community of Concern is not sufficient to ensure equitable access

Recommendations

After analyzing data from the SFMTA pilot I conclude that stationless bikeshare and scooter system operations align with the Transit, Sustainability, and Equitable Access Emerging Mobility Guiding Principles. I find that the SFMTA's permit requirements likely improved system outcomes. But I also find that there is significant room for improvement. My recommendations to the SFMTA are grouped by Guiding Principle and should be implemented in future micromobility permits. Where possible, the SFMTA should implement these strategies for the remainder of its pilot periods.

Transit Recommendations
1. Prioritize providers/ regulations that support transit and other forms of sustainable transportation [make it a truly first/last mile solution]
   a. Integrated trip planning
   b. Integrated payments
   c. Bundled purchase of transit passes with service

Sustainability Recommendations
2. Require better data collection on non-revenue VMT and research strategies to reduce non-revenue VMT to form best practices
3. Partner with researcher to study lifecycle GHG emissions and how they compare to auto life cycle emissions.

Equitable Access Recommendations
4. Promote equitable access by signing up Muni Lifeline pass holders and coordinate with other agencies to enroll more residents in low income plans (ex: coordinate with public housing/ affordable housing agencies)
5. Conduct further research on why certain groups don't utilize the service. Devices are relatively available and affordable; why the large disparity in use by gender, race, and income?

Transit Recommendations

The SFMTA should evaluate future permit applications with a stronger emphasis on supporting transit. The agency should clearly state that applicants who propose transit supportive operational strategies will be scored better than applicants who do not. The agency can weight an applicant's commitment to maintaining device availability near major transit stations, like the San Francisco Caltrain station. For applicants that provide

other transportation services, the agency can encourage the agency to provide nudges to customers to opt for more sustainable (higher occupancy, more space efficient) travel modes.

Most importantly, I recommend the SFMTA give considerable weight to permit applicants who integrate transit services into their platform. Operators who provide multimodal trip planning on their platform should be scored significantly higher for doing so. Even more than trip planning integration, the agency should prioritize operators who integrate transit fare payment with their platform.

Possible transit fare integration could include the ability to buy Muni or other transit agency rides. Applicants could include options to purchase a monthly Muni or Muni/BART pass as part of a larger monthly pass. With the next generation of Clipper Cards underway, more fare integration opportunities may be possible in the near future. The agency can inform applicants of its increased emphasis on transit supportive strategies and also see what applicants propose.

The agency could also require integrated transit trip planning or payment. That requirement may be logistically difficult for permit applicants for future permits in 2019, but the agency should consider adding these requirements at a future date.

As user surveys show, nearly all of the shift away from auto travel modes was from riders opting to take a scooter or bike trip instead of a TNC trip. An increasing share of auto trips in the city are TNC trips. Shifting 80% of all trips to sustainable modes by 2030 will be made more difficult if TNC use continues to rise. A TNC applicant who integrated transit trip planning and fare integration should receive a significant boost when their application is scored.

Nearly all of the reductions in VMT came from shifting away from TNC trips. Being able to plan or purchase a scooter or bike first/last mile connection and a transit fare at once would make sustainable, multimodal trips much easier for travelers. As San Francisco's primary transit operator, the agency should be doing all that it can to support transit and uphold its Transit First mandate.

Sustainability Recommendations

The SFMTA should require all permittees track non-revenue VMT for all operations within the city. It should make it clear that this reporting include VMT from both employees and independent contractors. It should also clarify that revenue and non-revenue VMT should be reported by vehicle type (electric moped, electric vehicle, diesel van, etc.). For future permits, the SFMTA should continue to favor applications that propose innovative ways to reduce non-revenue VMT, including swappable batteries, rider incentive for rebalancing, rebalancing with vehicles that don't increase VMT (electric mopeds, bikes, etc.), and other new strategies to reduce operations VMT.

The SFMTA should also partner with a third party university researcher to study the life cycle GHG emissions of micromobility systems and their potential to further reduce GHG emissions compared to automobile travel and current operations.

Equitable Access Recommendations

The SFMTA should conduct further research to understand why some groups utilize stationless bikeshare and scooters less than others. The SFMTA successfully ensured permittees provide equitable access to devices within Communities of Concern. But, physical proximity to an available device is the true minimum measure of access. Further research is needed to understand other barriers to access in using these services for different groups face.

The SFMTA can promote equitable access to stationless bikeshare and scooters by directly advertising and enrolling people into low income plans, including by partnering with other city agencies. The SFMTA has set low income plan eligibility at the same income levels it uses to determine Muni Lifeline Pass eligibility. The city can best expand access to these new services by directly enrolling Muni Lifeline Pass holders when they purchase their pass. At the minimum, the agency should inform eligible individuals of these low income plans when they are purchasing a Muni Lifeline Pass.

Less than 1% of all stationless bikeshare and scooter riders are enrolled in low income plans, yet at least 30% of households in San Francisco would

qualify for the plans. The Ford GoBike system has 16% of its riders enrolled in its low income plan. Permitted companies have little incentive to enroll eligible low income riders, and will generally put in the minimal effort to do so to please the city. Instead, it is the city that should take on the responsibility of ensuring low income residents benefit from new mobility services. The SFMTA knows its Lifeline Pass customers are eligible for these plans, and should inform Lifeline Pass customers about low income rider plans.

I further recommend that the SFMTA partner with other city agencies to notify and enroll eligible individuals of these plans. City agencies providing social services know which individuals would qualify for a low income plan better than any permitted company could.

The SFMTA should fully uphold its Equitable Access Guiding Principle and ensure that "groups who have historically lacked access to mobility benefits must be prioritized and should benefit most." To ensure equitable access for stationless bikeshare and scooters and future mobility services, the SFMTA must transition from public transit to public mobility.

Conclusion

After examining stationless bikeshare and scooters, I conclude that these services are transit-supportive and may in fact induce more transit trips than they replace.

I find that these services reduce VMT, but that current claims of VMT reductions are greatly exaggerated, especially for scooters. It's highly likely there will be more intense VMT reduction in the near future, though, as companies implement strategies like swappable batteries and rider rebalancing incentives. These services are in their nascent stage. Companies will learn over time how to reduce non-revenue VMT as they move up the learning curve.

VMT reductions were negligible considering each day drivers in the city rack up 5.6 million miles of driving, all while the city allows driver's to store 500,000 registered vehicles.[28] The city has not legislated a cap on the number of these vehicles that can be parked in the public right-of-way, despite them being significantly larger, deadlier, and environmentally destructive. These vehicles regularly violate ADA accessibility and cause bodily harm, and they certainly do not follow the principle of Equitable Access.

User surveys demonstrate that very few of these trips reduce the use of driving personal automobiles. Nearly all VMT reductions are from reduced TNC usage. If San Francisco is to meet its climate goals and increase the share of trips taken by sustainable modes, scaling these systems will help but not suffice. For that to happen, the city will have to separately address the private automobile question.

Micromobility companies and users benefit from economies of scale. An increased number of permitted devices will likely result in improved revenue to non-revenue VMT ratio, further reducing VMT in the city. An increased number of devices should also increase how frequently they're used, as riders will find an available device nearby more often. Over time, riders will view these services as a more reliable transportation option, increasing usage. Even if these services don't significantly reduce VMT, they are certainly still and improvement. More importantly, they improve mobility options in the city.

San Francisco should act according to its espoused values, adopted Emerging Mobility Guiding Principles, and Transit-First legal mandate to promote shared mobility and active transportation on its streets. Pilot programs are a useful tactic to learn, iterate, and develop solutions. But now that evidence from the pilot has shown these services provide public benefit, while unwanted side effects can be mitigated with a permit and proper regulation.

Parking problems and sidewalk crowding are indeed an issue and important to address. Although not explored in this research, parking issues and sidewalk crowding is the most common flashpoint for fights over scooters and stationless bikeshare, and is a highly contentious issue San Francisco and other cities hope to address with permit requirements, parking enforcement, and other interventions, like requiring devices have a locking mechanism. Parking is an important issue to address. Pedestrians are already allocated so little road space that fights over the sidewalk are to be expected.

Even so, it is illogical and inconsistent for San Francisco to limit the number of devices on its streets over fears that storing privately owned vehicles in the public right-of-way may lead to crowding and squeeze pedestrian space further. The city currently takes away pedestrian space to store privately owned vehicles in the public right-of-way. Enough space, in fact, for 275,500 privately owned vehicles that take at least 6 times as much space as a bike.[29] And of these 275,500 on-street parking spaces, only 10% require payment to use (metered). Every time a bikeshare station is proposed and street space is reallocated from storing one private vehicle (a car) to 8 or more (bikes), the SFMTA holds a public hearing and significant outreach is conducted. Yet, when someone buys a car, no such process occurs even though the city effectively reallocated same amount of space for privately owned vehicle storage.

The SFMTA understood that stationless bikeshare and scooters had the potential to provide a public benefit when it started its pilot programs and created new permits. San Francisco has learned from these pilots, and moving forward it should continue to iterate and improve its permits from what it learned. It must pursue further research on problems identified during

its pilots, especially to understand and better meet its Equitable Access principle. It should continue to iterate and improve its permits.

Expanding and improving shared mobility and active transportation is imperative for San Francisco to meet and uphold its sustainability goals. It is the city's responsibility to improve and expand its micromobility systems.

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Appendices

Appendix A
SFMTA Emerging Mobility Service (EMS) User Survey

Appendix B
SFMTA Real-time data requirements for stationless emerging mobility services

Appendix C
SFMTA Scooter Permittees monthly reporting template

Appendix D
SFMTA Powered Scooter Share Mid-Pilot Evaluation

Appendix E
*SFMTA Stationless Bikeshare Mid-Pilot Evaluation*

Appendix A

SFMTA Emerging Mobility Service (EMS) User Survey Results and Requirements

Appendix A – User Survey

The SFMTA requires both its stationless permit programs to conduct a user survey to better understand user profile, mode choice, and travel patterns.[1] As part of the pilot programs, permittees were required to survey a sample size that is representative of active users to allow for statistically significant findings.[2] The SFMTA is including the results of its other permitted stationless shared mobility provider – JUMP – for comparison purposes.[3] All percentages discussed in the text represent the combined responses of all three stationless shared mobility providers unless otherwise noted.

Question 1 – What was the purpose of your most recent trip?
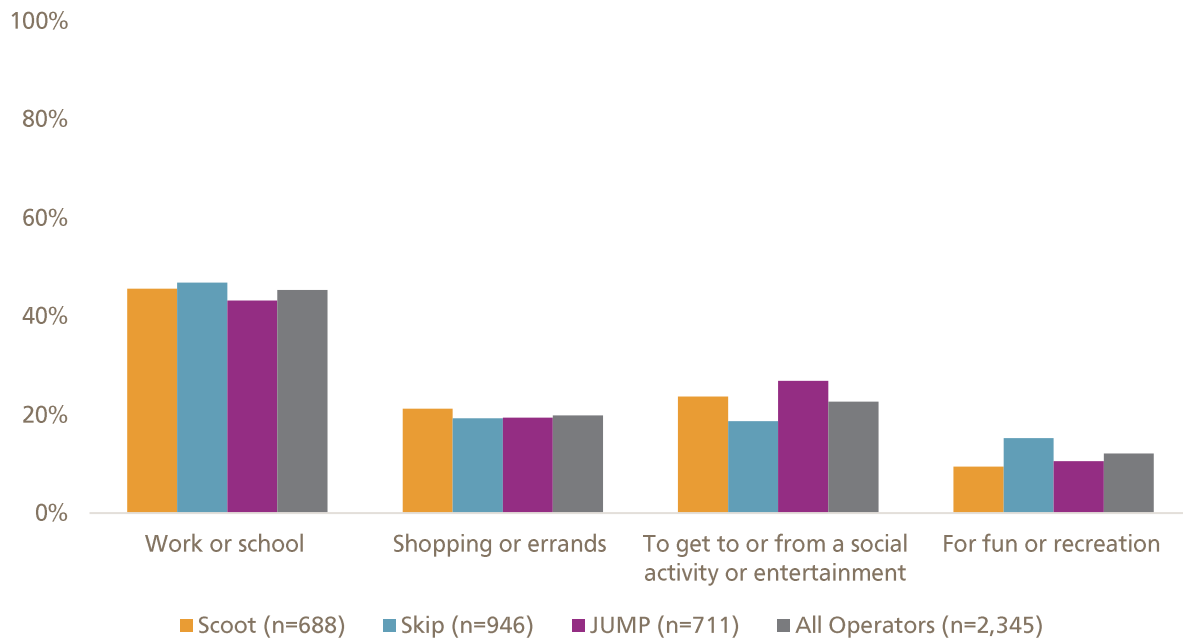
The greatest share of survey respondents used shared stationless devices to travel to or from work or school (greater than 40%) on their most recent trip. The fewest number of respondents used shared scooters or e-bikes for fun or recreation, indicating that most trips were taken on these devices for utilitarian purposes.

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[1] Surveys were distributed from January 7 through February 5, 2019 and were available in English, Spanish, Chinese, and Tagalog.

[2] The SFMTA created and hosted the survey, while each permittee administered the survey via email to anyone who used their service from October to December 2018. The required sample sizes allow for a confidence level of 95% and at most a margin of error of 4%.

[3] Because this survey was distributed via email on an opt-in basis, data and findings should be interpreted with appropriate caveats compared with random sampling. Since the survey is not a simple random sample, survey results are subject to selection bias. Furthermore, because a survey respondent could use all three services, there is no guarantee that respondents are not double counted between surveys.

Question 2 – If this service was not available for your most recent trip, what mode of transportation would you have used?

Scoot (n=648) ■ **Skip (n=925)** ■ **JUMP (n=683)** ■ **All Operators (n=2,256)**
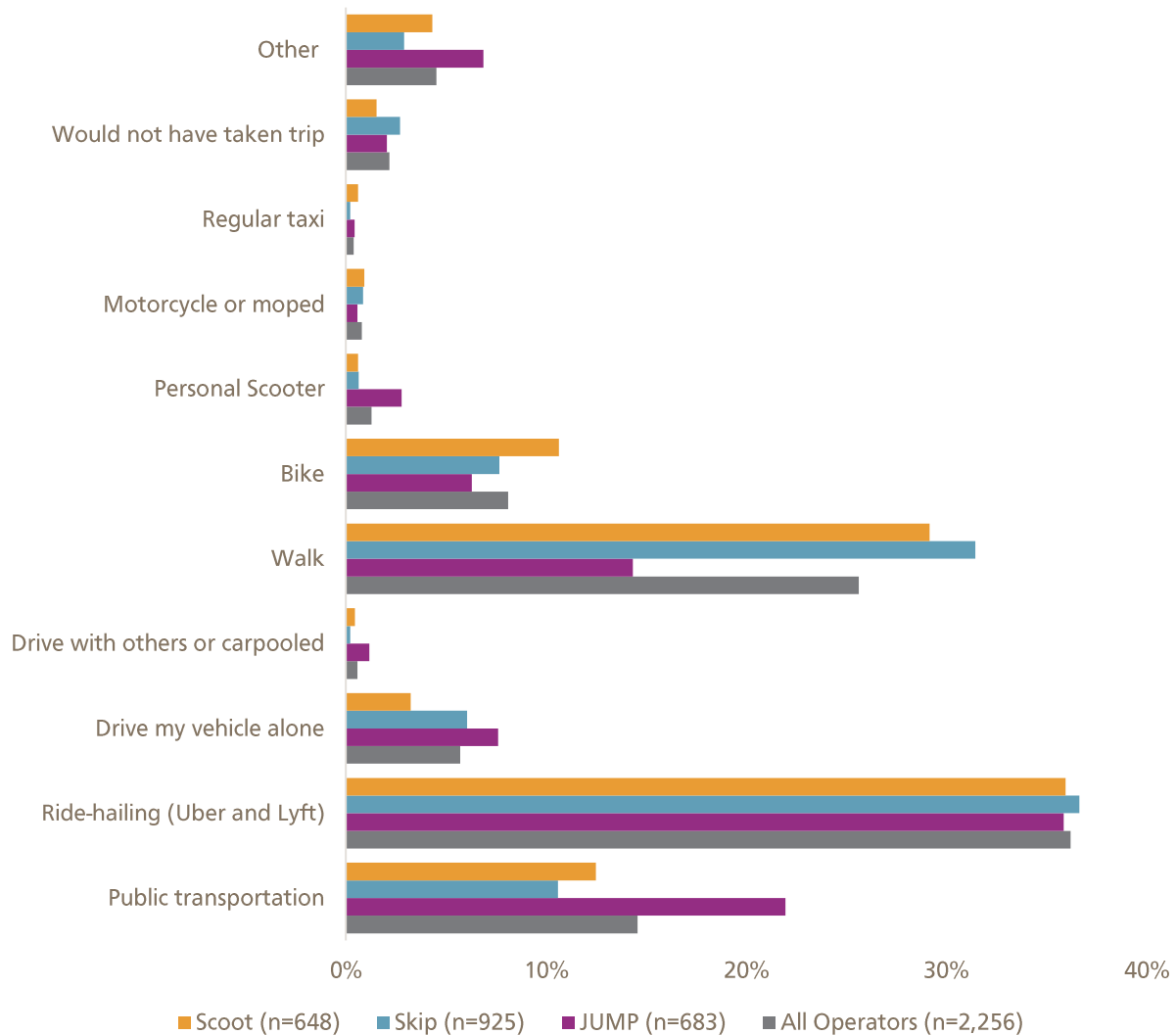
Most respondents (36% overall) indicated they would have taken a ride-hailing vehicle had the stationless device they rode not been available for their most recent trip. 26% of respondents would have walked, with the largest shift from walking reported amongst Skip (31%) and Scoot (29%) respondents, versus 14% of JUMP respondents.

22% of JUMP survey respondents would have taken transit had the service not been available, versus 13% of Skip respondents and 11% of Scoot respondents. However, a crosstabs analysis indicates that 27.5% of scooter survey respondents would not have otherwise taken transit but used the service to connect to transit (induced transit trips). This analysis shows that the availability of shared scooters induced around four times as many transit trips as were replaced by these services, indicating that shared scooters facilitated a net increase in transit trips by serving as a last-mile solution.[4] Additional information on scooters and transit use is found below (Question 4).

[4] Nearly 28% of scooter survey respondents reported a new transit trip on their last scooter journey when they would not have otherwise taken transit if scooters weren't available. This indicates that scooters facilitate a first/last mile connection to transit.

Question 3 – For your most recent trip, why did you choose this service over another mode? Select up to three reasons. [5]
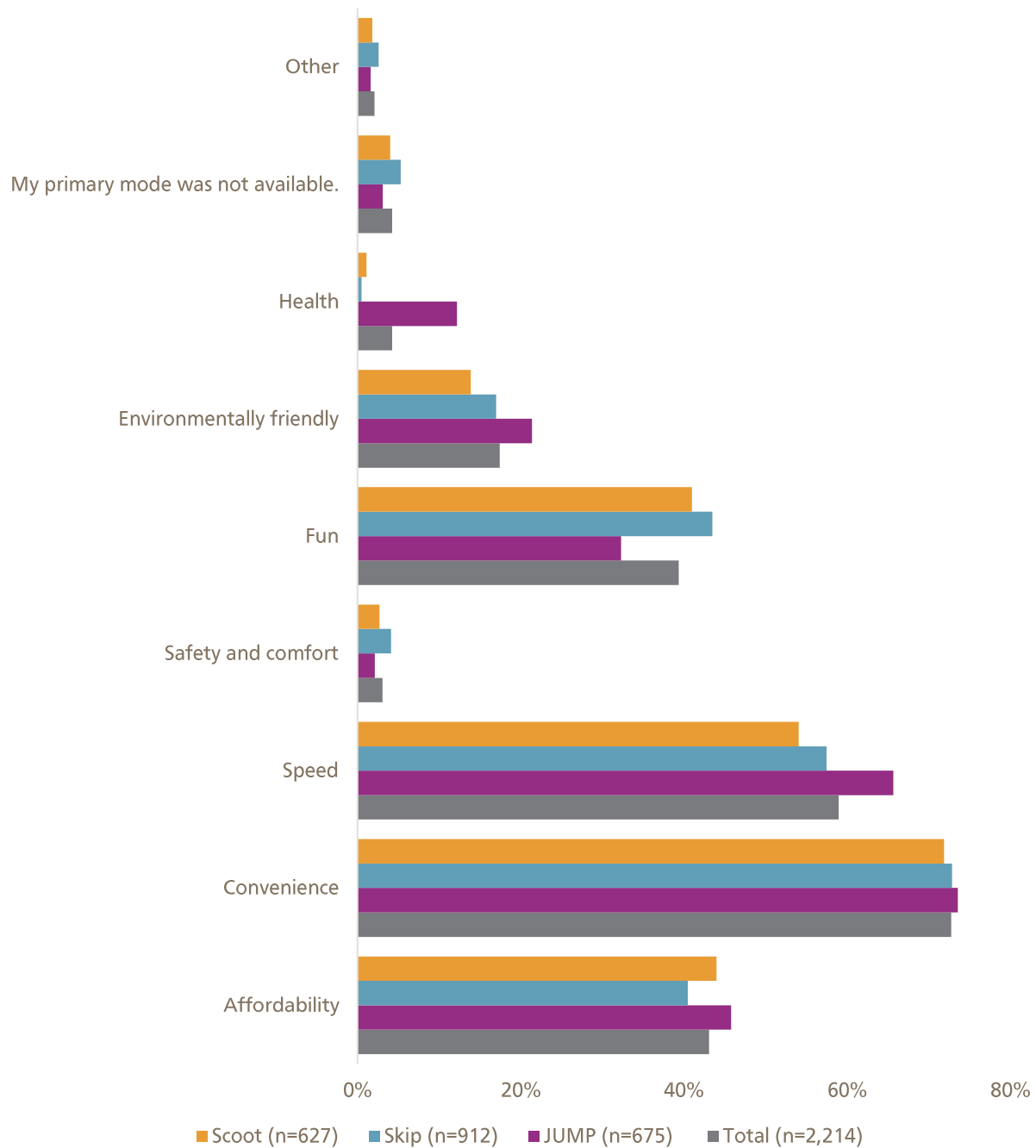
The top three reasons that respondents chose to take a shared stationless service over other modes were because they were more convenient (73%), quicker (59%), and/or affordable (43%) than alternatives.[5]

---

[5] Note: for this question, users were able to select up to three responses.

Question 4 - For your most recent trip, did you use the service to get to or from public transportation?

Scoot (n=677) ■ Skip (n=933) ■ JUMP (n=675) ■ Total (n=2,311)
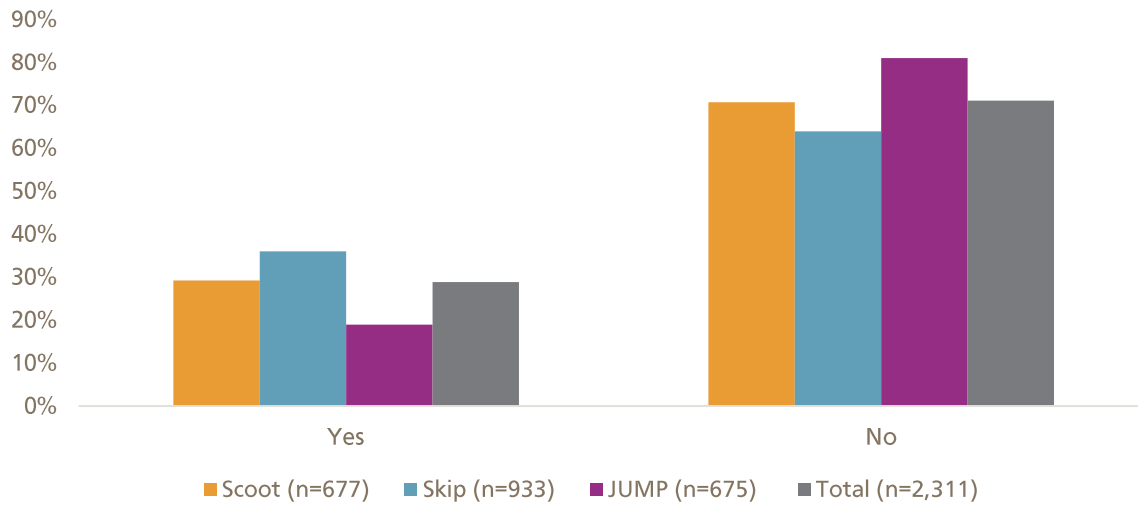
36% of Skip respondents, 29% of Scoot respondents, and 19% of JUMP respondents used each respective service to get to or from public transportation on their most recent trip. The analysis discussed under Question 2 shows that the availability of shared scooters induced around four times as many transit trips as were replaced by these services, indicating that shared scooters facilitated a net increase in transit trips by serving as a last-mile solution.

Question 5 - In general, how often do you use the service?

Scoot (n=677) ■ Skip (n=931) ■ JUMP (n=704) ■ All Operators (n=2,312)
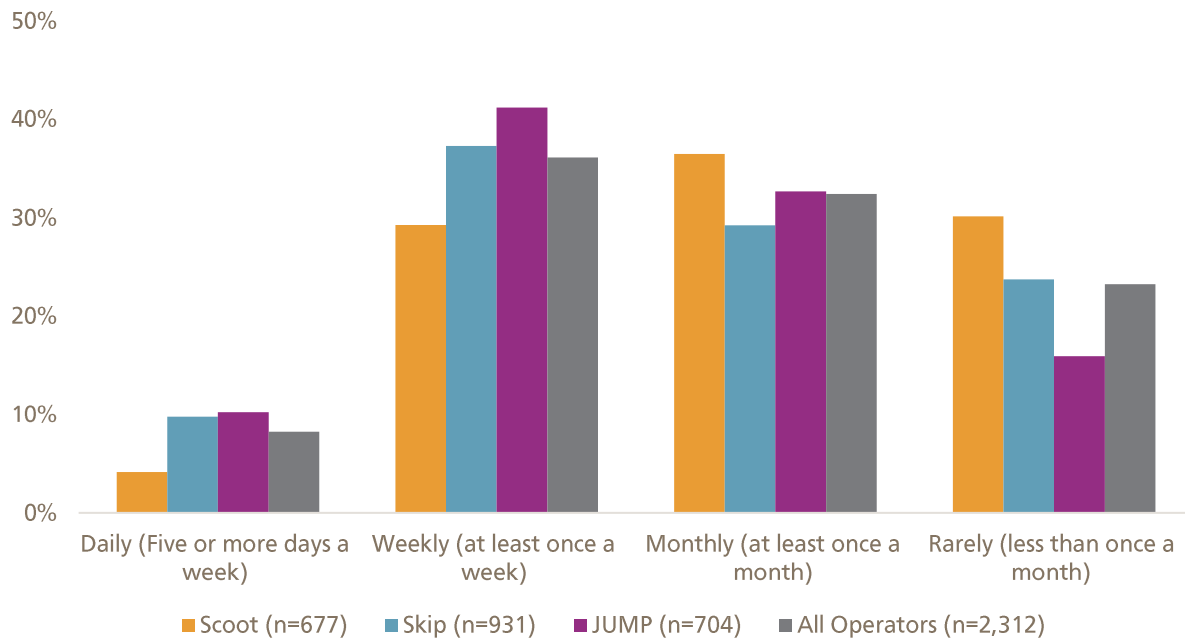
Most respondents report using a given service weekly (36%) or monthly (32%). Fewer respondents use that service rarely (23%) or daily (8%).

Question 6 - In general, how often do you take public transportation?
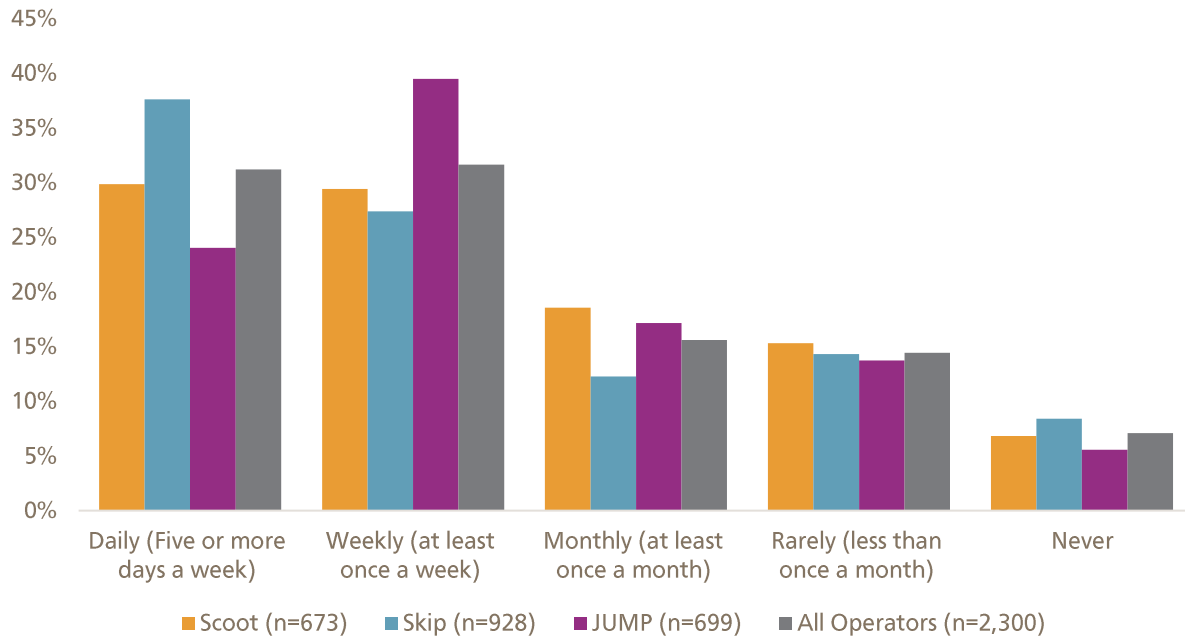
Most survey respondents use public transportation weekly (32%) or daily (31%). The highest percentage of Skip and Scoot respondents use public transit daily (38% and 30%, respectively). Only 7% of survey respondents reported never using public transportation.

Question 7 - What gender do you identify with?
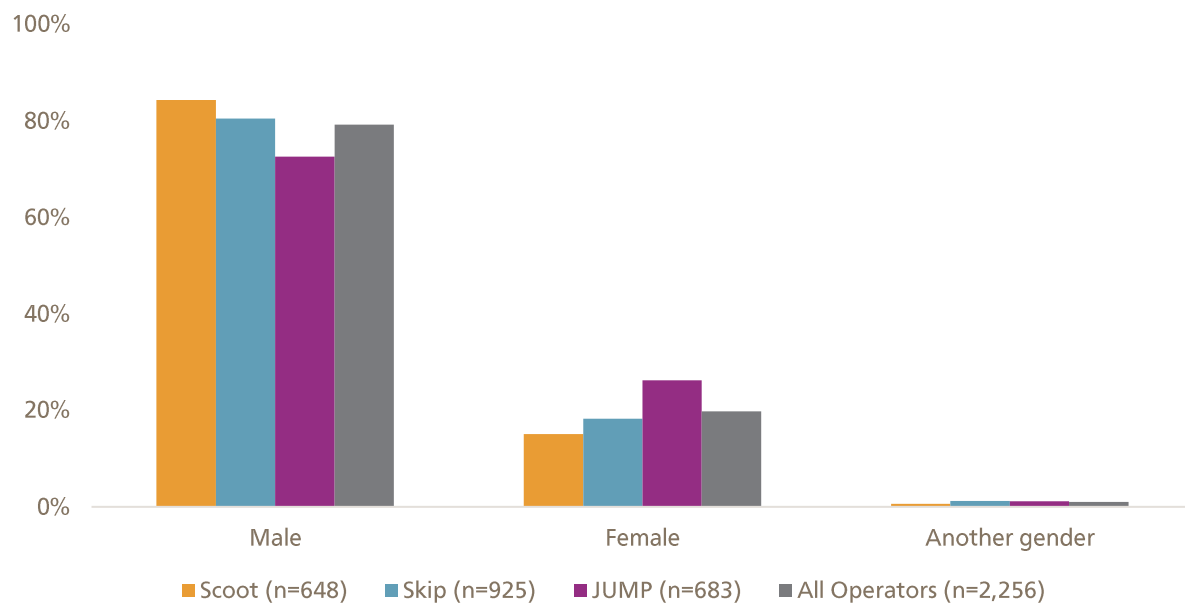
79% of survey respondents identified as male. 20% of respondents identified as female, while 1% identified as another gender.

Question 8 - What ethnic groups do you consider yourself a member of? Select all that apply.[6]
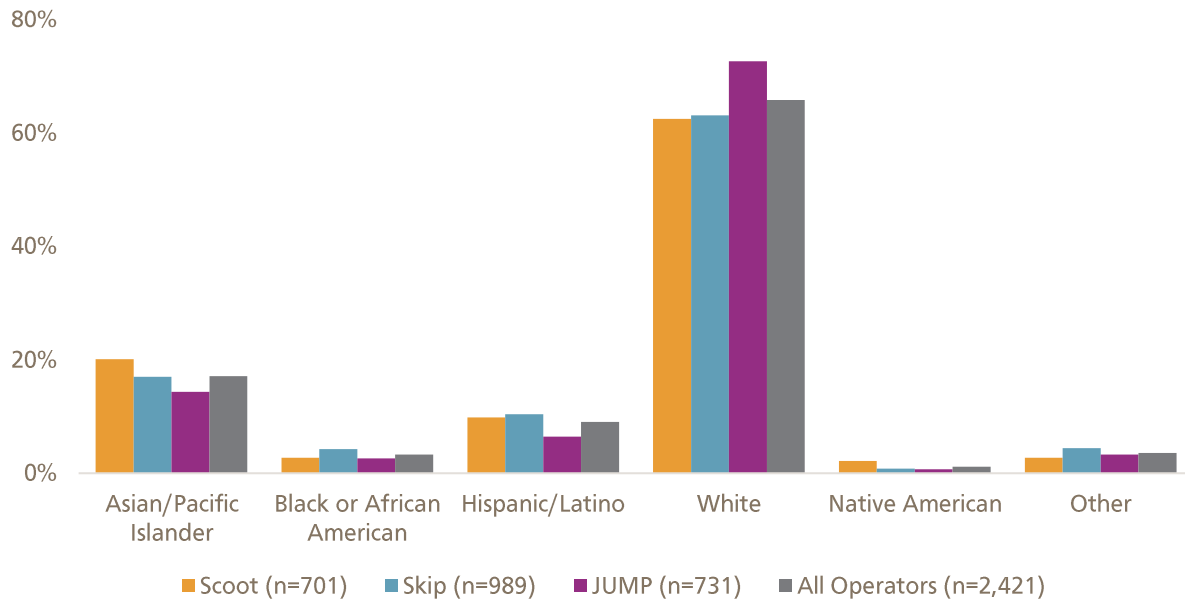
The largest group of survey respondents (66%) self-identified as White, with 17% identifying as Asian. 9% of respondents identified as Hispanic/Latino.[6]

Question 9 – What is your age?
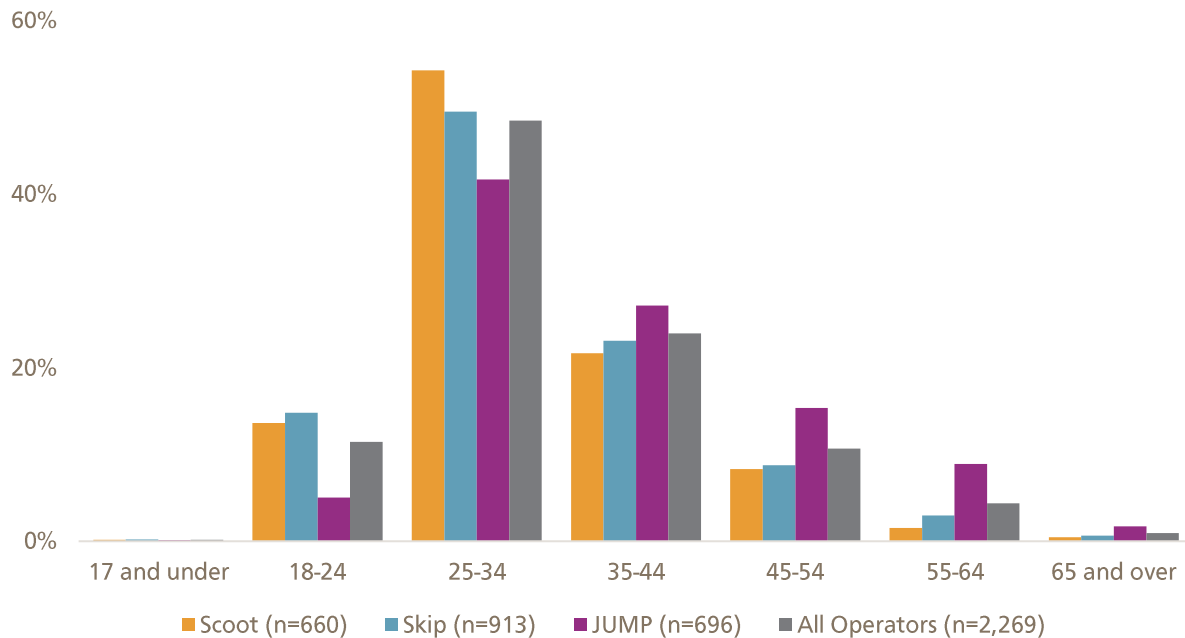
Most survey respondents were in the 25-34 (48%) or 35-44 (24%) age range.

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[6] Note: for this question, users were able to select more than one answer.

Question 10 – What is your home ZIP code?

Most survey respondents (75%) live in San Francisco, while 16% live in other parts of the Bay Area, and 9% live outside of the Bay Area. The ZIP codes with the greatest number of respondents were 94110 (Mission), 94107 (South of Market (SoMa), Potrero Hill, & Dogpatch), and 94103 (Central & Western SoMa and Mid-Market). The highest density of respondents was in the 94102 (Hayes Valley & Tenderloin), 94109 (Nob Hill & Russian Hill), 94105 (Rincon Hill & South Beach), and 94158 (Mission Bay) ZIP codes.

Question 11—How long have you lived in San Francisco?[7]

Scoot (n=444)   Skip (n=534)   JUMP (n=519)   All Operators (n=1,497)
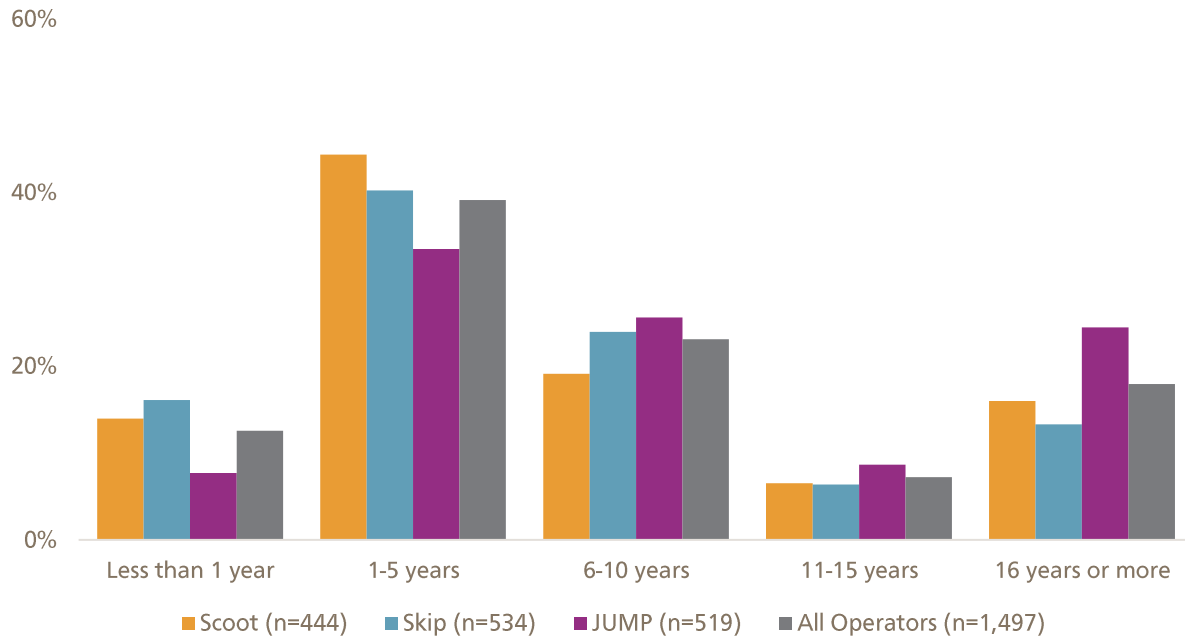
Most survey respondents have lived in San Francisco 1-5 years (39%), 6-10 years (23%), or 16 years or more (18%). 13% of respondents have lived in San Francisco for less than one year.

Question 12—What is your annual household income?

Scoot (n=654)   Skip (n=860)   JUMP (n=644)   All Operators (n=2,158)
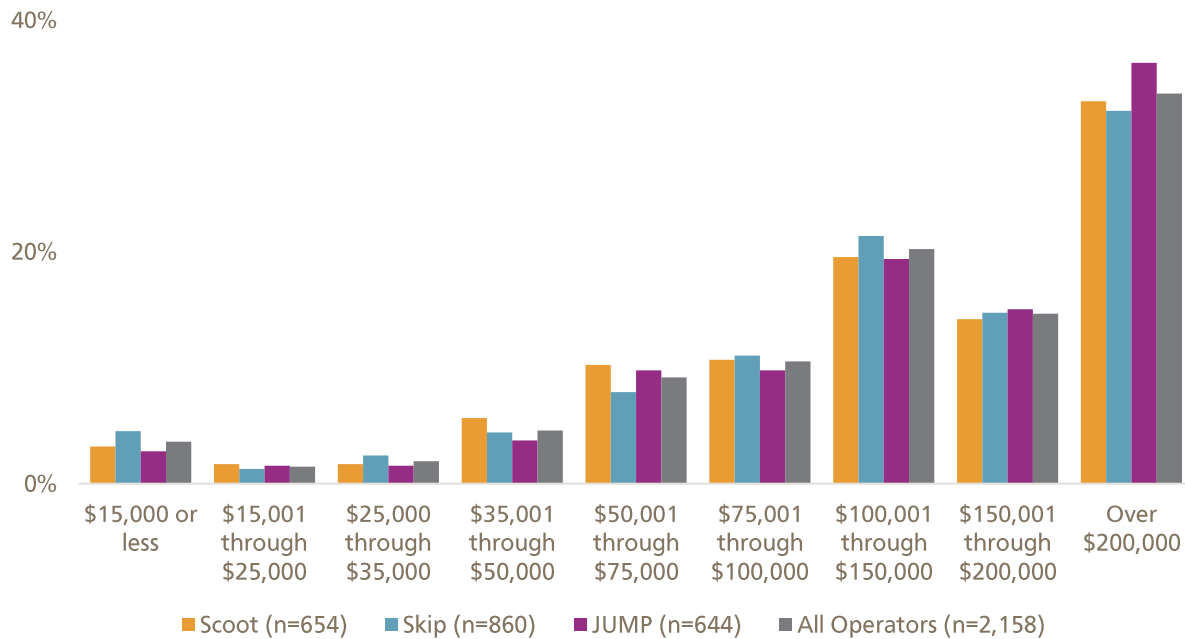
34% of survey respondents had an annual household income greater than $200,000. 20% reported a household income of $100,001 to $150,000, while 15% reported a household income of $150,001 to $200,000. 31% of respondents had a household income below $100,000.

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[7] This question was only asked of users who entered a San Francisco ZIP code for Question 10.

Question 13 - In total, how many people live in your household?
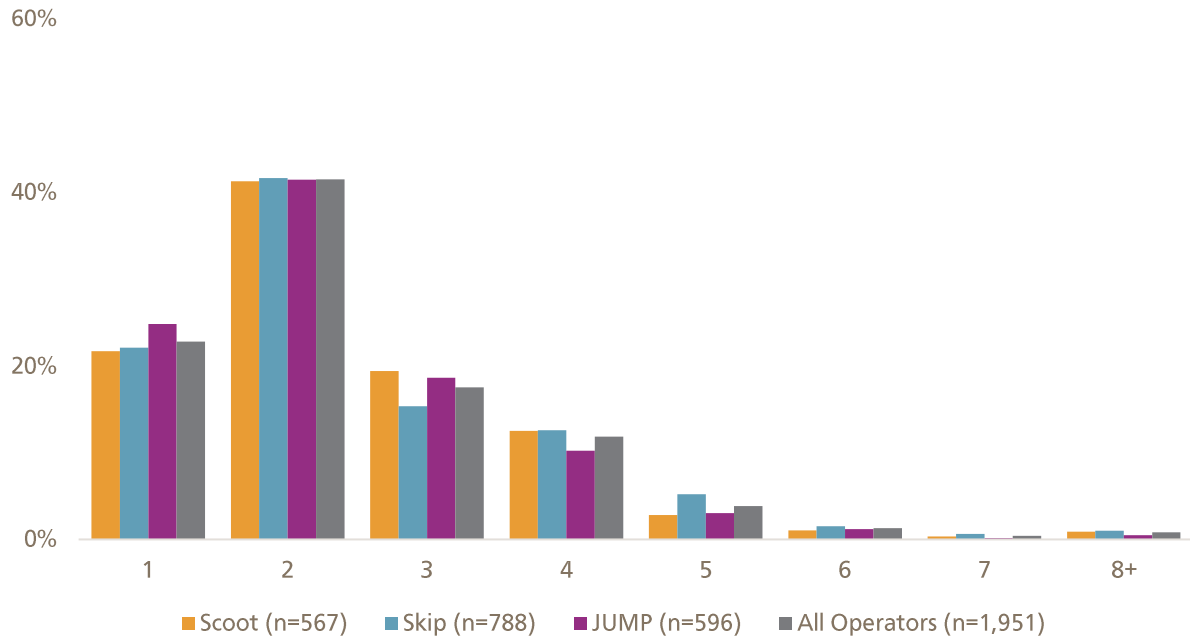
41% of survey respondents lived in a household of two people, while 23% lived alone. 36% of respondents lived in a household of three or more people.

Question 14 - What is the primary language spoken in your household?
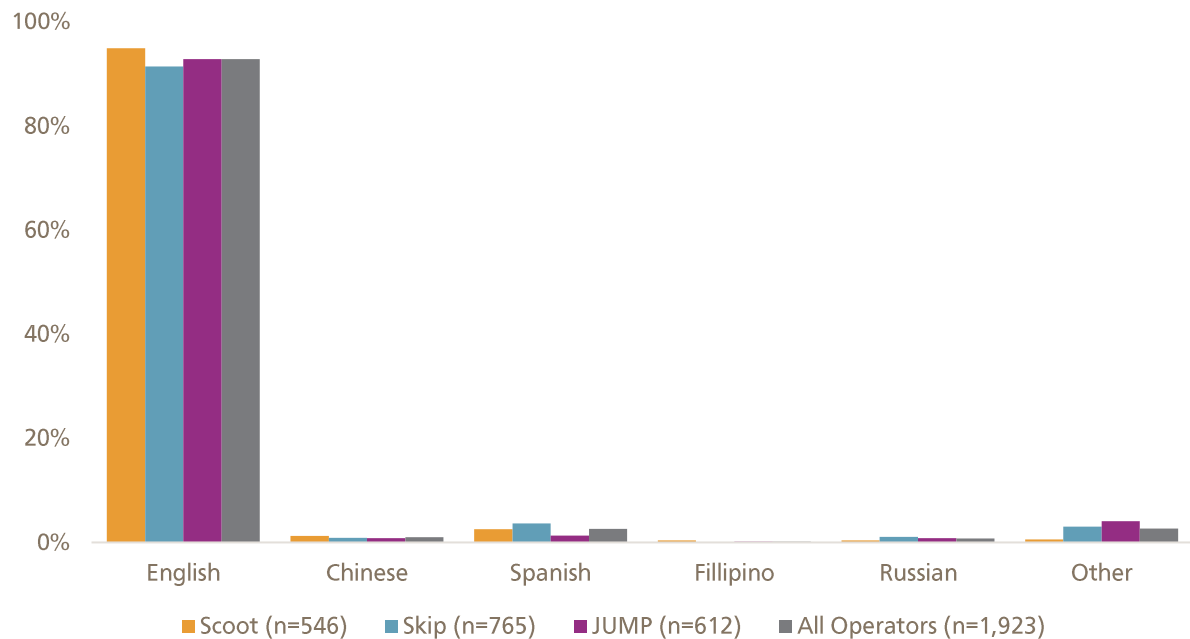
Most survey respondents (93%) indicated that English was the primary language spoken in their household.

Question 15 - Do you have a disability or health condition that affects the travel choices you make in San Francisco?

Scoot (n=552) Skip (n=758) JUMP (n=615) All Operators (n=1,925)
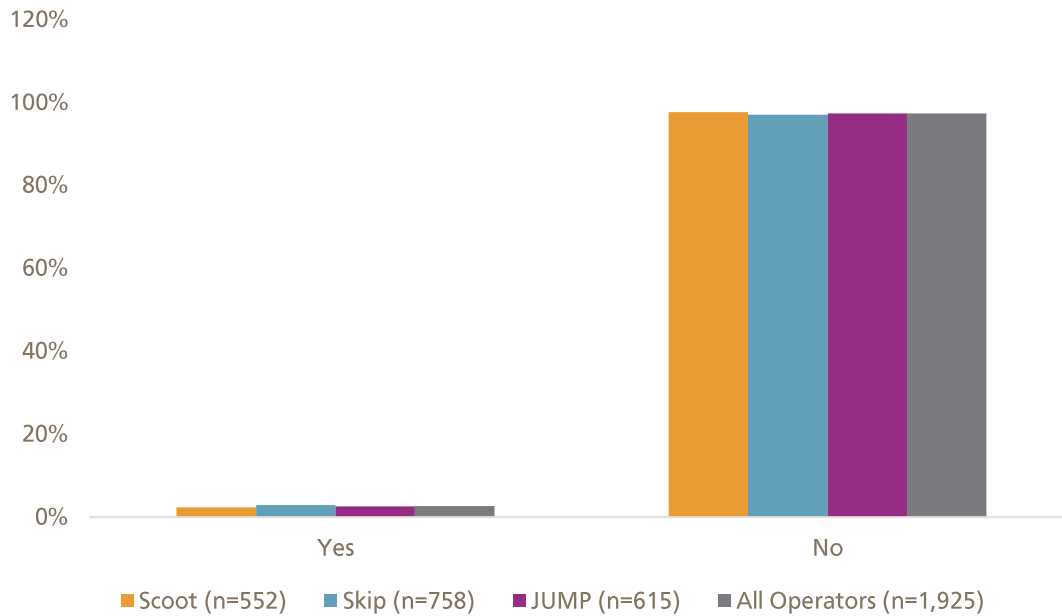
Three percent of survey respondents indicated that they had a disability or health condition that affects the travel choices they make in San Francisco.

Question 16 - What is your disability? Select all that apply.[8]

Scoot (n=18) Skip (n=21) JUMP (n=14) All Operators (n=53)
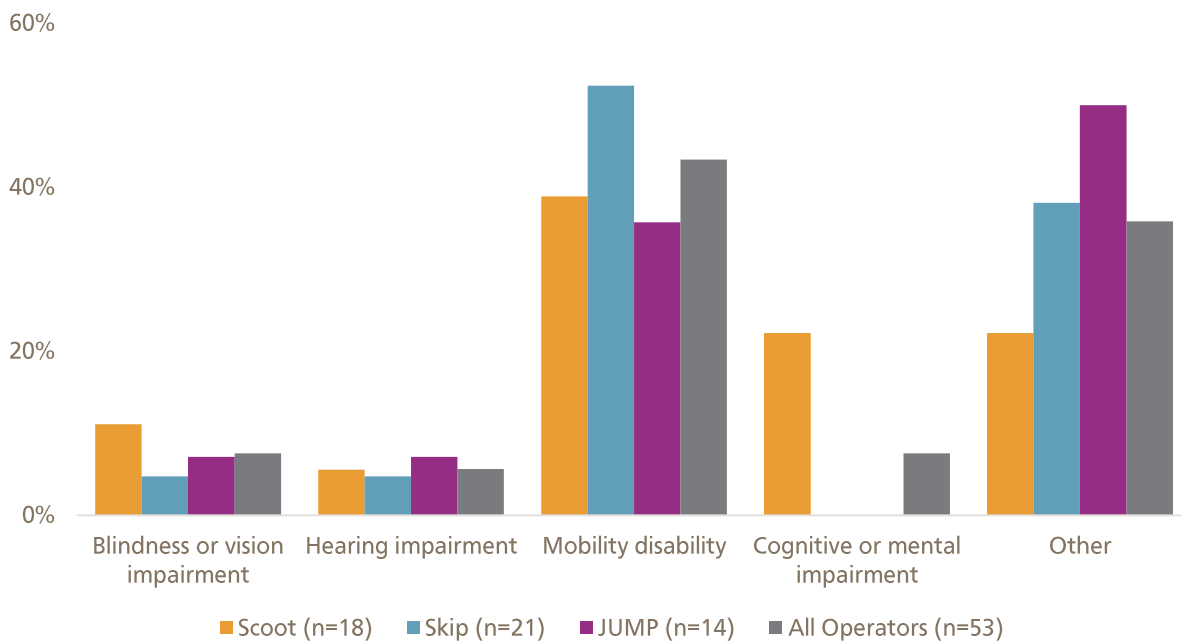
For those that indicated in Question 15 that they had a disability or health condition that affects the travel choices they make in San Francisco, 43% cited a mobility disability and 36% cited a disability other than blindness or vision impairment, hearing impairment, or cognitive or mental impairment.[8] .

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[8] This question was only asked of users who indicated having a disability or health condition in Question 15. Note: for this question, users were able to select more than one answer.

Emerging Mobility Service (EMS) User Survey

General Description

The SFMTA requires the Scooter Pilot Program permittee to conduct a user survey on an annual basis and submit the results to the SFMTA for program evaluation. This user survey will be used to better understand user profile, mode choice, and travel pattern of trips made in San Francisco. It is an important instrument for determining performance metrics identified in the 2018 SFMTA Strategic Plan and providing the agency with the necessary information for annual reporting.

Survey requirements

A.   Frequency and timeline

The SFMTA requires the permittee to conduct the annual user survey with consideration for variations in travel patterns due to summer, holidays, and potential early winter rains. For the year of 2019, the data collection period should be between March 25th, 2019 and May 17th, 2019 in order to capture the pattern of peak travel season. The survey can be conducted through phone, email, user application, web, or a combination of the above. The survey can be conducted in English, Spanish, Filipino and Chinese, depending on the user preference. The complete list of survey questions is provided in Appendix A.

B.   Sample size

The SFMTA requires the permittee to survey a sample size that is representative of service active users. Active users are defined as those who have used the service for at least once in the reporting month, to travel within, from, or to San Francisco. The sample size should possess at least a confidence level of 95%, and at most a margin error of 5%. The sample size should be calculated based on the number of active users in February 2019. Given n is sample size, and N is the number of active users in February 2019, the sample size is calculated using the following formula:

$$n = \frac{384.16}{1+(\frac{0.9604}{0.05^2 * N})}$$

The survey should not be sent to a user who has already completed the survey within the same survey cycle.

C.   Deliverables

The SFMTA requires the permittee to submit raw data of the survey results in Excel format by 5:00 PM, July 31st, 2019. The dataset should have each survey response as an observation, with answer to each question as an attribute. A sample dataset is provided in Appendix B.

Appendix A

Survey Questionnaire

1. What was the purpose of your most recent trip on this service?
    a. To commute to/from work, including work-related events
    b. To commute to/from school/university
    c. To/from running errands, such as store, bank, hospital
    d. To/from attending social events, such as restaurant, park, theater
    e. Other (specify)
    f. (left blank, do not show in survey)
2. If _____ [insert service name] or similar _____ [insert: bikeshare, carshare, powered scooter share, etc.] service wasn't available to you for the last trip you took on this service, what would you have done? (Note: Remove your service's type from the options and code them with the letters below)
    a. Drove my vehicle alone
    b. Drove with others or carpooled
    c. Public transportation (Muni, BART, AC Transit, paratransit, etc.)
    d. Walk
    e. Bike
    f. Ride-hailing like Uber and Lyft
    g. Scooter
    h. Motorcycle or moped
    i. Private transit or shuttle like Chariot
    j. Drove carshare
    k. Regular taxi

  l. Other (specify)

  m. Would not have taken trip

  n. (left blank, do not show in survey)

3. How often do you use this or a similar _____ [insert one: bikeshare, carshare, powered scooter share, etc.] service?

  a. Daily

  b. Weekly

  c. Monthly

  d. Rarely

  e. Never

4. What other services have you used in the last 1 month? (select all that apply)

  a. Ride-hailing like Uber and Lyft

  b. Stationed bikeshare like Ford GoBike

  c. Stationless bikeshare like JUMP, Lime bikes, and Spin bikes

  d. Moped share like Scoot mopeds

  e. Private transit like Chariot

  f. Carshare / On-street vehicle share like Zipcar, Maven, and Gig

  g. Scooter share like Scoot scooters and Skip scooters

  h. Courier network services like Amazon Fresh, Postmates, Doordash

  i. Commuter shuttle

  j. Regular taxi

  k. Public transportation (Muni, BART, AC Transit, paratransit, etc.)

5. What gender do you identify as?

  a. Male

  b. Female

  c. Another gender (specify) _____

  d. Prefer not to respond

6. Do you consider yourself to be Hispanic or Latino?

  a. Yes

  b. No

  c. Prefer not to respond

7. Do you consider yourself to be:

  a. White or Caucasian

  b. Asian/Pacific Islander

  c. African American

  d. Native American

  e. Other (specify) _____

  f. Prefer not to respond

8. What is your age?

  a. 17 and under

  b. 18-24

  c. 25-34

  d. 35-44

  e. 45-54

  f. 55-64

  g. 65+

      h.   Prefer not to respond
9. What is your home zip code?
      a.   (Type zip code)
10. What is your annual household income?
      a. $15,000 or less
      b. $15,001 through $25,000
      c. $25,001 through $35,000
      d. $35,001 through $75,000
      e. $75,000 through $100,000
      f. $100,001 through $150,000
      g. $150,001 through $200,000
      h.   Over $200,000
      i.   (left blank, do not show in survey)
11. In total, how many people live in your household?
      a.   1
      b.   2
      c.   3
      d.   4
      e.   5
      f.   6
      g.   7
      h.   8+
12. Do you have a disability or health condition that affects the travel choices you make?
      a.   Yes
      b.   No
      c.   (left blank, do not show in survey)
13. (If Yes) What is your disability? Select all that apply.
      a.   Blindness or vision impairment
      b.   Hearing impairment
      c.   Mobility disability
      d.   Cognitive or mental impairment
      e.   Other (please specify) _____
      f.   Prefer not to respond

Appendix B

SFMTA Real-time data requirements for stationless emerging mobility services

SFMTA Real-time data requirements for stationless emerging mobility services

8/29/18

This document describes the SFMTA's real-time data reporting requirements for stationless permit programs (e.g., Stationless Bicycle Share, Powered Scooter). The SFMTA may request additional information in other forms (e.g., summary monthly report, survey of users) as part of the terms and conditions of the permit program.

Collecting this data (in addition to other periodic data reporting requirements) will enable the SFMTA to collect data that will support:

- Managing permittees and operating permit programs
- Enforcing permittee's adherence to permit terms and conditions
- Evaluating permit programs
- Collecting data to support planning efforts consistent with the agency's strategic goals for transportation

Success in each area is highly dependent on staff having access to properly structured data in a timely manner. Towards that end, providers will be required to share data with the SFMTA via a set of Application Programming Interfaces (APIs). To minimize development effort and overhead for permittees, the SFMTA will adhere as closely as possible to existing and emerging standards. This includes using the General Bike Feed Specification (GBFS) as well as the emerging Mobility Data Specification (MDS) drafted by the City of Los Angeles.

For current operations, all permittees must implement the GBFS. Additionally, the SFMTA will require permittees include a request parameter allowing the agency to obtain data for specific points in time.

While the SFMTA requires this detailed data to manage the public right-of-way and support the agency's strategic goals, the SFMTA recognizes that some of this data may be considered sensitive and will aggregate data temporally and spatially when sharing this information outside of the agency.

The remainder of this document describes the following API endpoints in more detail, and what information they are intended to capture. Each of these are based on the MDS. The APIs are divided into "provider" and "agency" based on who is responsible for implementing the server

side of a particular API endpoint. For the purposes of this document, a "provider" is a permitted mobility services provider, and "agency" is the SFMTA.

Interchange Protocol

All data shall be transmitted as message bodies for HTTPS requests or replies. The use of encryption is mandatory. Access to every service shall be controlled using HTTP basic authentication. The mechanism for exchanging authentication credentials is not described in this document.

Data Format

- All message bodies shall be valid *JSON*.
- All message bodies shall be encoded using *UTF-8*.
- Line breaks are optional, but if present shall be identified with a single newline character (\n).

Field Definitions

- Timestamp fields shall be a JSON number containing the number of milliseconds since January 1, 1970 00:00:00 UTC. Leap seconds shall be accounted for using the *UTC-SLS Proposal*
- Id fields in the document should be represented as strings that identify that particular object. They:
    - must be unique within like fields for the same provider (device_id must be unique among devices)
    - do not have to be globally unique
    - must not contain spaces
    - should be persistent for a given object (device, area, etc)
- Enumerable values consist of a list of JSON strings. Values in fields of this type should match an item in the list exactly. The list should be expected to change over time. Values will not be removed, but new valid values may be added as business requirements change and consumers should be designed to handle these changes.
- Point fields shall be *GeoJSON Points*. Coordinate precision is six decimal places.
- LineString fields shall be *GeoJSON LineStrings*. Coordinate precision is six decimal places.
- MultiPolygon fields shall be *GeoJSON MultiPolygons*. Coordinate precision is six decimal places.
- Coordinate pair fields shall be a latitude, a literal comma (",") and a longitude. Each coordinate shall be specified in decimal degrees with a precision of six decimal places. The reference system shall be the same as is used by *GeoJSON*. Coordinate pairs are always used

in this document to define bounding boxes by specifying the northwest and southeast corners of a rectangle in the GeoJSON reference system.

- JSON empty object is an open brace followed immediately by the close brace *{ }*.

Mobility Device Types

Name	Description
bicycle	A bicycle powered solely by its rider
electric_bicycle	A bicycle with electrical power assist
electric_scooter	A powered scooter

Provider API Endpoints

- Service Area endpoint – A record for every polygon that defines a service area, and the start/end dates that each area went into/out of effect.
- Trips endpoint – A record for each trip taken, including start/end time/location.
- Historical Status Change endpoint – A record indicating the time/location of each device when its status changed (e.g., becomes reserved, available for use, unavailable for use, or removed from service) Data from these endpoints is intended to be near real-time; permittees should make new data available to the agency as soon as they are available.

Agency API Endpoints

- Service Area endpoint – A record for every polygon that defines a service area, and the start/end dates that each area went into/out of effect.
- Status Change endpoint – A record indicating the time/location of each device when its status changes (e.g., becomes reserved, available for use, unavailable for use, or removed from service)

API Detail

- Types mentioned in this document are the standard JSON types unless otherwise descibed in *Field Definitions* above.
- The *provider_id* is issued by the agency, and is guaranteed to be unique across providers.

Data Retention Requirement

All the endpoints which provide historical data must do so for at least the previous two years. Each endpoint specifies whether it is subject to his retention requirement. What shall be returned for specific endpoints in the case where the data does not exist back that far is specified for each endpoint where it is applicable.

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Error Body

In cases where an error is returned, the response body shall have the following fields

Field Name	Type	Required	Defines
errors	Array	Yes	A list of strings. Must contain at least one error message
-	String	Yes	Informative error message

Example:

```
{
  "errors": [
    "box_se must be specified if box_nw is specified!",
    "end_time happens before start_time!"
  ]
}
```

Provider Endpoints

Service Areas

Service areas are the geographic regions within which a mobility as a service provider operates. This endpoint is subject to the *Data Retention Requirement.*

Endpoint: `/service_areas`

Method: GET

Request Parameters

Name	Type	Required
start_time	Timestamp	No
end_time	Timestamp	No

These two parameters define a time period for which service areas are to be described. The current service areas shall be returned if neither parameter is specified. Time periods in the future are allowed. The current service areas shall be returned if there are no changes foreseen for a period in the future. If a time period in the past starts or occurs entirely before the earliest version of all service areas, the first set of areas by chronological order shall be returned. Both or neither parameters should be specified. A response with status code 400 and an error body shall be returned for requests with just one of these parameters specified and for requests that specify an end_time which is smaller than the start_time.

Response body:

Field Name	Type	Required	Defines
provider_id	Id	Yes	
areas	Array	Yes	A list of area objects as defined below
- area_id	Id	Yes	Unique identifier of a service area.
- start_date	Timestamp	Yes	Date at which this service area became effective.
- end_date	Timestamp	Yes	Date at which this service area was replaced. Omit if it's the current effective area of this type
- area	MultiPolygon	Yes	GeoJSON MultiPolygon for this area
- prior_area_id	Id	No	If exists, the id of the prior service area for this type. See types below

- replacement_area_id	Id	No	If exists, the id of the area that replaced this type. See types below
- type	Enumerable	Yes	One of seven types that describes the intent of the service area geography. See types below

Area types

Name	Description	Notes
unrestricted	Areas where devices may be picked up/dropped off	A provider's unrestricted area shall be contained completely inside the agency's unrestricted area for the provider in question, but it need not cover the entire agency unrestricted area. See the agency version of the service areas endpoint below
agency_restricted	Areas where the agency does not allow device pick-up/drop-off	
provider_restricted	Areas where the provider does not allow device pick-up/drop-off	
agency_preferred_pick_up	Areas where users are encouraged by the agency to pick up devices	
provider_preferred_pick_up	Areas where users are encouraged by the provider to pick up devices	
agency_preferred_drop_off	Areas where users are encouraged by the agency to drop off devices	
provider_preferred_drop_off	Areas where users are encouraged by	

the provider to
drop off devices

Trips

A trip represents a journey taken by a mobility as a service customer with a geo-tagged start and stop point. The trips API endpoint shall be queriable for historical trip data. The endpoint should allow querying trips at least by *device_id*, geographical bounding box, and time. If a geographical bounding box is specified, any trip that has a point in the bounding box shall be returned. This endpoint is subject to the *Data Retention Requirement.*

Endpoint: */trips*

Method: GET

Request Parameters

Name	Type	Required
start_time	Timestamp	Yes
end_time	Timestamp	Yes
device_id	Id	No
box_nw	Coordinate pair	No
box_se	Coordinate pair	No

The box_* parameters must be specified together or not at all. A provider shall return a response with status code 400 and an error body for requests with just one of these parameters specified. Trips for the entire service area shall be returned if a bounding box is not specified. Trips for all devices shall be returned if a device Id is not specified. The provider shall return the empty JSON object for requests with an end_time that happened before the earliest available trip. A response with status code 400 and an error body shall be returned for requests with a start_time in the future or an end_time which is smaller than the start_time.

Response body:

Field Name	Type	Required	Defines
provider_id	Id	Yes	
trips	Array	Yes	A list of trip objects as defined below
-device_type	String	Yes	
-device_id	Id	Yes	
-trip_id	Id	Yes	
-duration	Number	Yes	Time, in Seconds

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-distance	Number	Yes	Distance, in Meters
-start_point	Point	Yes	
-end_point	Point	Yes	
-accuracy	Number	Yes	The approximate level of accuracy for start_point and end_point, in meters.
-route	LineString	Yes	
-sample_rate	Number	Yes	The frequency, in seconds, in which the route is sampled.
-start_time	Timestamp	Yes	
-end_time	Timestamp	Yes	
-membership_type	Enumerable	Yes	Membership type for the user.
-device_occupancy	Number	No	Capture vehicle occupancy (n/a for scooters and bikes)
-standard_cost	Number	Yes	The cost, in cents that it would cost to perform that trip in the standard operation of the System.
-actual_cost	Number	Yes	The actual cost paid by the user of the Mobility as a service provider

Membership types

Name	Description
subscriber	
subscriber_low_income	
single_ride	
single_ride_low_income	

Status Change

Status changes for mobility devices. This endpoint is subject to the *Data Retention Requirement.*

Endpoint: */device_status*

Method: GET

Request Parameters

Name	Type	Required

utc_hour	Timestamp	Yes
device_id	Id	No
box_nw	Coordinate pair	No
box_se	Coordinate pair	No

The box_* parameters must be specified together or not at all. A provider shall return a response with status code 400 and an error body for requests with just one of these parameters specified. Status changes for the entire service area shall be returned if a bounding box is not specified. Status changes for all devices shall be returned if a device Id is not specified. The *utc_hour* parameter shall be the timestamp for the first millisecond of an hour in the UTC timezone. Status changes for the following hour shall be returned. The provider shall return the empty JSON object for requests with an utc_hour that happened before the earliest available trip. A response with status code 400 and an error body shall be returned for requests with a utc_hour in the future. A provider may choose to truncate the timestamp value to the previous hour for requests with a *utc_hour* parameters which does not properly correspond to the beginning of a UTC hour, or may choose return a response with status code 400 and an error body for such requests.

Response body:

Field Name	Type	Required	Defines
provider_id	Id	Yes	
device_status	Array	Yes	A list of device status objects as defined below
-device_id	Id	Yes	
-device_type	Enumerable	Yes	See *Mobility Device Types* above
-event_type	String	Yes	Four types. Described in Appendix A
-reason	String	Yes	Reason for status change. Described in Appendix A
-time	Timestamp	Yes	When the event occurred
-position	Point	Yes	Event location
-battery_pct	Number	Yes	Percent battery charge of device, expressed as a fraction between 0 and 1. Specify 0 for unpowered devices
-trip_id	Id	Yes	Required for "Reserved" event types, associated trip. Details should be available using the provider Trips API endpoint

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311 Free language assistance / 免費語言協助 / Ayuda gratis con el idioma / Бесплатная помощь переводчиков / Trợ giúp Thông dịch Miễn Phí / Assistance linguistique gratuite / 無料の言語支援 / Libreng tulong para sa wikang Filipino / 무료 언어 지원 / การช่วยเหลือทางด้านภาษาโดยไม่เสียค่าใช้จ่าย / خط المساعدة المجاني على الرقم

Agency Endpoints

Service Areas

Service areas are the geographic regions within which a mobility as a service provider is permitted to operate. This endpoint is subject to the *Data Retention Requirement.*

Endpoint: `/service_areas`

Method: GET

Request Parameters

Name	Type	Required
start_time	Timestamp	No
end_time	Timestamp	No

These two parameters define a time period for which service areas are to be described. The current service areas shall be returned if neither parameter is specified. Time periods in the future are allowed. The current service areas shall be returned if there are no changes foreseen for a given period in the future. If a time period in the past starts or occurs entirely before the earliest version of all service areas, the first set of areas by chronological order shall be returned. Both or neither parameters should be specified. A response with status code 400 and an error body shall be returned for requests with just one of these parameters specified and for requests that specify an end_time which is smaller than the start_time.

Response body:

Field Name	Type	Required	Defines
provider_id	Id	Yes	
areas	Array	Yes	A list of area objects as defined below
- area_id	Id	Yes	Unique identifier of a service area.
- start_date	Timestamp	Yes	Date at which this service area became effective.
- end_date	Timestamp	Yes	Date at which this service area was replaced. Omit if it's the current effective area of this type
- area	MultiPolygon	Yes	GeoJSON MultiPolygon for this area
- prior_area_id	Id	No	If exists, the id of the prior service area for this type. See types below

	Id	No	If exists, the id of the area that replaced this type. See types below
- replacement_area_id			
- type	String	Yes	One of four types that describes the intent of the service area geography. See types below

Area types

Name	Description	Notes
unrestricted	Areas where devices may be picked up/dropped off.	A provider may choose to operate in a subset of this area. However, all of the provider's operating area must be completely contained in this operating area
agency_restricted	Areas where the agency does not allow device pick-up/drop-off	
agency_preferred_pick_up	Areas where users are encouraged by the agency to pick up devices	
agency_preferred_drop_off	Areas where users are encouraged by the agency to drop off devices	

Status Change

The Status Change endpoint allows providers to communicate the location for all devices on the street when their status changes (e.g., a user completes a reservation and the device is now available). When a device's status changes, the provider will push one of four event types with additional descriptive elements.

Endpoint: */device_status*

Method: POST

Response body:

Field Name	Type	Required	Defines
provider_id	Id	Yes	

device_id	Id	Yes	
device_type	Enumerable	Yes	See *Mobility Device Types* above
event_type	String	Yes	Four types. Described in Appendix A
reason	String	Yes	Reason for status change. Allowable values determined by event_type. Described in Appendix A
time	Timestamp	Yes	When the event occurred
position	Point	Yes	Event location
battery_pct	Number	Yes	Percent battery charge of device, expressed as a fraction between 0 and 1. Specify 0 for unpowered devices
trip_id	Id	Yes	Required for "Reserved" event types, associated trip. Details should be available using the provider Trips API endpoint

Appendix A: Status Change Event Types and Allowable Values for Reason

event_type	event_type description	reason	reason description
available	A device becomes available for customer use	service_start	Device introduced into service at the beginning of the day (if program does not operate 24/7)
		user_drop_off	User ends reservation
		rebalance_drop_off	Device moved for rebalancing
		maintenance_drop_off	Device introduced into service after being removed for maintenance
reserved	A customer reserves a device (even if trip has not started yet)	user_pick_up	Customer reserves device
unavailable	A device is on the street but becomes unavailable for customer use	maintenance_user	A device is no longer available due to equipment issues – initiated by a user
		maintenance_provider	A device is no longer available due to equipment issues – initiated by provider

		low_battery	A device is no longer available due to insufficient battery
removed	A device is removed from the street and unavailable for customer use	service_end	Device removed from street because service has ended for the day (if program does not operate 24/7)
		rebalance_pick_up	Device removed from street and will be placed at another location to rebalance service
		maintenance_pick_up	Device removed from street so it can be worked on

Allowable event_type transitions

- removed->available
- available->reserved
- available->unavailable
- available->removed
- reserved->available
- reserved->unavailable
- unavailable->available
- unavailable->removed

Appendix C

SFMTA Scooter Permittees monthly reporting template

Guiding Principle	Metric	Notes	System Total to Date	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19
Safety	Complaints to companies about moving	Numeric Value. Document on Complaints Tab														
	Number of safety trainings with description of the training	Numeric Value. Document on Outreach and Safety Training Tab														
	List of complaints to companies on safety requirements	Numeric Value. Document on Complaints Tab														
	Number of collisions per 100,000 miles	Numeric Value. Document on Collisions Tab														
	Total number of collisions by severity	Put total number of collisions here. Document severity in the collisions tab.														
Disabled Access	Count of trips ending with devices safely parked in designated areas	Total number of trips that ended in correct parking (not blocking sidewalk, upright, no citation, etc.). Numeric Value. Total trips ends- misparked trip ends.														
	Percent of trips ending with devices safely parked in designated areas	Percentage. Same as above but in percent form. System total value is total trips ending with safe parking/ total system trips														
	Median Response Time to moving improperly parked scooters	Median time in Minutes														
	Complaints to companies about misparked devices	Numeric Value. Document in Complaints Tab.														
	Complaints to companies about sidewalk riding	Numeric Value. Document in Complaints Tab.														
Sustainability	Total device revenue Vehicle Miles Traveled (VMT)	Numeric Value in miles. For scooter companies, this is the total number of miles traveled by scooter by a customer (revenue miles). Document in the VMT Tab.														
	Non-revenue vehicle Vehicle Miles Traveled (VMT) by vehicle type	Same as above, but for miles traveled by all vehicles operated by company. This includes cars, trucks, and all other vehicles for operations and not miles traveled with a customer (non-revenue miles). Document in VMT Tab.														
	Number of device removed from system and beyond repair	Numeric Value. Devices that cannot be repaired and returned to service.														
	Number of lost or stolen devices removed from system	Numeric Value. Devices that cannot be repaired and returned to service that are lost or stolen.														
	Number of batteries disposed	Numeric Value.														
Equitable Access	Total number of trips each month	Numeric value of all trips by all member types.														
	Total number of unique users	Numeric Value. Total number of unique users.														
	Monthly aggregation of trips on low-income plan	Numeric Value. Total number of trips taken by customers on low-income payment plan.														
	Monthly number of trips facilitated through cash payments	Numeric Value.														
	Monthly average cost of trips facilitated through cash payments	Average dollar amount.														
	Number of low-income memberships/month	Additional low-income memberships added each month.														
	Number of unique users who live in Communities of Concern per month	Numeric Value. Calculated through customer addresses located within Communities of Concern. Total number of unique users. ONLY provide a numeric value.														
	Number of onboarded users who live in a Community of Concern per month	Numeric Value. Monthly additional new unique users who live in Communities of Concern. See above note for clarification.														

Guiding Principle	Metric	Notes	System Total to Date	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19
Accountability	Record of maintenance activities, including but not limited to device identification number and maintenance performed.	Numeric value for number of maintenance activities. Document maintenance information on Maintenance Tab.														
Labor	Service's net hourly median earnings for field workers minus job-related expenses	Recorded on a month by month basis but only required to report to SFMTA semi-annually with each month's data and average data for 6 month period.														
	Net value of mobility service operator (whether employees and/or contractors) benefits, including medical, dental, and retirement benefits	Recorded on a month by month basis but only required to report to SFMTA semi-annually with each month's data and average data for 6 month period.														
	Percent of employees with Bay Area residency 7+ years	Recorded on a month by month basis but only required to report to SFMTA semi-annually with each month's data and average data for 6 month period.														
Collaboration	Community outreach events and hours with description of each event	Numeric Value. Document detailed description in Outreach and Safety Training Tab.														

Complaint Type	Submittal Type	Time until Response (Minutes)	Date	Time	Location	Notes	311 Case Enquiry ID (if applicable)	
Sidewalk riding, parking, helmet use, other	Complaint submitted: Mobile Application, Website, Phone Call, Email, etc.	Number of Minutes: Telephone wait times, email response times, instant response.	12/12/2018	15:47	Cross Streets, Coodinates, or other desciption if known	Describe the nature of the complaint if it is different than parking, sidewalk riding, or helmet use	If complaint tied to a 311 case, please provide ID here to avoid double counting	Response Options
Parking	Email	15	12/12/2018	15:55	Van Ness and Market	The scooter was left in middle of the sidewalk. Tripping hazard.	N/A	Example

What date did this incident occur?	What was the time of day?	Location of incident - Primary Street	Location of incident - Secondary Street	Member Date of Birth	Member Gender	Occurred at intersection?	Customer location at time of collision	Was this reported to the police?	If yes, please provide the case number.	Reported Injury?	Severity of Injury	Hospital visit made or planned?	Name of hospital, if visited (or tranported to by ambulance)	Third-party involvement?	Vehicle types involved in collision	Crash type	User wearing helmet?	Reported Property damage
Date of incident	Time of incident: from user or from police report. Can include evening, morning, late night, etc. if exact time is not known.	Street user was on, as reported by user or police report	Cross street, as reported by user or police report	Date of birth for member. Used in linkage analyses. Otherwise, report unknown.	Gender for member. Used in linkage analyses.	Yes or no	sidewalk; bicycle lane; roadway; other	Yes or no	Case Number	Yes or No	Options: Fatal, Severe, Other Visible Injury, Complaint of Pain. If no injury, put N/A	Yes or No	SF GENERAL HOSPITAL (ZSFG) or OTHER HOSPITAL	Yes or No	Options: No other vehicle involved (N/A); bicycle; e-bicycle; e-scooter; motor vehicle; motor-driven cycle or moped; e-skateboard; segway, hoverboard, e-unicycle, other electrically motorized board; other (specify); Unknown	Collision with motor vehicle; single vehicle crash; Collision with bicycle; Collision with pedestrian; Collision with motorcycle; Collision with other vehicle type	Yes or No	Yes or No

Appendix C: SFMTA Scooter Permittees monthly reporting template

		Device (Scooters, E-Bikes, etc.)	Diesel Truck	Gasoline Truck	Light-Duty Gasoline Vehicle	Light-Duty Electric Vehicle	Monthly Total	System Total																		
Oct-18	Total Device **Revenue** VMT	Numeric Value (miles). Should match or be very close to API monthly total						Number Value (miles): Total Scooter or E-bike miles traveled by a customer																		
	Total **Non-Revenue** vehicle VMT (by vehicle type)		Numeric Value (miles). Format columns above to reflect the vehicles your company uses					Number Value (miles): Total miles traveled for **all system operations,** including by contactors.																		
Nov-18	Total Device **Revenue** VMT																									
	Total **Non-Revenue** vehcile VMT (by vehicle type)																									
Dec-18	Total Device **Revenue** VMT		`																							
	Total **Non-Revenue** vehcile VMT (by vehicle type)																									
Jan-19	Total Device **Revenue** VMT																									
	Total **Non-Revenue** vehcile VMT (by vehicle type)																									
Feb-19	Total Device **Revenue** VMT																									
	Total **Non-Revenue** vehcile VMT (by vehicle type)																									
Mar-19	Total Device **Revenue** VMT																									
	Total **Non-Revenue** vehcile VMT (by vehicle type)																									
Apr-19	Total Device **Revenue** VMT																									
	Total **Non-Revenue** vehcile VMT (by vehicle type)																									
May-19	Total Device **Revenue** VMT																									
	Total **Non-Revenue** vehcile VMT (by vehicle type)																									
Jun-19	Total Device **Revenue** VMT																									
	Total **Non-Revenue** vehcile VMT (by vehicle type)																									

Organization	Type	Safety Training?	Date	Company Reps	Location	Description	SFMTA Notes
Example Organization	Community Based Organizations, Merchant Associations, City Departments, Electeds/Staff, Local Events, Group Rides, Etc.		12/12/2019	Ed Reiskin	1 S Van Ness	Please descibe here the group or event, the nature of the company's presence there, and what activity's the company did.	General Example
San Francisco Bike Coalition	Advocacy Group	X	5/2/2019	Jose Perez	1720 Market Street	Safety class followed by neighborhood group ride	Safety Training Example
Sunday Streets (SoMa)	Community Event		1/12/2018	Jane Smith	Folsom Street at 4th	Tabled to promote low income plan and distribute free helmets	Outreach Example

Maintenance ID	Date Created	Maintenance Type	Device ID	
1521925	12/12/18 13:36	Examples: inspection, brakes, shifting, lock, lights, etc.	18285	**Example**

Appendix D

SFMTA Powered Scooter Share Mid-Pilot Evaluation

Powered Scooter Share Mid-Pilot Evaluation

Executive Summary

This document provides an evaluation of the San Francisco Municipal Transportation Agency's (SFMTA's) Powered Scooter Share Pilot Program (Pilot) at the mid-point of the 12-month pilot period per the August 28, 2019 Pilot Powered Scooter Share Permit Program Policy Directive.

Powered scooter share offers a new transportation option, particularly for short trips, which could be especially useful as a last-mile solution when paired with public transit. The appeal and convenience of scooter share suggest how it may offer major mode-shift potential to significantly reduce reliance on private automobiles or ride-hail services. The survey of scooter users suggests that up to 40 percent of scooters trips may be replacing trips that would otherwise be made using private automobiles.

When scooters appeared on San Francisco streets in the spring of 2018, public concerns focused on how scooter programs initially negatively impacted safety and accessibility of San Francisco's sidewalks due to illegal sidewalk riding and scooters left in locations that impeded pedestrian access and created tripping hazards.

Based on both potential and observed concerns, along with San Francisco's past experience regulating shared mobility systems, the Board of Supervisors and the SFMTA took steps to regulate scooter services. The resulting legislation authorized the SFMTA to implement a 12-month Pilot Powered Scooter Share Permit Program to address the significant concerns observed during the initial deployment of scooter share programs. The Pilot terms, as established by the SFMTA Board of Directors, authorize the SFMTA to issue permits during the one-year Pilot period, with a maximum total of 1,250 scooters during the first six months and discretion to increase the total up to 2,500 scooters after six months.

Mid-way through the Pilot, the evaluation shows that the permittees have faced challenges, successfully mitigated negative impacts, and improved operations to be in a position to meet growing demand for powered scooter share service. Permittees are complying with the terms and conditions set forth by the SFMTA, and scooters are serving as a valuable last-mile solution. The evaluation also identifies several areas for potential improvement for both the permittees and the program itself. The SFMTA will complete its full evaluation of the Pilot in fall 2019, including recommendations for if and how to permanently permit the operation of electric shared scooters in San Francisco.

This evaluation covers five primary topic areas, based on the Pilot permit terms and conditions as well as San Francisco's Guiding Principles for Emerging Mobility:

1. Progress of the Pilot;
2. Safety and Accessibility;
3. Complaints and Citations;
4. Inclusive and Equitable Service; and
5. Ridership and Demand.

Summary of Key Findings

- Complaints about sidewalk riding and improper parking were significantly reduced under the Pilot;

- The lock-to design addresses major issues with sidewalk clearance and pedestrian safety.

- While State law no longer requires scooter riders over the age of 18 to wear helmets, the SFMTA continues to encourage operator commitment for helmet distribution and rider education are beneficial to prevent injuries.

- More robust equity engagement is needed to ensure powered scooter share programs effectively serve historically disadvantaged communities, especially low-income individuals.

- Demand for powered shared scooters is strong, and scooters may reduce private auto use and VMT.

- Powered scooter share systems can serve the public interest when properly regulated.

Recommendations and Next Steps

- *Continue monitoring the Pilot.* At the midpoint, the Pilot demonstrates strong demand for shared powered scooters in San Francisco. The SFMTA's analysis shows that the Pilot supports Agency policies and goals such as Transit First by providing a first/last mile connection to public transit.

- *Promote safety as a top priority.* Based on collision and injury analysis, the SFMTA recommends the following additional steps to ensure the safety of electric shared scooter users and non-users alike: continued education and rider accountability aimed at preventing sidewalk riding and associated injuries to non-user pedestrians, increasing access to helmets,[1] and monitoring youth users of shared powered scooters and enforcing permittees' age restrictions to ensure injuries to youth do not arise on rented devices. Finally, to encourage accurate reporting, permittees should improve communications to riders regarding the steps to take when involved in a collision.

- *Ensure continued progress in areas that need improvement, particularly equity.* Low-income plan participation remains low, and more robust equity engagement and multilingual outreach is needed to ensure underrepresented communities can actively participate in the program. The SFMTA will continue to monitor progress on this, as well as other goals and commitments contained in each permittees' application proposals.

- *Continue permit compliance monitoring and complete Pilot evaluation.* The SFMTA will continue to ensure permit compliance. It will also continue to research and evaluate how system usage changes over time. The SFMTA will also monitor how the recommendations in this evaluation are incorporated for the duration of the Pilot. The Pilot is an opportunity for a thorough evaluation and monitoring of scooter share programs in San Francisco, as well as a chance to examine the experiences of other peer cities' scooter share systems. The SFMTA will evaluate the full Pilot in fall 2019. The final evaluation will include, but not be limited to, the following topics:

  - Understanding safety impacts of scooters and opportunities for infrastructure and non-infrastructure improvements by reviewing collision reports, particularly those involving injury;

  - Assessing the impact of scooter share on the public right-of-way, including maintaining accessible pedestrian paths of travel and eliminating sidewalk riding, as well as the enforcement/maintenance burden on City staff;

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[1] Recent powered scooter guidance from the American College of Emergency Physicians[1] names helmet use as the "easiest and smartest thing you can do to avoid serious head injury."

- Evaluating the use patterns of permitted scooter share systems to identify geographic and/or demographic gaps where scooter share could be promoted;

- Understanding users' choice to travel by scooter share vis a vis other transportation options, in the context of operational needs, to understand the overall impacts to congestion and vehicle miles traveled in San Francisco;

- Assessing the efficacy of rider accountability efforts in reducing the incidences of unsafe riding or parking behavior; and

- Understanding any unforeseen impacts of scooter operations on the communities they serve.

Background and Evaluation Framework

Scooter share systems have expanded rapidly across the United States in the past year. The SFMTA supports innovative solutions that complement the City's transportation network. Scooter share programs have the potential to introduce a new transportation option for short trips and reduce private automobile trips, especially when paired with public transit.

However, when companies deployed scooter share programs in the spring of 2018 in San Francisco, the scooter programs had a negative impact on the safety and accessibility of San Francisco's sidewalks due to illegal sidewalk riding and scooters left in locations that impeded pedestrian access and created tripping hazards.

Based on these concerns and San Francisco's past experience regulating shared mobility systems, the Board of Supervisors and the SFMTA Board of Directors amended Divisions I and II, respectively, of the San Francisco Transportation Code to regulate scooter services. The resulting Transportation Code amendments authorized the SFMTA to implement a 12-month Pilot Powered Scooter Share Permit Program (Pilot) to address the significant concerns observed during the initial deployment of scooter share programs in San Francisco and ensure consistent and effective regulation of scooter share programs.

The Pilot terms, as established by the SFMTA Board of Directors, authorize the SFMTA to issue up to five total permits during the one-year Pilot period, with a maximum total of 1,250 scooters during the first six months, with discretion to increase the total up to 2,500 scooters after six months. For the first six months, the SFMTA chose to issue two permits for 625 scooters each in the interest of promoting geographic equity and allowing the necessary scooter density to serve neighborhoods beyond the downtown core.

Over the 12-month Pilot period, SFMTA is collecting data and public feedback to assess whether further increases to the number of shared scooters is advisable and would serve the public interest. The SFMTA also held a community discussion on April 2nd to gather feedback on the Pilot, with a particular focus on safety, accessibility, equity, outreach, and data. The permit requirements and Pilot program reflect the SFMTA's data-driven approach to better understand how new mobility services impact San Francisco and its communities. This model is similar to approaches the SFMTA has taken in the past, including using pilots and short-term permits to better understand the needs and impacts of new services such as on-street car sharing, stationless bike sharing and electric moped sharing.

The SFMTA may increase the total number of scooters granted to 2,500 after six months, depending on the results of the mid-Pilot evaluation.

Emerging Mobility Guiding Principles

In July 2017, the San Francisco County Transportation Authority (SFCTA) and the SFMTA adopted the following ten Guiding Principles as a framework for evaluating the benefits and impacts of all emerging mobility services and technologies, such as shared powered scooters, in San Francisco.

1. Collaboration
2. Safety
3. Transit
4. Congestion
5. Sustainability

6. Equitable Access
7. Accountability
8. Labor
9. Disabled Access
10. Financial Impact

The SFMTA uses the Guiding Principles as a tool to ensure new services and technologies align with City policies, while minimizing any potentially detrimental impacts on the City's transportation network. Through evaluations such as this one, these principles help the Agency to assess if and how powered scooter share meets City goals. The SFMTA is then able to use its findings to shape future policies, programs, and actions.

This evaluation focuses on six of the Guiding Principles that are particularly relevant to shared scooter services:

1. **Safety**: The Pilot must be consistent with the City's goal for achieving Vision Zero and ensuring public safety and security;
2. **Disabled Access**: The public right-of-way must be maintained in a way that doesn't allow electric shared scooters to be a nuisance (i.e. blocking paths of travel or cluttering sidewalks);
3. **Equitable Access**: Scooters must be made available in disadvantaged communities, and memberships must be affordable to people with low incomes;
4. **Collaboration**: Emerging Mobility Services and Technology providers and the City must engage and collaborate with each other and the community to improve the City and its transportation system.
5. **Labor**: Emerging Mobility Services and Technologies should support San Francisco's local hire principles, promote equitable job training opportunities, and maximize procurement of goods and services from disadvantaged business enterprises.
6. **Sustainability**: Permittees must support sustainability, including helping to meet the City's greenhouse gas (GHG) emissions reduction goals, promote use of all non-auto modes, and support efforts to increase the resiliency of the transportation system;
7. **Transit**: Powered scooter share must support, rather than compete with, public transit services, and must account for the operational needs of public transit and encourage use of high-occupancy modes; and
8. **Accountability**: Under the Pilot, permittees must share relevant data so that the City and the public can effectively evaluate the powered scooter share systems' benefits to and impacts on the transportation system.

The SFMTA reports on a number of performance metrics across each topic area in the "Key Findings to Date" section. Table 1 provides a summary of these metrics and how they related to each topic area and Guiding Principle.

Table 1 – Performance Metrics by Guiding Principle and Topic Area

Topic Area	Related Emerging Mobility Principle(s)	Performance Metrics
1. Progress of the Pilot	Accountability, Collaboration, Equitable Access	• Average fleet size • Geographic availability • Compliance with device cap
2. Safety and Accessibility	Safety	• Collisions and injuries • Helmet use • User accountability
	Disabled Access, Safety	• Lock-to implementation
3. Complaints and Citations	Accountability, Collaboration, Disabled Access, Safety	• Rider behavior complaints • Parking complaints • Parking citations
4. Inclusive and Equitable Service	Equitable Access	• Availability in Communities of Concern/southeastern neighborhoods • Usage in Communities of Concern • User demographics
	Collaboration, Equitable Access	• Outreach • Low-income plan participation • Community meeting summary
5. Ridership and Demand	Accountability, Collaboration	• Unique users
	Sustainability	• Number of trips taken • Trips per device per day • Trip duration and length
	Equity, Sustainability, Transit	• Trip origins, destinations, and routes • Mode choice

Key Findings to Date

The following sections summarize the findings for each of the five key topic areas:

- Progress of the Pilot;
- Safety and Accessibility;
- Complaints and Citations;
- Inclusive and Equitable Service; and
- Ridership and Demand.

Progress of the Pilot

Each permittee began service under the Pilot on October 15th, 2019, with a maximum fleet size of 625 scooters per company.

Scoot's service area includes South Beach, Mission Bay, Lower Haight, the Mission District, and portions of South of Market, Upper Market & the Castro, Bernal Heights, the Excelsior, Dogpatch, and the Bayview. The current service area—including 2018 Communities of Concern (CoCs)—is shown in Figure 1.

Skip's service area includes Downtown, South of Market, the Tenderloin, Chinatown, North Beach, the Embarcadero and Wharves, Russian Hill, Nob Hill, the Marina, Pacific Heights, Western Addition, Presidio Heights, the Inner Richmond, the Haight, South Beach, Mission Bay, and portions of the Castro & Upper Market, the Mission, Potrero Hill, Dogpatch, the Bayview, Visitacion Valley, and the Excelsior. The current service area—including the southeastern neighborhoods where Skip committed to maintain at least 20% of its fleet—is shown in Figure 2.[2]

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[2] In their applications, each permittee proposed different equity-based metrics for ensuring device availability in underserved communities. Scoot committed to maintaining at least 20% of its fleet in Communities of Concern. Skip committed to maintaining at least 20% of its fleet in southeastern neighborhoods of the City. Based on Skip's proposed service area in their permit application and expanded service area as of March 6 2019, the SFMTA considers the "southeast neighborhoods" to be the following San Francisco Planning Department neighborhoods: Bayview, Excelsior, Visitacion Valley, Outer Mission, and Crocker Amazon. The SFMTA calculates the 20% device availability metric based on this definition.

Figure 1 - Scoot Service Area and Communities of Concern
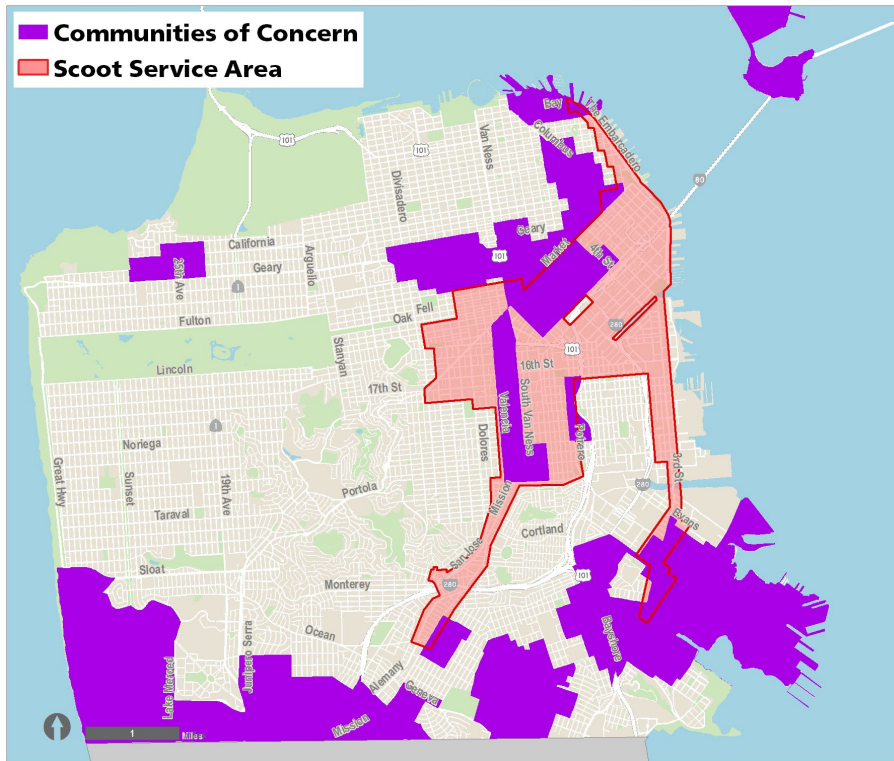
Figure 2 - Skip "Drop Zone" and Southeastern Neighborhoods[3]

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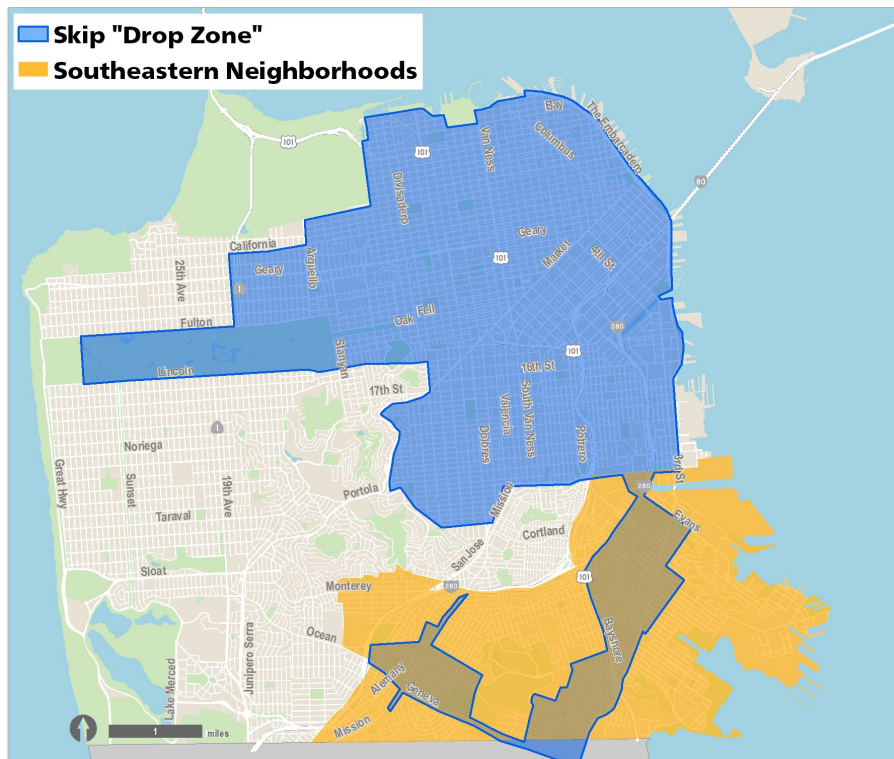
[3] Skip's service area is the entirety of San Francisco; the drop zone represents the area where scooters are distributed during deployment and rebalancing.

Scoot and Skip report monthly to the SFMTA on metrics organized around the Emerging Mobility Guiding principles, including safety, disabled access, sustainability, equitable access, accountability, and collaboration. Additionally, the SFMTA's Emerging Mobility Application Programming Interface (API) uses a version of the Mobility Data Specification (MDS) to provide accurate and timely available scooter statistics.[4] This allows the SFMTA to monitor availability in the service area at hourly intervals. The data are accessible to the SFMTA in real time, allowing the Agency to directly monitor permit compliance and evaluate the Pilot. SFMTA staff also meet with permittees on a biweekly basis to address issues as they arise.

Fleet Size and Availability

During the most recent complete month of available data (February 2019), an average of 235 Scoot scooters and 382 Skip scooters were available in San Francisco at 8 AM each day. Scoot has generally deployed lower fleet size numbers compared with Skip for the duration of the Pilot. Under the current terms and conditions of the permit, each permittee may only operate up to 625 scooters throughout the city. The average daily available fleet size at 8 AM for each provider is shown in **Figure 3**.[5] Note that as a mode, powered scooter share can be impacted by weather conditions, particularly rainy days, and fleet size fluctuations may reflect this. Additionally, while an 8 AM snapshot is currently useful as a comparison of fleet size across shared mobility operators, as data standards improve, the program may shift to a more comprehensive comparative metric.

Figure 3- Daily Snapshot - Average Fleet Size at 8 AM
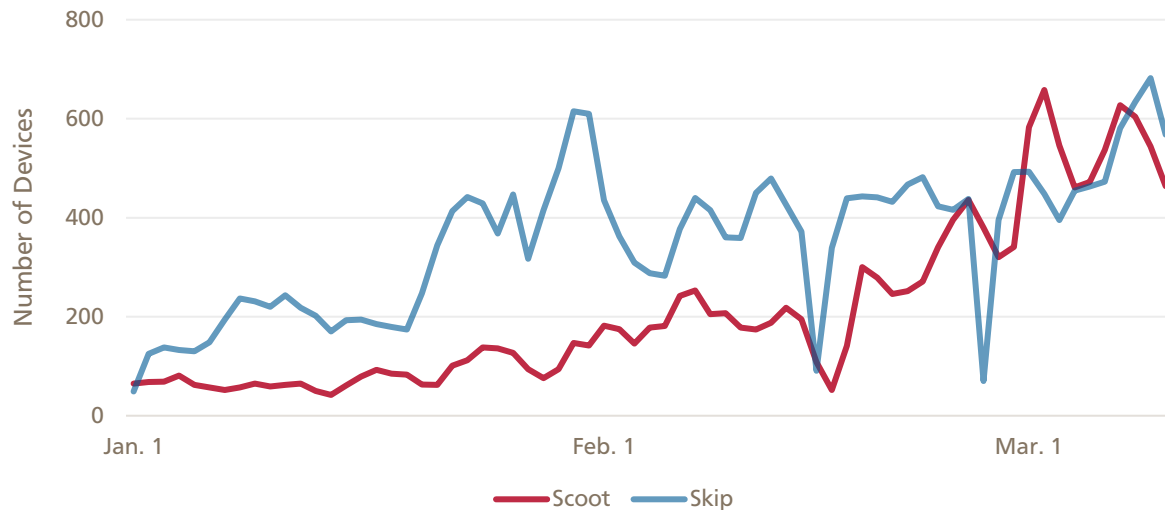
Scooters were generally concentrated in northern and eastern portions of the City, with some exceptions. Figure 4 shows the February average scooter distribution at 8 AM. The highest density of scooters was in

[4] MDS is a data and API standard that allows cities such as San Francisco to gather data from shared dockless mobility providers such as powered scooter share and stationless bikeshare companies.

[5] Data are for January 1, 2019 through March 10, 2019 and are based on event data provided by Scoot and Skip to the SFMTA per the SFMTA's Data Requirements for Stationless Emerging Mobility Services. This 8 AM snapshot shows the total on-street devices with a last known event type of available, unavailable, or reserved. The "last known event" is defined as the last event received within 48 hours of the 8 AM snapshot. Devices with no known event beyond 48 hours are excluded from this count.

the Financial District, South of Market, and Mission Bay, with some areas of higher scooter density in outlying areas such as the Excelsior, Bayview, and the Presidio.

Figure 4 – Average February 8 AM Scooter Distribution
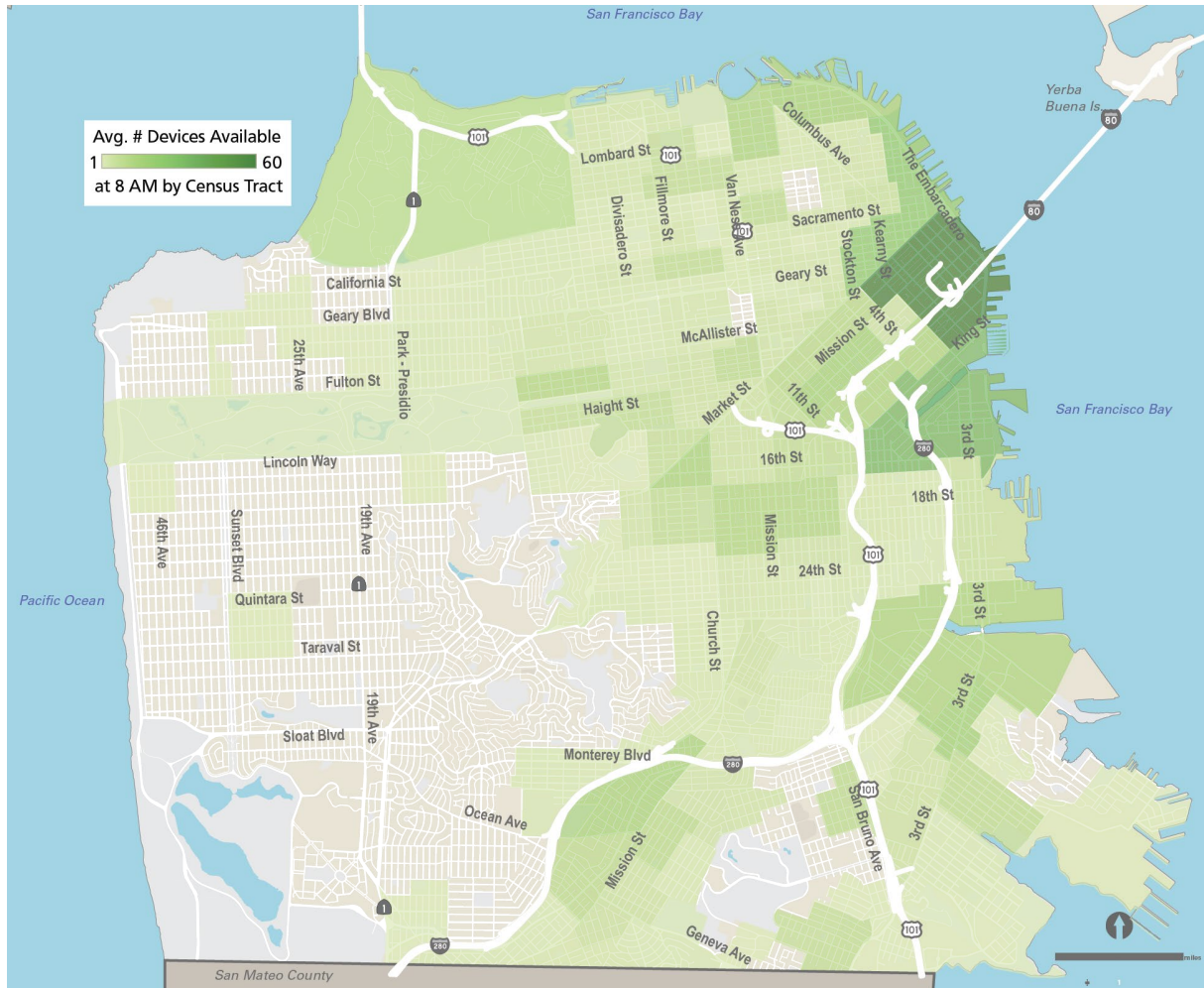
Compliance with Device Cap
Scoot and Skip have generally been in compliance with the maximum device cap of 625 scooters during the most recent three months of available data. Each permittee has exceeded the cap at the 8 AM snapshot only twice during this period, with all occurrences in March.

Safety and Accessibility

Collision and Injury Data
Collisions are self-reported to the SFMTA by each permittee on a monthly basis. In addition to collision reports from companies, both Zuckerberg San Francisco General Hospital and Trauma Center (ZSFG) and San Francisco Police Department (SFPD) data provide further information on the injury impacts of powered scooters in the City (data for those sources only available through 2018), including privately-owned powered scooters. Figure 5 displays monthly counts of traumatic electric-scooter (e-scooter)[6] injuries treated

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[6] All powered scooters are referred to as "e-scooters" in hospital reporting, including those unaffiliated with the Pilot program.

at ZSFG (green), alongside counts of SFPD reports of collisions involving an e-scooter (blue), and counts of collisions reported by riders and the public to Powered Scooter Pilot Program Companies (orange).[7] Note that ZSFG traumatic injuries represent a subset of injuries treated at the hospital - the more serious ones - and that powered scooter company collision reports did not all involve injuries.[8]

Figure 5 – Reported Powered Scooter Collisions/Injuries[8]
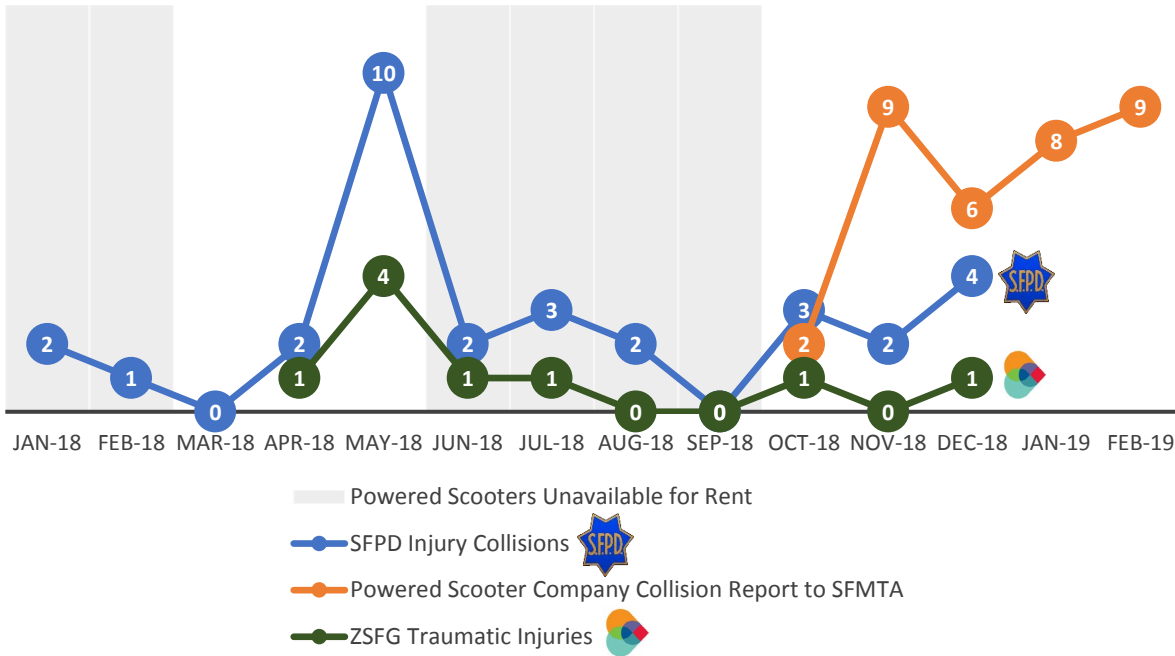
Key Findings

Powered scooter riders involved in collisions and sustaining injuries are predominantly male, adult, and White or Asian according to both SFPD and ZSFG data sources. Of nine people with traumatic injuries treated at ZSFG in 2018, 44% were injured in crashes with motor vehicles, 22% reported wearing a helmet, and one person was struck and injured by an e-scooter while walking.[9] Of 32 e-scooter related injuries reported to SFPD in 2018, 19% were severe, 7% involved wearing a helmet[10], and 13% were injuries to people walking. Across all data sources, reported or documented rider helmet use is low.

Zuckerberg San Francisco General Hospital Trauma Data

ZSFG tracks traumatic injuries associated with various non-traditional vehicle types – including e-scooters. As the only Trauma Center in the City and County of San Francisco, ZSFG treats nearly all patients who sustain traumatic injuries in the City. Notably, this data source reflects only the most serious injuries, and

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[7] Note that only collisions reported to the company can be directly associated with the Pilot. Other sources, including SFPD and ZSFG data, do not generally specify whether or not an individual involved in a collision was riding a Scoot or Skip scooter vs. a private scooter, so data should be interpreted accordingly.
[8] Of the 34 collisions reported to permittees (who then report them to SFMTA) during the period of October through February, 18 included an injury.
[9] Note that these data include both the unpermitted spring 2018 scooter deployment, as well as the first 2.5 months of the Pilot.
[10] This statistic describes 2 out of 28 non-pedestrian injured parties.

not those, for example, of a person riding or hit by an e-scooter who presented to the ZSFG emergency department but did not require trauma team activation or hospitalization.

The group of nine patients who sustained e-scooter related injuries in San Francisco in 2018 had the following characteristics:

- 100% male (N=9)
- Average age 39 years, including three children (aged 17 and younger) injured and one senior (aged 65 and older) who was critically injured[11]
- 33% Asian (n=3), 67% White (n=6)
- 66% admitted to hospital (n=6) and 22% critically injured[2] (n=2), including one pedestrian struck by an e-scooter
- Causes of e-scooter related injury were e-scooter vs. motor vehicle collision (n=4); rider falling from an e-scooter (n=3); collision with a stationary object (n=1); one pedestrian injured by collision with an e-scooter (n=1)
- Six injuries (67%) included involved injury to the head. Injury to the lower body was also prevalent, particularly to knees (n=4, 44%)
- 22% of those injured wore helmets (n=2)

A detailed collision and injury analysis by the Vision Zero SF Injury Prevention Research Collaborative (VZIPR)[12] can be found in Appendix E.

San Francisco Police Department Data

Of a total 31 collision reports referencing e-scooters in all of 2018, all involved injuries to at least one party. Reports of collisions were highest in May 2018, the month corresponding to peak e-scooter concentration in San Francisco. While collision reports dropped after May 2018, there has been a rise in the number of e-scooter related collision reports since the Pilot commenced in mid-October 2018 (compared to the 4.5 months immediately prior). Over 2018, injuries have been reported in people from 12-86 years old, including four children (age 0-17) and three seniors (age 65 and up). Among 32 injured parties, four were pedestrians, and 28 other. Nineteen percent of injuries were reported as severe. Injured pedestrians were older adults (age range 64-86), White or Asian (50% each), and 75% female. A quarter of injuries to pedestrians were described as severe, and 75% as other visible injury. Of those injured while using an e-scooter, two people (7%) reported wearing a helmet.

Self-Reported Data from Powered Scooter Permittees

Due to variations in data collection and reporting methodologies across data sources, only collisions that are reported to the permittees can be directly associated with the Pilot. Scoot did not report any collisions from permit issuance through February 2019. Skip reported 34 collisions during this period. Of those collisions, 18 involved an injury, three of which were severe injuries. The leading collision type reported was motor vehicle vs. powered scooter (44%), followed by powered scooter collisions without a second

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[11] Critical injury is a subset of traumatic injury reflecting the most severe injuries. This categorization relies upon assessment of an Injury Severity Score by trained medical professionals.

[12] The VZIPR Collaborative is composed of epidemiologists, physicians, and key staff from the San Francisco Department of Public Health (SFDPH) and ZSFG. VZIPR has been working since 2014 to develop, institutionalize, and utilize comprehensive injury data in support of strategic research and analyses for Vision Zero SF, San Francisco's policy and commitment to eliminate traffic deaths on city streets. The methodology developed by this group to track emerging mobility services and technologies– including e-scooters– is available at:
https://www.sfdph.org/dph/files/EHSdocs/PHES/VisionZero/Emerging_Mobility_Injury_Monitoring_Methodology.pdf

party (38%) and powered scooter vs. pedestrian collisions (12%). Calculated on a per-mile basis, Skip saw 19 collisions per 100,000 scooter miles traveled and 16 collisions per 100,000 Skip scooter trips. Overall, 12% of Skip riders reporting collisions also reported helmet use.

Helmet Distribution and Use

Prior to January 1, 2019, California law required the use of a helmet when operating a powered scooter. However, Assembly Bill 2989 changed state law such that helmets are no longer required for adult scooter riders. The SFMTA evaluated Pilot applicant proposals pursuant to laws in effect at the time, including a criterion for promoting and distributing helmets to encourage their use. Scoot and Skip both proposed distribution of free helmets upon request or at events. The permittees distributed 1,775 helmets as part of the Pilot.[13] While state law has changed, SFMTA continues to encourage helmet use for riders of powered scooters.

User Accountability

Response to complaints

Since the initial unregulated roll-out of scooters in San Francisco, the public has expressed concern regarding individual misbehavior, whether reporting improper parking or sidewalk riding. Each permittee needed to develop robust systems to hold individual users accountable, allowing public complaints to register bad behavior, and imposing appropriate repercussions for users who exhibit repeated violations.

Scoot levies penalties for poor rider behavior including fees for parking citations, safety violations, and service suspension for repeat violations. As of March 18, 2019, Scoot has issued warnings to 80 riders for unsafe riding or parking, fined 12 riders $300 each for unsafe riding or parking, and suspended 2 users for unsafe riding or parking.

Skip has a policy/process to take action when they positively identify a Rider Code of Conduct violation. While they do have a policy in place, Skip requires a high degree of proof to act on their 3 strike policy, to make sure that they are not limiting access to their platform with inconclusive evidence. With these measures in place, Skip has not deactivated any user accounts to date for Rider Code of Conduct violations. The SFMTA will continue to monitor each company's rider accountability measures to ensure they are adequately meeting the Agency's standards under the Pilot.

Lock-To Implementation

The SFMTA has made the implementation of a locking or tethering mechanism a priority of this Pilot. Based on the experience during the unpermitted pre-Pilot scooter rollout in spring 2018, the SFMTA determined that locking or tethering shared stationless devices—such as powered scooters—to fixed objects is the most practical way to ensure the public pedestrian right-of-way is kept clear of obstacles.

Device locks are now implemented on the entire fleet for both operators. Scoot has deployed an app-controlled integrated locking mechanism on 100% of its fleet. Skip has deployed a non-integrated, non-app controlled combination lock throughout its fleet. Parking complaints and citations have decreased since the introduction of these measures (discussed in more detail in the following Complaints and Citations section).

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[13] 1,243 free helmets were distributed by Skip and 532 helmets powere distributed by Scoot as of March 15, 2019.

The two permittees reported 1,719 scooters lost or stolen from October 2018 through February 2019 (453 for Scoot, 1,266 for Skip). Additionally, 374 scooters have been damaged beyond repair and removed from the system (100 for Scoot, 274 for Skip). Scoot has seen a decline in the monthly number of devices stolen since implementation of its integrated locking mechanism. Skip's number of devices stolen remains steady, with an average of 253 scooters stolen per month, and has not seen a notable decrease in this rate since implementing a non-integrated locking solution.

Complaints and Citations

State and local laws impose limitations on parking and riding powered scooters in San Francisco. Parking and riding powered scooters in a manner that impedes pedestrian traffic presents significant challenges for other sidewalk and street users, particularly for older adults or persons with disabilities, such as someone who has low vision or is blind, or who or uses a cane, walker or wheelchair. Appendix 1 of the Powered Scooter Share Program Terms and Conditions provides guidance to help permittees meet their obligations under the law and ensure that scooters do not reduce the safety and accessibility of San Francisco sidewalks.

Between October 15, 2018 and February 28, 2019, the SFMTA received 624 complaints of improperly parked scooters blocking the public right of way. The SFMTA received an additional 69 complaints regarding improper riding by powered scooters during this period. Complaints were primarily channeled through 311, with the remainder received by email. This compares with the nearly 2,000 complaints received by the SFMTA during a two month period in spring 2018. Complaints are shown in Figure 6.[14]

Figure 6 –Complaints Received by SFMTA by Month[14]
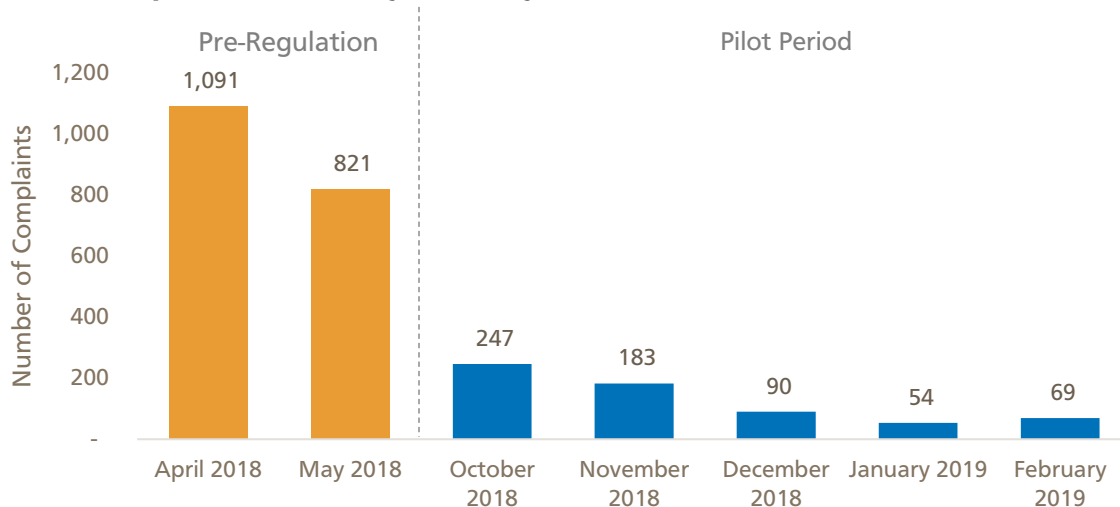
On-street enforcement of the parking guidelines is conducted by investigators who respond directly to 311 complaints while in the field and issue citations for improperly parked powered scooters. In addition to responding directly to complaints, investigators also cite any improperly parker powered scooters that they witness while conducting other duties in the field. A total of 166 citations for improper parking were issued to both Skip and Scoot through February 28, 2019, with 39 issued to Scoot and 127 issued to Skip. During the first quarter of the Pilot, Scoot and Skip both developed "lock-to" solutions on their devices. The companies encourage riders to lock devices to bike racks and specifically instruct customers not to

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[14] Complaints may also include privately-owned powered scooters.

park scooters next to curb cuts, in pedestrian pathways, or immediately adjacent to accessible parking spaces. The lock-to solutions have reduced the frequency of improper parking. A decline in the number of issued citations for improper parking starting in December 2018 roughly corresponds with the introduction of the lock-to solution in both fleets, as shown in Figure 7.

Figure 7 – Parking Citations by Month
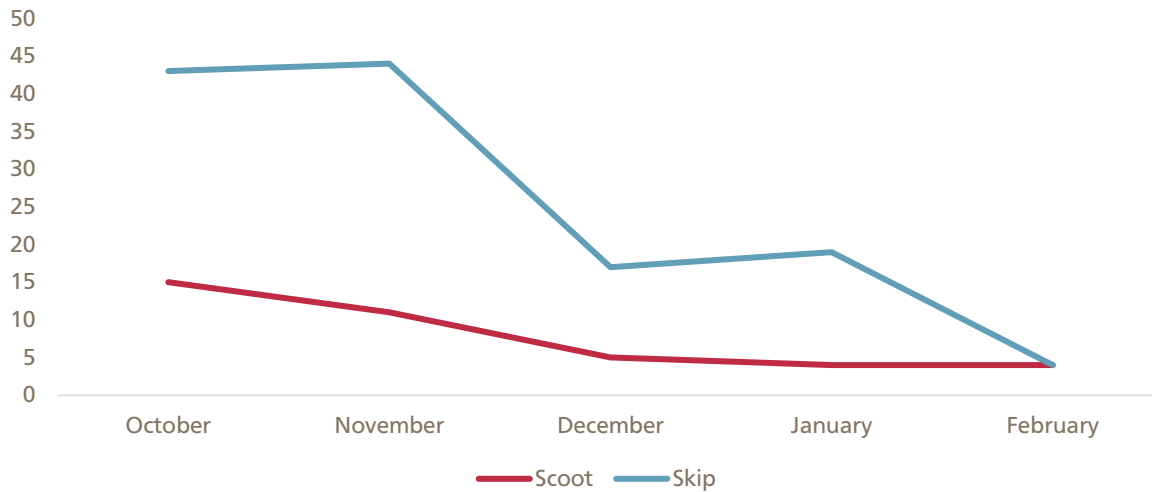
Inclusive and Equitable Service

Communities of Concern

Each powered scooter share permittee committed to specific equity targets for device distribution in their applications. Scoot committed to making at least 20% of their fleet available in Communities of Concern at any given time, while Skip committed to maintaining 20% of their fleet in southeast portions of the City. Scoot's service area and Communities of Concern (CoC) are shown in Figure 1. The SFMTA defines Skip's southeast zones to include Bayview, Excelsior, Visitacion Valley, Outer Mission, and Crocker Amazon, as shown with Skip's service area in Figure 2.

Availability in Communities of Concern

During the most recent month of available data (February 2019), Scoot had an average of 35.6% of its fleet deployed in Communities of Concern at 8 a.m. each day, while Skip had an average of 31.1% of its fleet deployed in Communities of Concern.[15] Neither permittee dropped below the 20% CoC threshold during the February 8 a.m. snapshot.

Availability in Southeastern Neighborhoods

During the most recent month of available data (February 2019), Skip had an average of 21% of its fleet deployed in southeastern neighborhoods of the City at 8 a.m. each day, with a maximum of 34% and a minimum of 13%. Skip failed to meet its 20% commitment of deployment in southeastern neighborhoods 12 out of the 28 days that month, with a mean availability in this area of 16% on those 12 days.

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[15] Skip is not required to meet a minimum percentage of its fleet in Communities of Concern based on its application. Data are shown for comparison purposes only.

Usage in Communities of Concern

From December 1, 2018 through March 2, 2019, 63,462 trips began or ended in Communities of Concern, representing 52% of all trips made during this period. 19,568 trips (16%) started *and* ended in a Community of Concern.
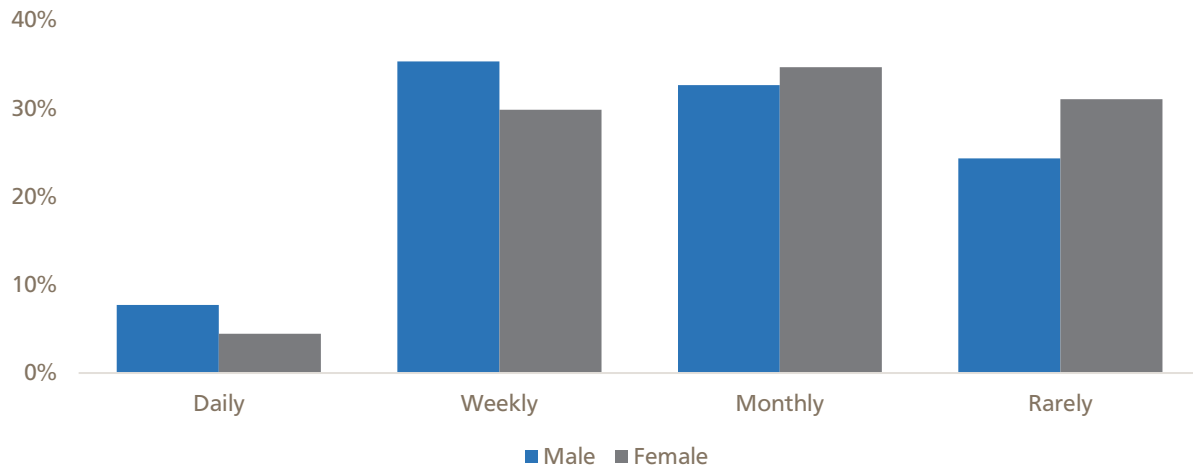
User Demographics

Under the terms and conditions of the Powered Scooter Share permit, permittees are required to administer two user surveys within the permit year, using questions provided by the SFMTA. The first user survey was distributed from January 7 through February 5, 2019 and was available in English, Spanish, Chinese, and Tagalog. The survey included questions regarding travel behavior and mode shift. Full details on the User Survey questions and results can be found in Appendix A.[16]

The user survey results provided a number of insights into the demographics of scooter users. Most survey respondents were male (81%) compared to female (17%) or another gender (1%).[17] Male survey respondents generally report using shared powered scooters more frequently than female respondents. Males were nearly twice as likely to ride daily and a sixth more likely to ride weekly as compared to female respondents, as shown in Figure 8.

Because the user survey was distributed via email on an opt-in basis, respondents self-selected and data and findings should be interpreted with appropriate caveats compared with random sampling. Since the survey is not a simple random sample, survey results are subject to selection bias. Furthermore, because a survey respondent could use either scooter service, there is no guarantee that respondents are not double counted between surveys. More research is needed to confirm whether results accurately reflect reality.

Figure 8 - Frequency of Scooter Usage by Gender

The majority (61%) of survey respondents were White, while 16% were Asian or Pacific Islanders. 11% of respondents identified as other and/or mixed, 7% as Hispanic/Latino, and 2% as Black or African American.[18] This compares with the demographics of San Francisco as a whole – 41% White, 34% Asian or Pacific Islander, 15% Hispanic/Latino, 5% Black or African American, and 4% other and/or mixed.

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[16] The SFMTA will require permittees to distribute an additional survey during the second half of the Pilot. This survey may be structured or administered differently.

[17] 1% of respondents selected "another gender"; separately, 1% of respondents left this question blank.

[18] Note: for this question, users were able to select more than one response. 3% left this question blank.

Additionally, powered scooter share users in San Francisco generally skew younger. Half of all survey respondents were between the ages of 25 and 34, while 23% of San Francisco residents fall within this age range [19]

88% of survey respondents lived in the greater Bay Area, while around two-thirds lived in San Francisco proper. A map of survey respondent density by home ZIP code is shown in Figure 9. Full details on the User Survey questions and results can be found in Appendix A.

Figure 9 – Survey Respondent Density by Home ZIP Code
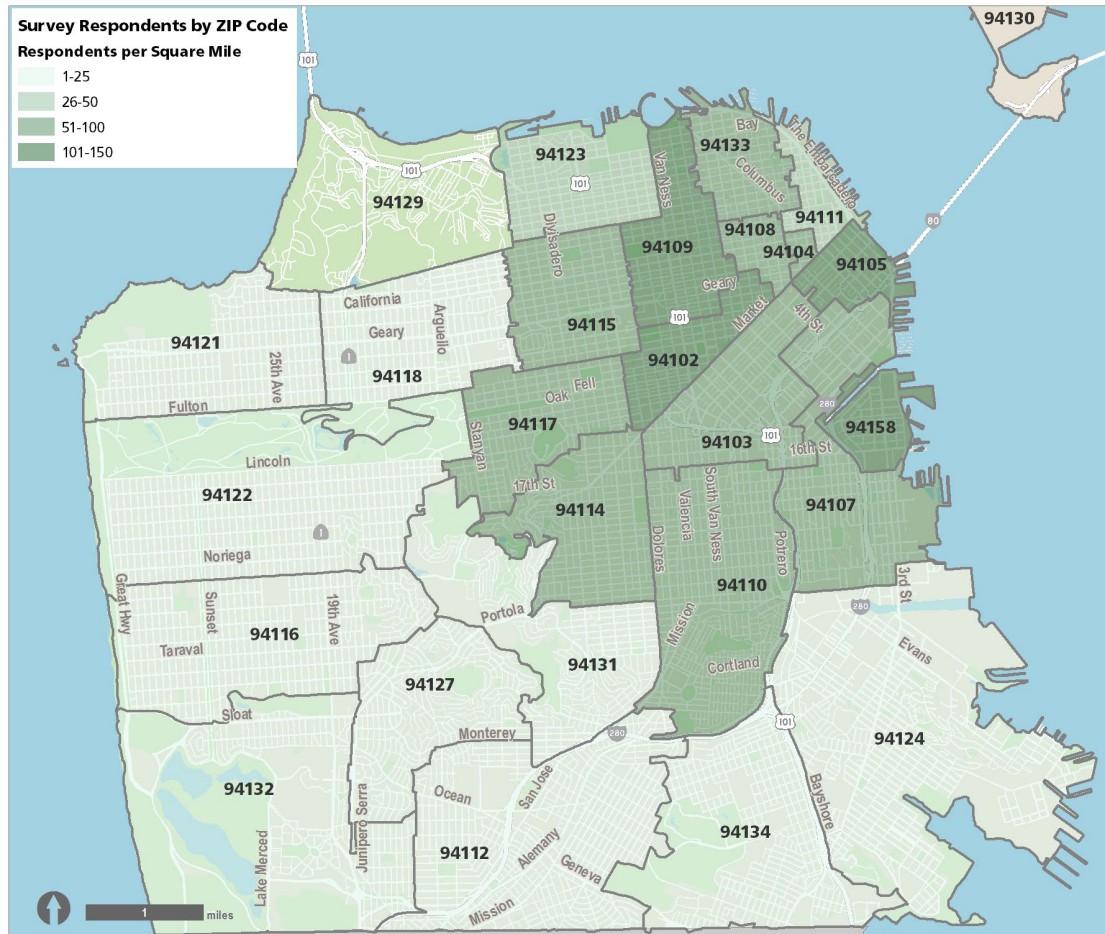
Outreach

Under the Pilot, the SFMTA requires a robust community engagement plan. Scoot and Skip have each completed a number of outreach activities since being awarded permits to operate in San Francisco, meeting with various community groups and elected officials, as well as attending and hosting events.

Scoot met with many members of the Board of Supervisors, various City departments, merchants associations, Community Benefit Organizations, neighborhood associations, and safer streets advocacy organizations. Scoot also held 12 safety trainings as of February 2019.

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[19] San Francisco demographic data are from the Census Bureau's American Community Survey 5-year estimates from 2013-2017.

Skip met with all members of the Board of Supervisors, as well as a number of merchants associations, Community Benefits Districts, Community Benefit Organizations, neighborhood groups, safer streets advocacy organizations, and political groups. Skip also participated in a number of community events such as Sunday Streets, and held 21 safety trainings as of February 2019.

Despite the outreach activities completed to date, shared powered scooters have not been embraced by all of San Francisco's diverse communities, particularly with respect to age, gender, income level, and race. More targeted programmatic outreach is needed to encourage adoption in in these underrepresented groups, for whom shared stationless mobility options could have the largest impact.

The SFMTA solicited outreach summaries from each permittee, specifically highlighting successes and challenges. Their descriptions show the need for additional work in this area and a more strategic approach.

Scoot Outreach Successes and Challenges

Scoot reports that its outreach and partnership efforts have been successful in that dialogues were open, respectful, and productive. Most organizations expressed support for the service and welcomed forming partnerships.

Scoot reports some challenges including complaints about distribution. Some communities asked for more availability, while others wanted to be excluded from the service area. Scoot has also felt some communities did not prioritize a collaborative partnership, but is hopeful that groups will have more capacity to form working relationships in the future. Overall, they experienced a low number of signups for the low-income Community Plan, and further efforts will address this disparity to ensure awareness, and to identify any other barriers towards adoption.

Skip Outreach Successes and Challenges

Since receiving a permit, Skip reports efforts to build relationships with community groups, addressed concerns from the initial unregulated scooter roll-out, and worked to repair public trust with scooter operators as a whole.

Skip reports reaching out to community groups, through in person meetings, and a series of popup events and safety trainings, designed to reach the broader public. In some neighborhoods, Skip employees walked merchant corridors to directly engage feedback and to answer questions. Skip reports it has continued to foster a positive relationship with bike and walk advocacy to grow a coalition for safer streets, with scooter riders, bicyclists, and pedestrians, joining in demonstrations like People Protected Bike Lanes.

Some of Skip's reported challenges include a stalled attempt to implement a community design effort for Skip scooter footboards.

Low-Income Plans

The SFMTA requires that Scoot and Skip each offer a discounted low-income plan for users who qualify for various government assistance programs. Scoot offers their "Community Plan" to anyone with an EBT card, discounted utility bill or any other state or federally-run assistance program document, as well as members of several pre-approved community-based organizations (CBOs). Skip also offers a low-income

plan called the "Rider Assistance Program" to anyone with qualifying Cal Fresh, MUNI lifeline, PG&E CARE, or Golden State Advantage participation. Both plans offer a 50% discount on rides.

Low income plan participation is very low—there were 68 participants in Scoot's Community Plan, and 75 participants in Skip's Rider Assistance Program as of February 2019—even though 9% of users are low-income.[20] Usage by low-income plan members is also low. 120 trips had been facilitated by Scoot's low-income plan and 671 by Skip's plan from Pilot launch through February 2019. Trips made by low-income plan participants represented .5% of all Scoot trips and .3% of all Skip trips during this period.

Community Meeting

The SFMTA held a community discussion on April 2, 2019 to gather feedback on the Pilot, with a particular focus on safety, accessibility, equity, outreach, and data. More than 50 members of the public shared their thoughts on successes and areas for improvement for both the program and for individual operators. The feedback received included:

- **Safety**: Participants underscored the importance of safe riding and parking of scooters, and had a number of ideas about how to improve safety for riders and non-riders alike. Improvements to rider accountability and education were both stressed. With respect to rider accountability, many attendees felt that permittees could do more to ensure that riders operate scooters safely, either through incentives, penalties, or suspension of accounts. On the topic of education, some articulated that the permittees could better educate their riders about the rules of the road, especially visitors who may not be familiar with local laws, and that rider education should include more nuance about navigating different neighborhoods and transportation infrastructure in San Francisco. However, most participants stressed that incidences of sidewalk riding were less numerous than during the unpermitted rollout of spring 2018. Some in attendance thought that the permittees should better educate riders and the public on how to report a collision to the companies. Finally, many stressed the need for more extensive and higher quality biking infrastructure, such as separated biked lanes and bike racks.

- **Accessibility:** Those in attendance felt that implementation of the locking mechanism by both permittees had noticeably improved parking behavior and reduced incidences of scooters blocking the accessible path of travel. Participants were asked to compare their observations of parking behavior both before and after the implementation of locking mechanisms, with most rating that behavior was "better" or "much better" after lock-to had been deployed, and a majority indicating that scooters should be required to include a lock moving forward.

- **Equity:** Participants felt that many in their communities did not know about scooters or think scooters were for them, and that the permittees should promote their programs more widely in these communities, especially Communities of Concern. Additionally, some were unaware that companies had a low-income plan or how to qualify, underscoring the need for additional promotion of low-income plans. With respect to device distribution, many in attendance expressed a preference for additional scooters in more neighborhoods and felt that the current fleet sizes were insufficient to adequately serve demand.

- **Outreach:** Attendees expressed a wide array of feedback on outreach, with some noting high levels of outreach in certain neighborhoods, with others stressing the need for improved and more extensive outreach. In particular some participants indicated that permittees could

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[20] Figure based on a comparison of survey respondent household income levels with Muni Lifeline Program income limits, household income, and household size. .3% of Scoot users and .1% of Skip users are low-income plan participants.

undertake better multi-lingual outreach to reach a broader set of stakeholders, including in languages beyond Spanish and Chinese.
- **Data:** Participants were eager to gain access to the data that the SFMTA receives from both permittees through both the Emerging Mobility API and other sources such as the complaints and citations database. The SFMTA plans to implement a public-facing dashboard by May 2019 with snapshots of various metrics such as trips per device per day, origins and destinations by Census Tract, and scooter availability by neighborhood.

The SFMTA will duly consider the feedback gathered at this meeting in program decisions for the remainder of the Pilot, as well as for any future permit program after the current Pilot expires.

Ridership and Demand

Unique Users

Scoot identified 22,985 unique users in San Francisco as of February 2019, while Skip identified 72,448. The number of users is defined as the total number of unique accounts.

Demand

Users have taken 242,398 trips on shared scooters since the Pilot launched in October 2018 through February 2019. Scoot users took 24,295 trips and Skip users took 218,103 trips during this time period. The number of trips was higher in the months of October and November before dropping by roughly half in the winter months, likely due to a high frequency of rainy days during these months.[21] However, Scoot saw an increase in the number of trips per month in February, likely due to an increase of its fleet size compared with prior months. The number of trips per month taken on each service is shown in Figure 10.

Figure 10 - Total Trips per Month
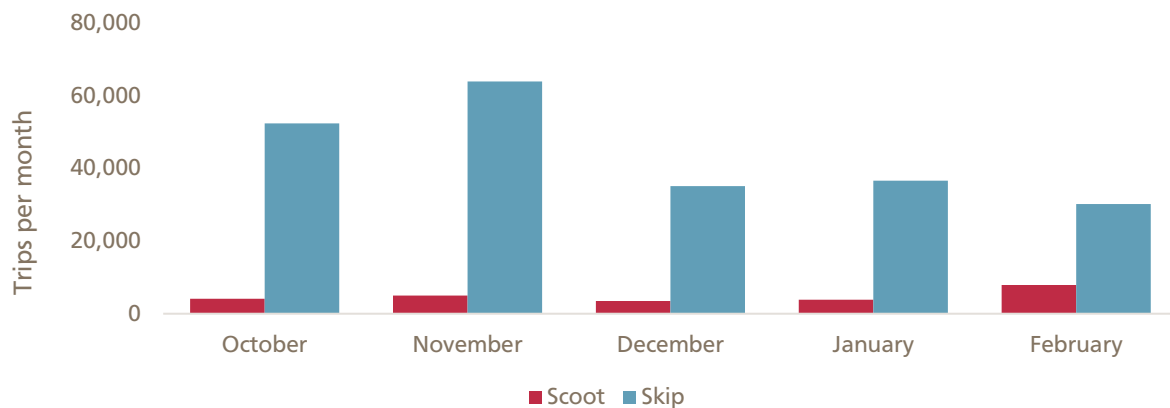
During the most recent month of complete data (February 2019), Scoot saw an average of 303 trips per day, while Skip saw 1,054 trips per day.

Trips per Device

During the most recent month of available data, Scoot and Skip both saw an average of between two and three trips per device per day, as shown in Figure 11. This number was lower compared with earlier in the Pilot, likely due to inclement weather during the month of February.

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[21] Skip does not operate its service on days when the weather.com forecast shows a 40% or greater chance of precipitation.
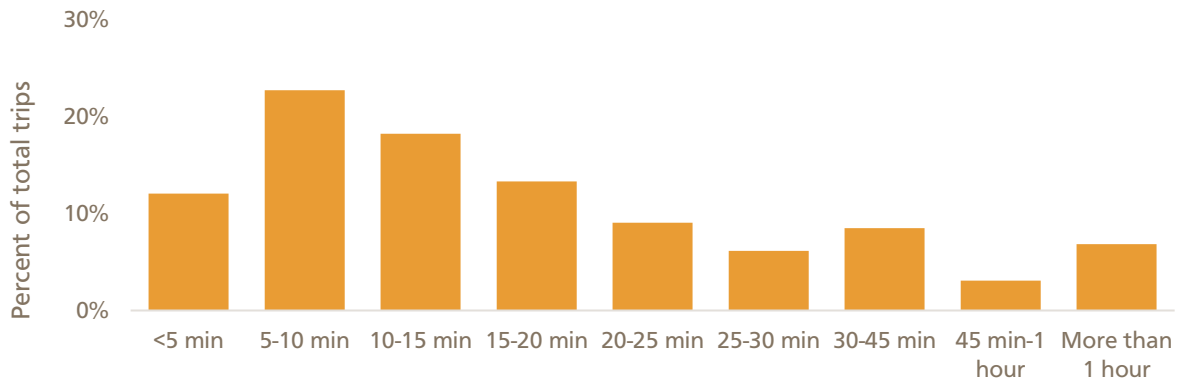
Figure 11 – Trips per Device per Day, by Week[22]
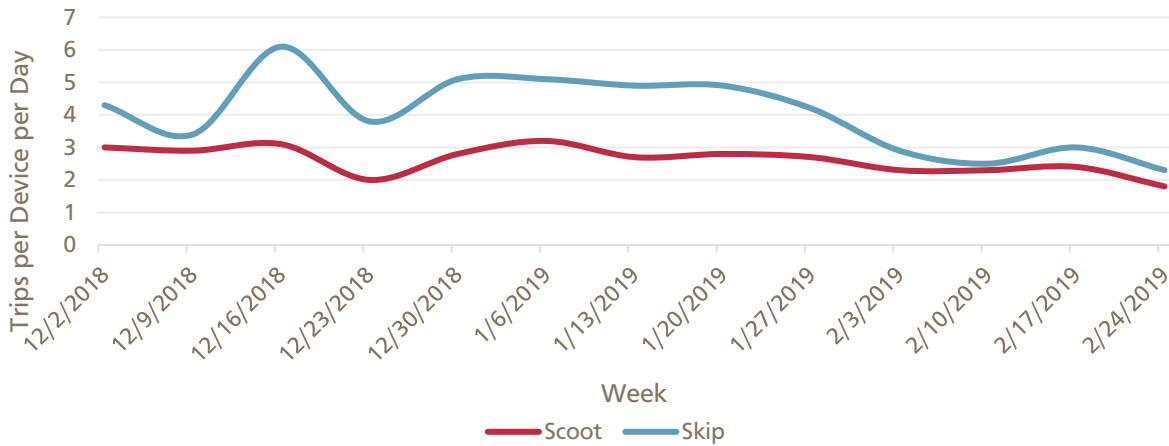
Trip Duration and Length

The mean trip on a shared powered scooter was 20 minutes in duration and just under 1 mile in length. The median trip was nine minutes in duration and .7 miles in length. The distributions of trip durations and lengths are shown in Figure 12 and Figure 13.

Figure 12 - Trip Duration[23]

Figure 13 - Trip Length[23]

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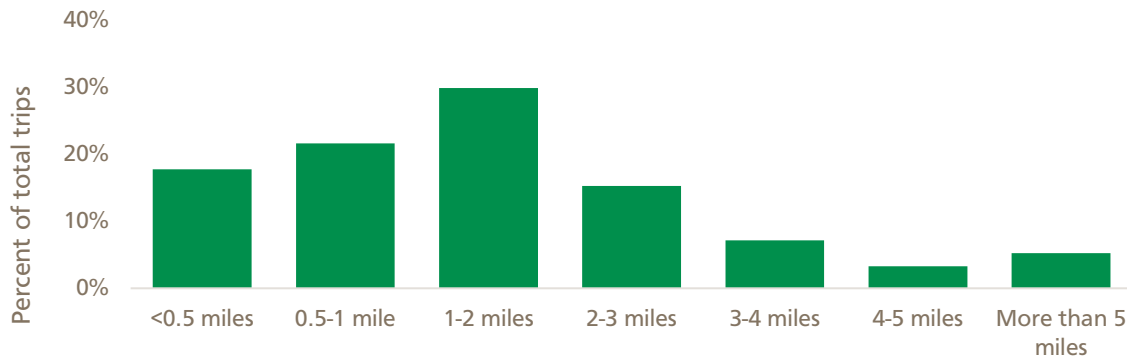
[22] This metric represents the total number of trips divided by the total revenue hours per device. Revenue hour is defined as the total time a device was in a state of 'reserved' or 'available' per the events sent to SFMTA according to the SFMTA Data Sharing Requirements for Stationless Emerging Mobility Services
[23] Note: trip duration and length data are for 10/15/2018 through 3/2/2019.

Trip Origins, Destinations, and Routes

Trip origins and destinations were generally concentrated in the northeastern part of the City, primarily the Financial District, Fisherman's Wharf, South of Market, Rincon Hill, South Beach, and Mission Bay, as shown in Figure 14 and Figure 15.

Users took the greatest number of trips in the northern and eastern two-thirds of the City, as shown in Figure 14 and Figure 15. The most commonly utilized routes include the Embarcadero, Market Street, 2nd Street, 3rd Street, and Townsend Street.

Figure 14 – Trip Origins & Destinations by Census Tract and Trips by Street Segment[24]

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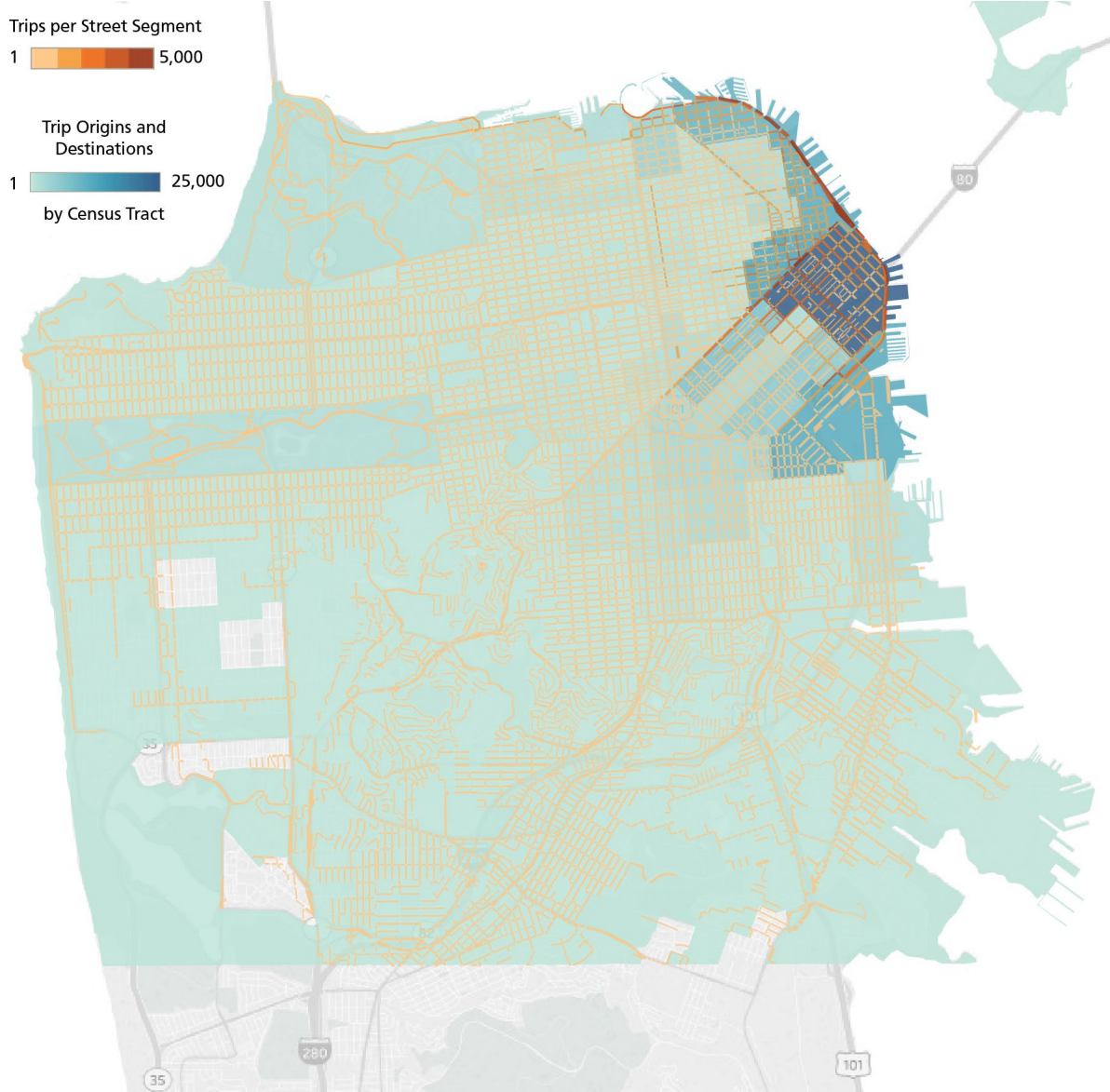
[24] Trip origin and destination data are from November 20, 2018 to March 5, 2019. Trip longitude and latitude data are from November 20, 2018 to March 5, 2019.

**Figure 15 - Origins & Destinations by Census Tract and Trips by Street Segment (Downtown)**[25]
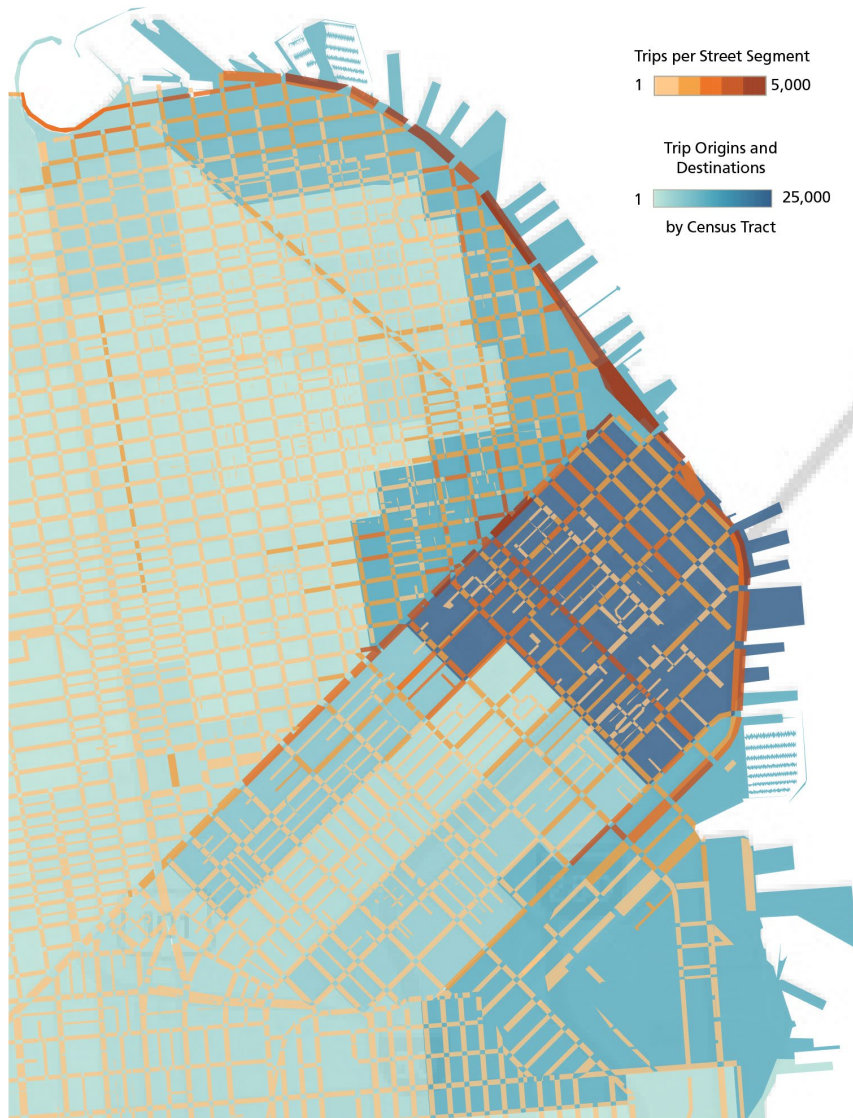
Mode Choice

The SFMTA's analysis of survey results yielded several interesting findings related to mode shift that are consistent with the Agency's goal of making sustainable modes of transportation the most attractive and preferred means of travel. 42 percent of all scooter user survey respondents indicated that they would have taken an automobile mode on their last trip had a scooter not been available, as shown in Figure 16. The vast majority of those users would have taken ride-hailing Uber or Lyft (36 out of 42 percentage points).

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[25] Trip origin and destination data are from November 20, 2018 to March 5, 2019. Trip longitude and latitude data are from November 20, 2018 to March 5, 2019.

**Figure 16 – Mode Choice Had Scooter Not Been Available**
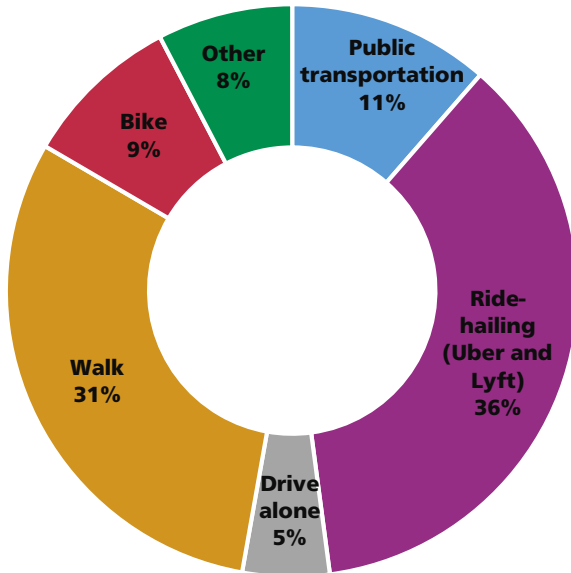
The top three reasons for shifting to a scooter away from an automobile mode were convenience, affordability, and speed, as shown in Figure 17. The top three reasons for shifting to a scooter from a non-automobile mode were convenience, speed, and fun, as shown in Figure 18.

Figure 17 - Top 3 Reasons for Switching from Auto Mode to Scooter
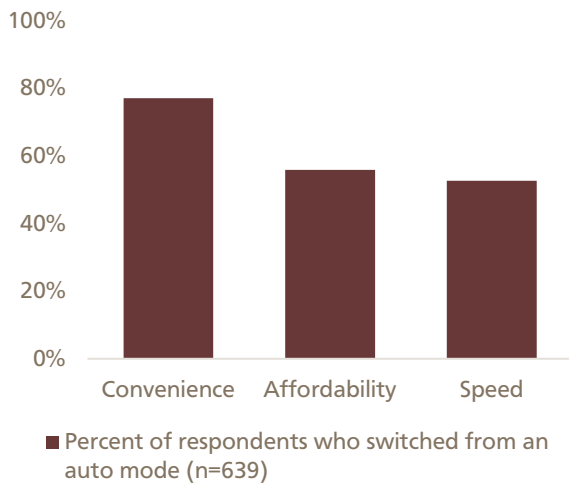
Figure 18 - Top 3 Reasons for Switching from Non-Auto Mode to Scooter
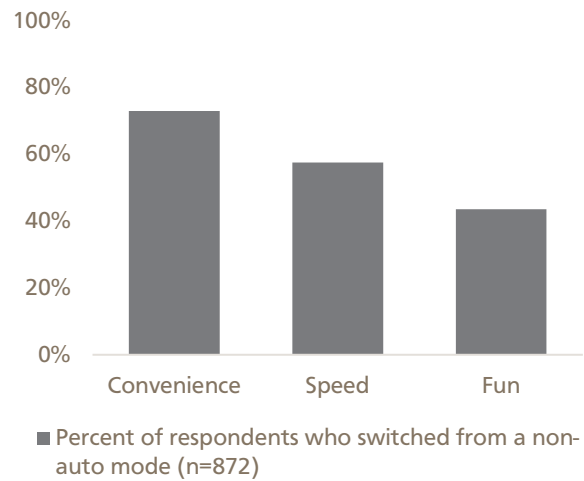
Connections with Transit

On their last trip, 34% of survey respondents used the service to get to or from public transportation. Nearly 28% of respondents would not have taken transit if a scooter was not available, but used the service to connect to transit. 7% of respondents would have taken transit had a scooter not been available, and did not use the service to connect to transit. On their own, these data show that scooters induce transit trips at roughly 4 times the rate that they replace transit trips, indicating that they could complement transit by serving as a valuable last mile connection.

Evaluation Report Card

Each permittee's performance at the mid-point of the Pilot is summarized, by Guiding Principle, in Figure 19. The rationale behind each rating can be found following the table.

Figure 19 – Evaluation Report Card

		Scoot	Skip
Safety	Permittees' operations must be consistent with the City's goal for achieving Vision Zero and ensuring public safety and security. State law establishes legal requirements to ensure the safe use of electric scooters in the public right-of-way, and the following complaints received during the unpermitted deployment of Scooters in spring 2018 should be directly addressed by permittees: illegal and unsafe riding on the sidewalk, unsafe riding without a helmet, use by minors including illegal use of scooters by individuals without a driver's license, and illegally riding a scooter with a passenger.	F	F
Disabled Access	California Vehicle Code Section 21235 prohibits motorized scooters and other objects from blocking pedestrian paths on the sidewalk, and Section 63 of the San Francisco Police Code generally prohibits the obstruction of sidewalks. Strategies to ensure properly parked scooters, including locking or tethering, should result in parking that does not block the right of way.	S	S
Equitable Access	Permittees' approach to providing service to low-income residents, including diverse payment options and fare discounts, should reduce barriers to participation. Permittees' programs must be available to all, including groups who have historically lacked access to mobility benefits. Service must be available in diverse geographic areas and that service is available to low-income residents through discount programs and varied payment options.	P	P
Collaboration/ Outreach	Permittees must undertake robust community outreach to ensure that any scooter services reflect community feedback and target a diverse set of users. Outreach approaches must include strategies to ensure that low income residents are aware of service and how to participate.	F	F
Labor	Permittees must ensure service reliability by understanding operational needs and adjusting resources as necessary. Scooter share operators should support San Francisco's local hire principles, and promote equitable job training opportunities. A trained and motivated workforce is necessary to ensure the safe and reliable operation of scooter share services.	S	F
Sustainability	Permittees must support sustainability, including helping to meet the City's greenhouse gas (GHG) emissions reduction goals, promote use of all non-auto modes, and support efforts to increase the resiliency of the transportation system. Approaches to operations and disposal should demonstrate commitment to environmental sustainability.	S	F
Transit	Permittees must support, rather than compete with public transit services, and must account for the operational needs of public transit and encourage use of high-occupancy modes	S	S
Accountability/ Compliance	Permittees must share relevant data so that the City and the public can effectively evaluate the powered scooter share systems' benefits to and impacts on the transportation system. Permittees must also comply with all terms of the scooter share permit.	S	F

Rating Definitions

S — **STRONG** ratings were given in areas where permittees performed particularly well. Permittees with strong ratings substantially exceeded the minimum program requirements as spelled out in the permit Terms & Conditions and/or communicated by the SFMTA.

F — **FAIR** ratings were given in areas where permittees performed adequately but unexceptionally. A fair rating demonstrates a moderate level of commitment and ability to solving known challenges and concerns, and meeting or somewhat exceeding the minimum program requirements as spelled out in the permit Terms & Conditions and/or communicated by the SFMTA.

P — **POOR** ratings were given to permittees whose performance in a given area requires significant attention and improvement for the remainder of the Pilot. Permittees were given a poor rating for demonstrating a low level of commitment and ability to solving known challenges and concerns. Failing to meet the bare minimum program requirements as spelled out in the permit Terms & Conditions and/or communicated by the SFMTA also resulted in a poor rating.

Safety

Company-reported collision rates have generally been low on a per-trip and per-VMT basis, and absolute numbers of injuries have decreased compared with the unpermitted scooter deployment of spring 2018. However, injury trends should continue to be closely monitored, especially as additional trauma data become available. Helmet use remains a significant area for improvement—only 12% of users who reported a collision to either operator indicated they were wearing a helmet. Permittees must continue to stress the importance of wearing helmets despite changes to State law, and Scoot in particular should continue to investigate the feasibility of including a helmet with every rental as proposed in their application. Because powered shared scooters also represent a new transportation mode that requires physical dexterity and raises safety concerns, robust rider education is especially important. Additionally, to encourage accurate reporting, permittees should improve communications toward riders regarding the steps to take when involved in a collision. Finally, Skip must implement improved rider accountability measures to ensure that complaints about unsafe rider behavior such as sidewalk riding are adequately addressed. Given reported injuries to people walking, additional education on where it is legal to ride is important to emphasize moving forward.

Disabled Access

Both permittees followed through on their proposals to introduce a locking mechanism, and 100% of both fleets had locking capabilities by February 2019. This has led to a significant drop in complaints of blocked sidewalks and citations for improper parking.

Equitable Access

Low-income plan participation remains very low, and more robust equity engagement is needed to ensure powered scooter share programs effectively serve historically disadvantaged communities, especially low-income individuals. While both companies have maintained at least 20% of their fleets in Communities of Concern, Skip must continue to ensure that its equitable access goal of maintaining 20% of its fleet in southeastern San Francisco is consistently achieved daily. Scoot deployed a fleet size much smaller than the permitted 625 during the first four months of the Pilot, with commensurate low ridership numbers. Scoot must work to deploy an adequate fleet to service their entire service area, including Communities of Concern. Finally, both permittees should work to ensure that scooters are available and utilized beyond the downtown core.

Collaboration/Outreach

Emerging Mobility Services and Technology providers and the City must engage and collaborate with each other and the community to improve the City and its transportation system. Both companies have demonstrated a commitment to working with the SFMTA to meet this goal, and have demonstrated general compliance with the Agency's community engagement expectations and guidelines. However, continued outreach is necessary to ensure that underrepresented communities are aware of these services and how to participate, including additional outreach in languages such as Spanish, Chinese, and Filipino.

Scoot has followed through on their outreach commitments and generally had success building partnerships in Communities of Concern such as the Bayview. Additionally, Scoot's engagement strategy includes understanding the needs of diverse communities, including those who choose not to use scooter services. However, usage by historically underserved communities remains low.

Skip has cultivated relationships with bike and walk advocacy groups, and developed partnerships with some Community Benefit Organizations. However, Skip's outreach in areas such as the Bayview and Excelsior has not resulted in increased adoption and usage in these areas.

Continued outreach is necessary by both permittees to identify and address barriers towards adoption in San Francisco's diverse communities, particularly with respect to age, gender, income level, and race.

Labor

Permittees should support San Francisco's local hire principles, promote equitable job training opportunities, and maximize procurement of goods and services from disadvantaged business enterprises. Scoot in particular has focused on hiring local and pays its operations staff—100% of which are company employees—a living wage. Skip has exceeded its goal of making 15% of chargers W-2 employees. However, Skip has not yet fostered the creation of an independent businesses pipeline for contractors as proposed, and some members of the public have expressed concerns about the independent contractor business model.

Sustainability

Scoot has demonstrated a commitment to sustainable operations through its moped/electric vehicle-based recharging and tracking/reporting of VMT associated with charging and rebalancing. While Skip has reported non-revenue VMT for company-owned vehicles, Skip's reluctance to track Vehicle Miles Traveled associated with independent contractor rebalancing makes it difficult for the SFMTA to evaluate the full environmental and congestion impacts of its service.

Neither Scoot nor Skip has disposed of batteries to date.

Transit

Powered scooter share must support, rather than compete with, public transit services. Results from the user survey are encouraging—34% of survey respondents used the service to get to or from public transportation, and nearly 28% of respondents would not have taken transit if a scooter was not available, but used the service to connect to transit. Responses were similar for both permittees; these data indicate that scooters generally complement transit by serving as a valuable last mile connection.

Accountability/Compliance

Scoot and Skip are both compliant with the terms and conditions of the permit at the Pilot's midpoint. Both permittees have submitted monthly reports in a timely manner. Additionally, each operator has demonstrated a good faith effort toward implementing SFMTA's Emerging Mobility API. While both companies have not fully implemented all application proposals, Skip has significant progress to make towards realizing their proposals. The SFMTA will continue to monitor each permittee for the remainder of the Pilot.

3 Month Compliance Reports

The Powered Scooter Share Permit Terms and Conditions require permittees to provide compliance reports to the SFMTA at 3 months from permit issuance documenting the permittee's implementation of the plans proposed in their application. SFMTA staff compiled a list of proposals from each permittee's application and asked the permittees to provide updates.

Companies were generally in compliance with proposals submitted in their applications. Exceptions include the following:

- Scoot:
    - o Scoot proposed installing onboard helmet boxes in their application. Scoot continues to look at options for including a helmet on the vehicle, however there is no plan to roll out a scooter with helmet box attached in the near future.
    - o Scoot has not yet created a frequent rider plan for kick scooters similar to the plan available for their moped program.
- Skip:
    - o Skip is still in talks with CashStar about forming a partnership to facilitate cash payments.
    - o Skip's creation of a Community Advisory Board is still in progress.

A complete copy of each permittee's 3 Month Compliance Reports can be found in Appendix C.

Appendix E

SFMTA Stationless Bikeshare Mid-Pilot Evaluation

Stationless Bikeshare Mid-Pilot Evaluation

Executive Summary

This document provides an interim evaluation of the SFMTA's Stationless Bikeshare Pilot Program, approximately 9 months after the start of the 18-month pilot period. The evaluation shows that the JUMP bikeshare system is generally performing well and complies with the terms and conditions set forth by the SFMTA. The evaluation also identifies several potential improvements. Based on this evaluation, the SFMTA recommends expanding the maximum fleet size for JUMP to 500 bikes for the duration of the 18-month pilot period. The SFMTA will complete its full evaluation of the pilot program in spring 2019, including recommendations for if and how to permanently permit the operation of stationless bikeshare in San Francisco.

This evaluation covers four primary topic areas, based on the stationless bikeshare permit terms and conditions as well as San Francisco's Guiding Principles for Emerging Mobility:

1. Compliance with permit terms and conditions;
2. System usage, trip details, ridership, and service provision;
3. Public feedback and public engagement; and
4. Equity.

Key Findings

- Demand for stationless, shared e-bikes is high.
- Stationless bikeshare complements the City's station-based bikeshare system, with different trip lengths, origins, and destinations.
- The lock-to design addresses major issues with sidewalk clearance.
- Stationless bikeshare leads to an increased demand for bike parking.
- Rebalancing guidelines for general redistribution and geographic equity should be improved.
- More robust equity engagement is needed to ensure stationless bikeshare effectively serves historically disadvantaged communities.
- Stationless bikeshare systems can serve the public interest when properly regulated.

Recommendations and Next Steps

- Continue the Pilot Program for further evaluation and expand the number of permitted stationless bikes to 500, contingent upon full compliance with all permit terms and conditions.
- Implementing the Emerging Mobility Data Specification and Application Programming Interface.
- Defining bike availability metrics for individual Communities of Concerns.
- Complete the final pilot evaluation by March 31, 2019, including recommendations for if and how to permanently permit stationless bikeshare in San Francisco.

Background and Policy Framework

San Francisco's first bikeshare system, Bay Area Bike Share, launched in August 2013 with 350 bikes and 35 stations in San Francisco. In 2015, the San Francisco Board of Supervisors unanimously approved legislation to join a regional bikeshare program managed by the Metropolitan Transportation Commission and operated by Motivate. The expanded system launched as Ford GoBike in June 2017, and will provide more than 320 stations and 4,500 bikes in San Francisco at full expansion. Currently, there are approximately 134 stations and 1,200 bicycles in service in San Francisco, with a mix of electric-assist and standard pedal bikes.

Even as the expansion of Ford GoBike continues, the stationless bikeshare systems emerged in North America in 2017. San Francisco amended its Transportation Code in March 2017 to include a definition of stationless bikeshare and to develop permit requirements and fees for operation of stationless bikeshare systems. The SFMTA initiated a pilot program permit with Social Bicycles (now doing business as JUMP Bikes) on January 9, 2018, including a Stationless Bikeshare Policy Directive describing the terms of the pilot and summarizing the legal and policy considerations that led to the creation of the pilot..

The pilot period is for 18 months, and expires on July 9, 2018. The SFMTA also has the sole discretion to allow JUMP to expand its operation in the City from 250 to 500 electric bikes (e-bikes) at the mid-point of the pilot (October 9, 2018). The Policy Directive includes guidance for pilot evaluation, which guided the inclusion of the metrics for this nine month mid-Pilot evaluation. The Pilot program provides an opportunity for a thorough evaluation and monitoring of stationless bikeshare expansion in San Francisco.

In addition to the Stationless Bikeshare Policy Directive, several other adopted policies guided the preparation of this evaluation.

Emerging Mobility Guiding Principles

In July 2017, the Transportation Authority (SFCTA) and the SFMTA adopted the following ten Guiding Principles as a framework for evaluating the benefits and impacts of all emerging mobility services and technologies, such as stationless bikeshare, in San Francisco.

1. Collaboration
2. Safety
3. Transit
4. Congestion
5. Sustainability
6. Equitable Access
7. Accountability
8. Labor
9. Disabled Access
10. Financial Impact

The SFMTA uses the Guiding Principles to as a tool to help guide new services and technologies into alignment with city policies while minimizing any potentially detrimental impacts on the city's transportation network. Through evaluations such as this one, these principles help the Agency to assess if and how stationless bikeshare meets city goals. The SFMTA is then able to use its findings to shape future policies, programs, and actions.

Transit First Policy

The SFMTA Transit First Policy prioritizes pedestrians, bicyclists, and public transit, and strives to reduce traffic and improve public health and safety. Bikeshare contributes to this goal by providing a first/last mile connection to public transit and by lowering barriers to bicycling.

2018 SFMTA Strategic Plan

The 2018 Strategic Plan establishes SFMTA's vision for a city of excellent transportation choices, with a mission to connect San Francisco through a safe, equitable, and sustainable transportation system. The plan sets forth four goals; bikeshare helps move the City closer to achieving three of these goals:

- **Goal 1**: Create a safer transportation experience for everyone;
- **Goal 2**: Make transit and other sustainable modes of transportation the most attractive and preferred means of travel; and
- **Goal 3**: Improve the quality of life and environment in San Francisco and for the region.

Bikeshare increases the attractiveness of sustainable modes and improves mobility and quality of life in San Francisco. Additionally, the Strategic Plan's Objective 3.1 commits the SFMTA to *use Agency programs and policies to advance San Francisco's commitment to equity*.

Evaluation

This pilot evaluation covers the following topics drawn from the policies described in the previous section:

1. **Accountability**: Under the pilot program, permittees must share relevant data so that the City and the public can effectively evaluate the bikeshare system's benefits to and impacts on the transportation system;
2. **Equity**: Bikes must be made available in disadvantaged communities, and memberships must be affordable to people with low incomes;
3. **Disabled Access**: The public right-of-way must be maintained in a way that doesn't allow stationless bikes to be a nuisance (i.e. blocking paths of travel or cluttering sidewalks);
4. **Safety**: The pilot program must be consistent with the City's goal for achieving Vision Zero and ensuring public safety and security; and
5. **Collaboration**: Emerging Mobility Services and Technology providers and the City must engage and collaborate with each other and the community to improve the city and its transportation system.

Consistent with the themes described above, the SFMTA used the following evaluation metrics for this report:

- Permit compliance;
- Ridership and demand;
- Trip locations, duration, and length;
- Bike availability;
- Disabled access;
- Public engagement;
- Public feedback; and
- Equity and low-income usage.

The following sections summarize the findings for each of these metrics.

Permit Compliance

To date, JUMP has fulfilled all permit terms and conditions with one exception. The permit requires that "*The emblem of the Stationless Bicycle Share Operator and a unique identifier are prominently displayed on both sides of Stationless Shared Bicycle.*" JUMP is only partially in compliance with this term. Some bikes currently display a unique identifier on the rear fender of the bike, others on the fender and both sides, and others on the fender and one side as shown in Figure 1.

The SFMTA instructed JUMP to add unique identifiers to all bikes to be consistent with the requirement, and JUMP is in the process of adding these unique identifiers to all bikes.

Figure 1. Photos Showing JUMP's Unique Identifiers

Ridership

Ridership data rely on monthly reports from JUMP bikes. Some sections use data from selected months, but not all months from January to August were included due to the lag in data processing. For future evaluations, the agency must have full access to trip data and other regular reporting requirements.

Unique Users

JUMP identified 38,000 unique users in San Francisco as of August 2018. The number of users is defined as the total number of unique accounts. Following JUMP's acquisition by the ride share Transportation Network Company Uber in August 2018, Uber members could check out JUMP bikes in the Uber app under the name Uber Bike. JUMP has not yet provided data on the number of users who have checked out a bike from this app.

Demand

Users have taken 325,000 trips on JUMP bikes since system launch in January through August 2018. The number of trips per month continues to increase each month, despite a fixed cap on the number of bikes, as shown in Figure 2.

Figure 2. Monthly Trips Since JUMP Launch
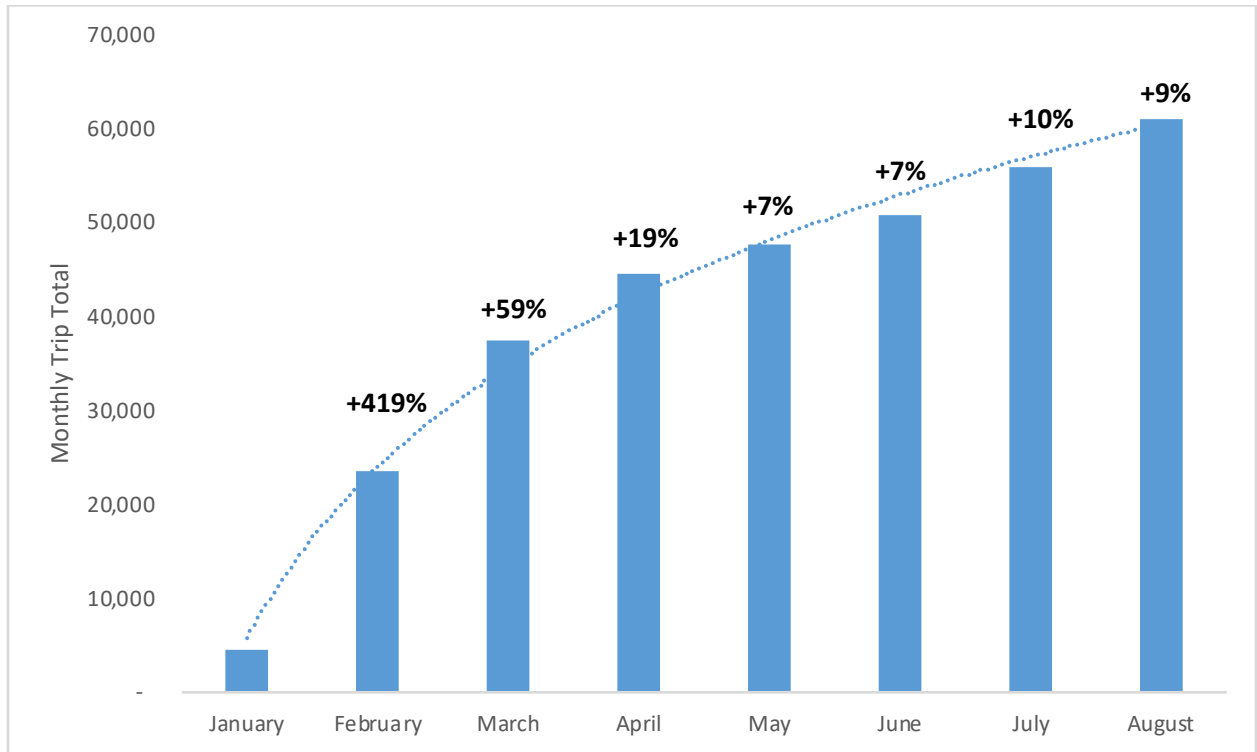
The average number of trips per bike per day (t/b/d) is eight, with some days reaching 10 t/b/d, as shown in Figure 3. Battery constraints, uneven demand throughout the day, and bike rebalancing needs likely limit the number of t/b/d. For reference, in August 2018 GoBike had an average of 1,100 bikes available daily in San Francisco. That month, there were nearly 136,000 GoBike trips in the city, resulting in an average of four t/b/d. GoBike Plus bikes (i.e., e-bikes) had reportedly significantly higher t/b/d than standard GoBikes and had t/b/d numbers comparable to JUMP bikes.

Figure 3. JUMP Trips per Bike per Day
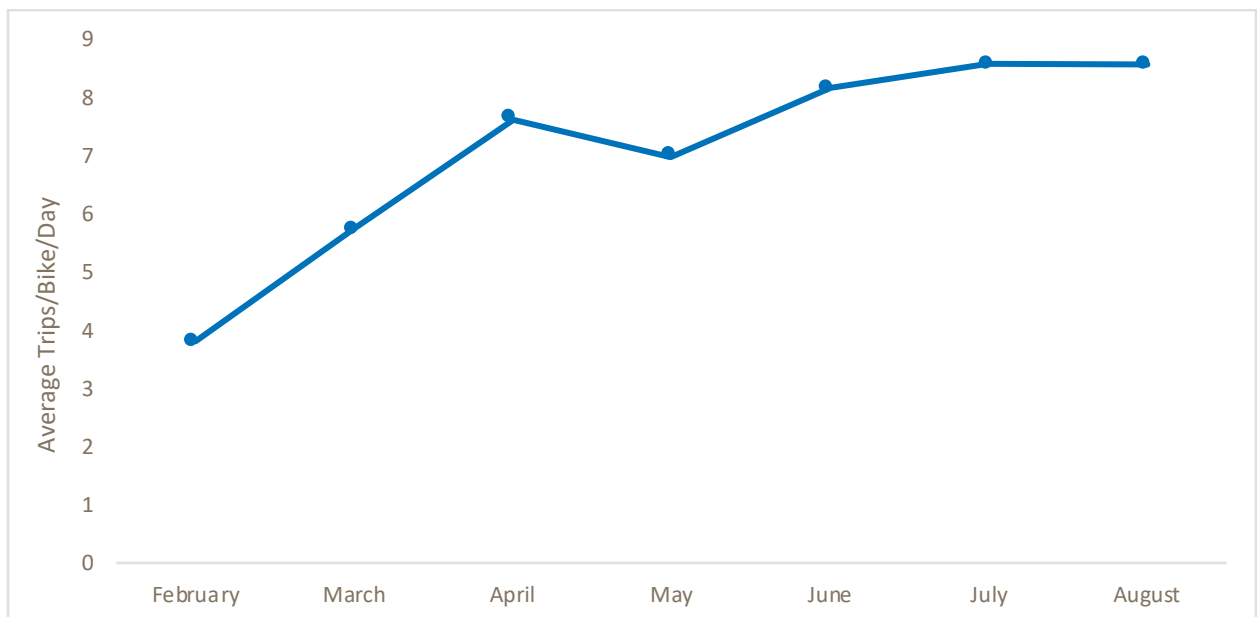
Trips by Corridor

Trips taken on JUMP bikes occur across the city, beyond both the JUMP service area and the GoBike service area. Predictably, JUMP bike use is similar to general bike usage, primarily on the established bike network—on Market Street, Howard Street, Folsom Street, Townsend Street, the Wiggle, Valencia Street, 5th Street, 17th Street, the Embarcadero, and Polk Street. Many JUMP trips also traverse the Presidio and Golden Gate Park, which are outside of the SFMTA's jurisdiction. Figure 4 shows paths & street segments that had more than 500 trips between January and May 2018. Figure 5 shows JUMP's aggregated trip routes across the city street grid and bicycle paths during the same period.

Figure 4. JUMP Trips by Corridor
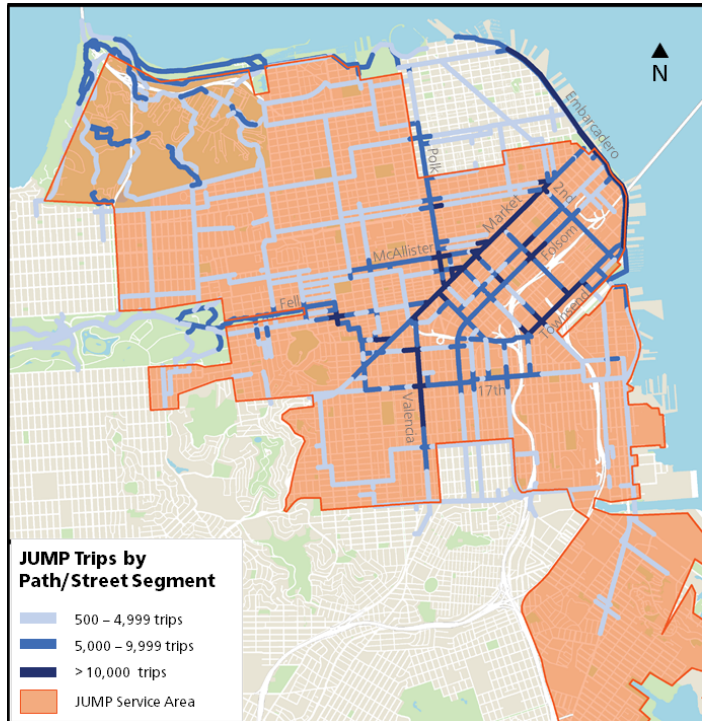
Note: Street segments with fewer than 500 JUMP trips during the January – May period are not shown.

**Figure 5. JUMP Trips and Bike Share Service Areas**

Trip Duration and Length

The average JUMP bike trip duration for the most recent month available was 27 minutes, while the median trip time was 14 minutes, as shown in Figure 6. Fewer than 10 percent of trips were longer than one hour, while over 90 percent of JUMP trips were shorter than one hour.[1] The average JUMP bike trip is 2.6 miles, while the median trip distance is two miles (Figure 7).

Figure 6. JUMP Trips by Duration
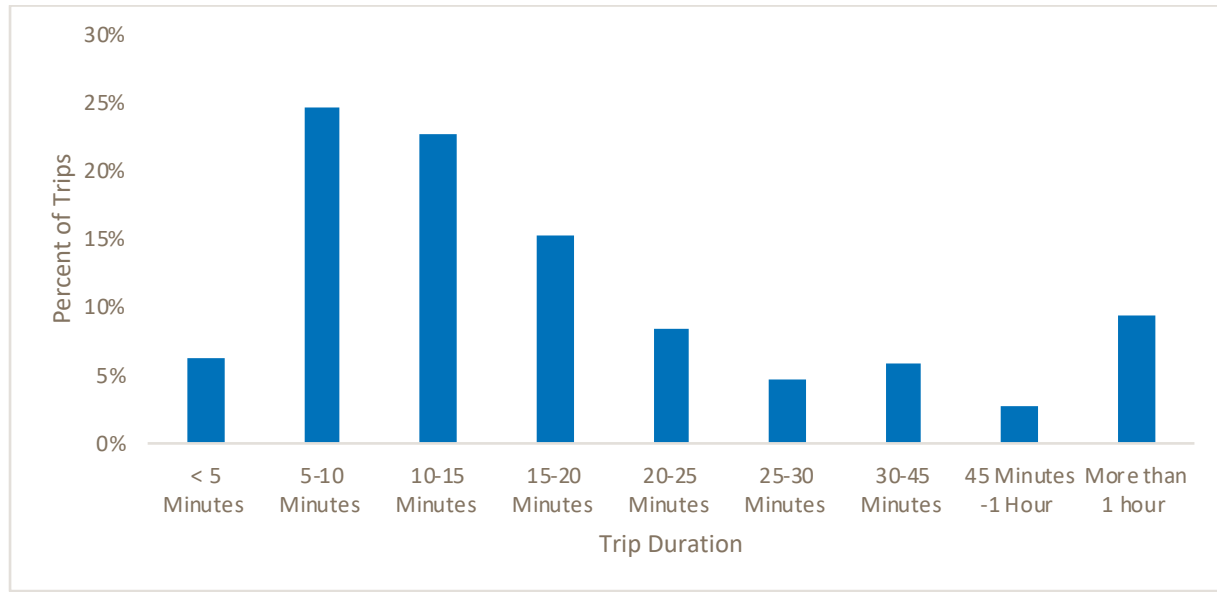
Note: Data are from a representative sample from August 1-31st, 2018 (n=60,914)

Figure 7. JUMP Trips by Length
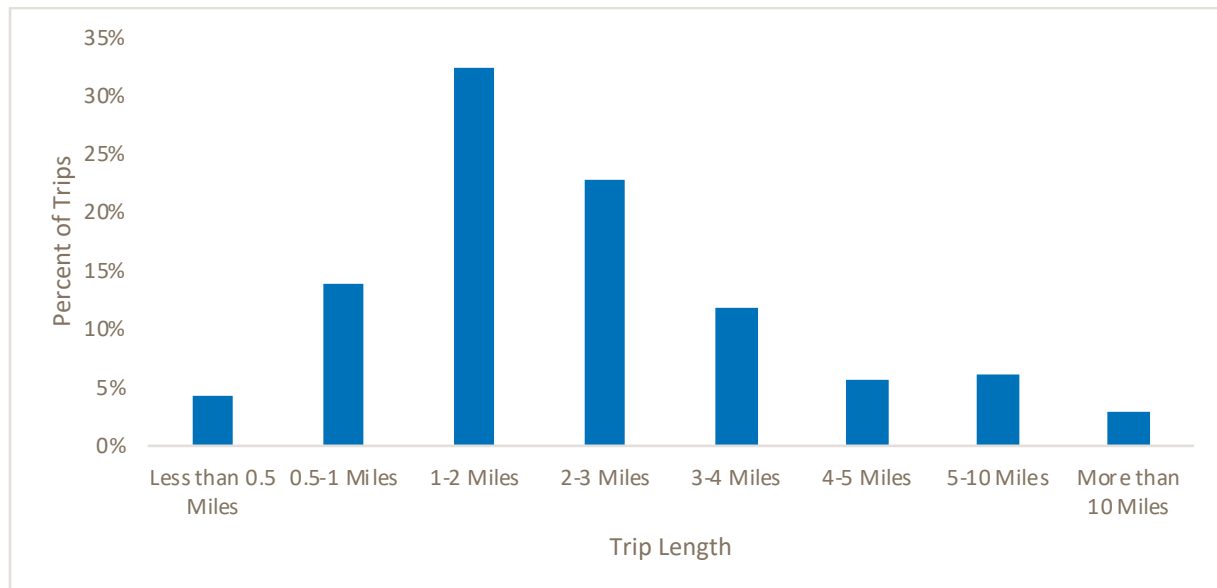
Note: Data are from a representative sample from August 1-31st, 2018 (n=60,914)

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[1] This information is from a representative sample of JUMP data for August 1-31st, 2018. Because JUMP provided the SFMTA with limited data for other periods of the Pilot, this was the only month for which these detailed calculations could be made.

Bike Availability

In October 2018, the JUMP service area included some or all of the Castro, the Mission, Potrero Hill, SoMa, Hunters Point, Bayview, Pacific Heights, the Haight, and Inner Richmond neighborhoods. In September 2018, JUMP also expanded its service area to include the Presidio through a separate permit under the Presidio Trust jurisdiction. The service area may be modified again commensurate with any increase to the number of permitted bicycles.

During the most recent month of available data (August 2018), an average of 230 JUMP bikes were available in San Francisco each day. Under the current terms and conditions of the permit, JUMP may only operate up to 250 bikes throughout the city (excluding the Presidio, where JUMP has an agreement to operate 50 bikes). The current service area—including Communities of Concern served—is shown in Figure 8.

The stationless bikeshare permit requires JUMP to maintain an availability of three bikes per square-mile. Without designating which square-mile areas needed to have three bikes, this evaluation used an aggregate metric. With a roughly 10 square-mile service area, as long as JUMP maintained 30 available bikes, they satisfied this requirement. However, bikes are often scarce in parts of the service area depending on the time of day and day of the week.

The permit also required at least 20% of all bicycle availability to be maintained within Communities of Concern as designated by the MTC. In a sampling of bike availability on a weekday in August, JUMP demonstrated compliance with this term by maintaining 21% of total bike availability in Communities of Concern. The **Opportunities for Improvement** and **Equity** sections provide further review for metrics related to bike availability for the total system and in Communities of Concern.

The SFMTA's forthcoming Emerging Mobility Application Programming Interface (API) will provide accurate and timely available bike statistics. This will allow the Agency to monitor availability in the service area at hourly intervals. The data will be accessible in real time, allowing the SFMTA to directly monitor compliance.

Figure 8. Current JUMP Service Areas and Communities of Concern
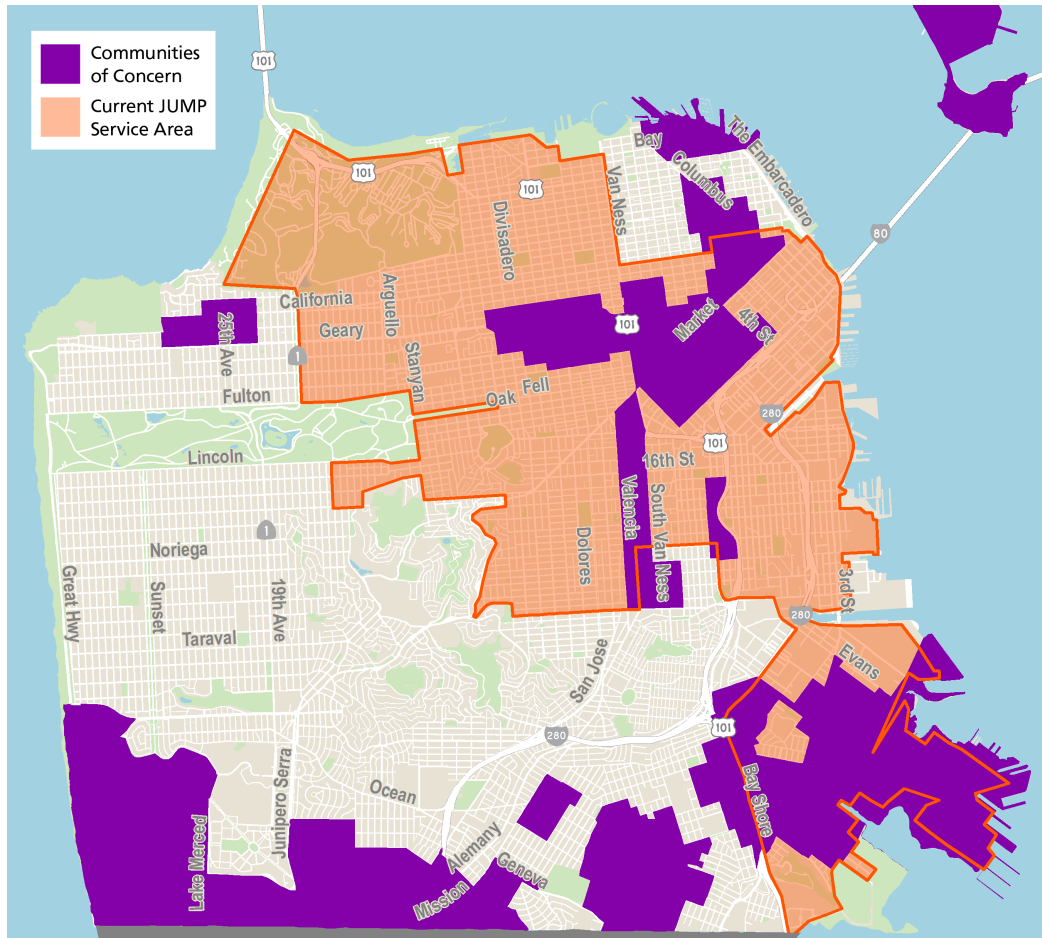
Disabled Access

Improperly parked stationless bikes have the potential to block the public right of way and accessible path of travel. JUMP's lock-to system encourages locking devices to bike racks, reducing the likelihood of improper bike parking. JUMP specifically instructs its customers not to park bikes next to curb cuts, in pedestrian pathways, or immediately adjacent to another JUMP bike. Between January and May, the SFMTA received 10 complaints of improperly parked JUMP bikes blocking the public right of way or accessible path of travel. However, since June the SFMTA has not received any additional complaints of this manner.

Incident Reports and Collisions

JUMP provided the SFMTA with incident reports filed by users between January and August 2018. During this period there were 15 incidents with a reported injury, of which three were reported to police.[2] Eight incidents involved a third party and four resulted in property damage. No fatalities were reported on the JUMP system. Data collected by JUMP allows the agency to cross check injuries and ensure the safety of the system. As part of SFMTA's Vison Zero, these incidents will be cross-checked with statewide traffic injury databases and admissions to San Francisco General Hospital.

Public Engagement

At the time of this evaluation, JUMP had hosted or attended 32 community events in San Francisco. Examples of these events include Vision Zero meetings, Sunday Streets, San Francisco Bike Coalition events, and YMCA Urban Services Ride Along and Training. JUMP also participated in 53 stakeholder meetings, some including Board of Supervisors, the Mayor's office, SFMTA workshops, and other city departments. JUMP surpassed the minimum requirement of offering two safety classes. Classes were offered in partnership with the San Francisco Bike Coalition on June 28, August 21, and September 15, 2018. At those classes, the Boost low-income membership plan was also advertised.

Public Feedback

The SFMTA has received 90 complaints about the JUMP system and 14 expressions of support during the pilot period. These totals include emails to the Agency and complaints submitted through the City's 311 system. The most common complaints pertained to blocked public right-of-way and abandoned bikes, while the most common expression of support was to request removal of the 250 bike cap.

In general, the number of complaints received per month has diminished significantly since the start of the Pilot. For the period from January through March, the SFMTA received an average of nine complaints per month. The Agency received 11 complaints per month during February, March, and April. During the June through August period, the number of complaints received by the SFMTA had significantly decreased to an average of two per month.

Additionally, a petition with over 850 signatures authored by the bikeshare advocacy group OurBikes.com expressed support for removing any kind of cap for the total number of JUMP bikes.

BOOST Low-Income Plan

226 customers registered with the Boost low-income membership plan, as of September 2018. The membership provides qualifying members with 60 minutes of daily ride time for $5 per year. JUMP reported that Boost members take an average of 6.5 trips per week compared to 2.5 trips per week for users who pay per rider. In August 2018, the most recent month with available data, Boost rides accounted for 2.5% of all trips. There were nearly 1,500 trips taken by Boost members in August; since system launch Boost members have taken over 10,000 rides.

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[2] JUMP does not collect data on injury severity.

Opportunities for Improvement

The SFMTA finds that the Stationless Bikeshare Pilot Program is performing well. Nonetheless, this evaluation identified potential opportunities for improvement, as described below. These observations will factor into the final pilot evaluation, and could result in amendments to the Transportation Code and/or modifications to terms and conditions for future permit programs.

Equity

The SFMTA identified the following ways to ensure more equitable access to the JUMP system.

1. The permit requires that 20% of bikes be available in Communities of Concern. In practice, this does not ensure equitable access across different communities. Observation suggests that Hunters Point and the Bayview have notably less access to JUMP bikes than neighborhoods like SoMa, the Tenderloin, and the Western Addition. Stationless bikeshare program requirements should be modified to ensure regular access to all Communities of Concern.

2. Limited effort was made to advertise and promote the low-income stationless bikeshare program, or to generally advertise the service in low-income areas. More outreach should be conducted regarding the low-income plan. The number of Boost members is small compared to the total number of unique members. JUMP should market the program in the JUMP (and Uber) apps and provide in-app eligibility verification for the Boost program.

3. JUMP conducted some outreach to promote its system. Targeted outreach for the Boost program, and a directed equity plan should address community needs beyond service provision. Some community stakeholders expressed an inconsistent effort in developing a Memorandum of Understanding about how business models and operations of a private enterprise could support neighborhood stakeholder needs of the most vulnerable communities to be socially responsible and empowering.

4. The SFMTA cannot determine if trips that begin or end in Communities of Concern were taken by disadvantaged individuals. Although 55% of trips start or end in Communities of Concern, there is no way to determine if those trips are serving residents of those communities. Once the SFMTA's Emerging Mobility API is operational, staff will be able to determine how many of these trips belong to Boost members.

Bike Parking Demand

Lock-to stationless bikeshare systems encourage more orderly parking; they also increase demand for bike rack parking. Bike rack demand will be further increased by other shared dockless mobility options, such as electric shared scooters. More bike racks are needed to meet this demand.

Recommendations and Next Steps

- *Continue monitoring the pilot program.* At the midpoint, the Pilot demonstrates strong demand for stationless e-bikes in San Francisco. The SFMTA analysis shows that the program supports Agency policies and goals.

- *Expand the number of bikes allowed in the stationless bikeshare pilot to 500, contingent upon full compliance with all permit terms and conditions.* Stationless bikeshare has enhanced the mobility of people in San Francisco, warranting an expansion for the remainder of the pilot period. This expansion is strictly contingent upon the following:

  o Expanding outreach and advertising of the Boost membership. This includes adding an option to sign up for the Boost program in the JUMP app;
  o Working with the SFMTA to implement the Emerging Mobility API (discussed in more detail below); and
  o Adding unique identifying numbers on both sides of JUMP bikes.

- *Complete user survey.* The SFMTA will finalize its annual Emerging Mobility user survey, which JUMP will distribute to members. This will facilitate an analysis of program usage across different demographic groups. Furthermore, the survey will help determine the degree to which JUMP is helping the SFMTA meet its strategic goals.

- *Implement the Emerging Mobility Data Specification and API.* The agency will require agreement to all data and API specifications. This data sharing system should be in place for the majority of the second half of the 18-month pilot period. Analysis will inform any changes to the Transportation Code or permanent permit program terms and conditions.

- *The SFMTA should define more specific metrics for general and equitable bike availability.* Current requirements fail to create reliable distribution for the overall service area, nor in communities of concern. The SFMTA should prescribe areas where bikes need to be regularly available—for example near transit hubs and larger trip generators.

- *Complete pilot evaluation and continue compliance monitoring.* The SFMTA will continue to ensure permit compliance. It will also continue to research and evaluate how system usage changes with an expanded number of bikes. The Agency will also monitor how these suggestions are incorporated for the duration of the Pilot. The SFMTA will complete a full evaluation of the pilot program in spring 2019. This evaluation will include, but not be limited to, the following topics:

  o Use of existing bikeshare systems to identify geographic and/or demographic gaps where stationless bikeshare should be promoted;
  o Impact of stationless bike share on the public right-of-way, including maintaining accessible pedestrian paths of travel, as well as the enforcement/maintenance burden on City staff; and
  o The degree to which JUMP addresses the opportunities for improvement and recommendations identified in this report during the second half of the Pilot.

JUMP's permit conditions require that the company provide data to SFMTA sufficient for this final evaluation. The evaluation will be documented and will result in policy recommendations for stationless bikeshare operations going forward, including amendments to the Transportation Code if necessary. This includes if and how to permanently permit stationless bikeshare in San Francisco.