ANNUAL PERFORMANCE REPORT

2017

BIXI Montreal

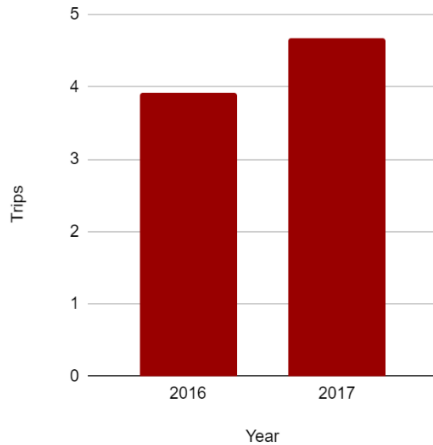20178 Bixby Ave
Montreal, H1Z 1K1

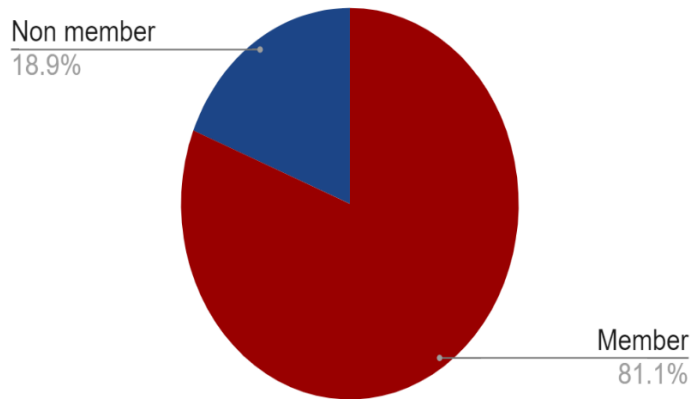(514) 555-1274
bixi@company.org

Performance Comparison 2016-2017

The number of riders has increased by nearly 20% this year compared to 2016, and we have seen a large number of non-members using BIXI stations as well.
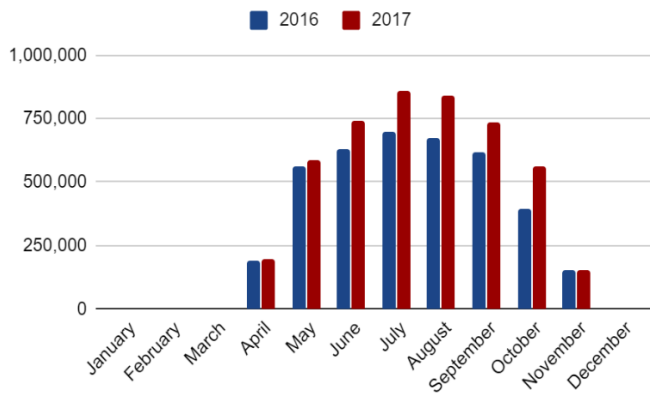

Trips (millions) both years

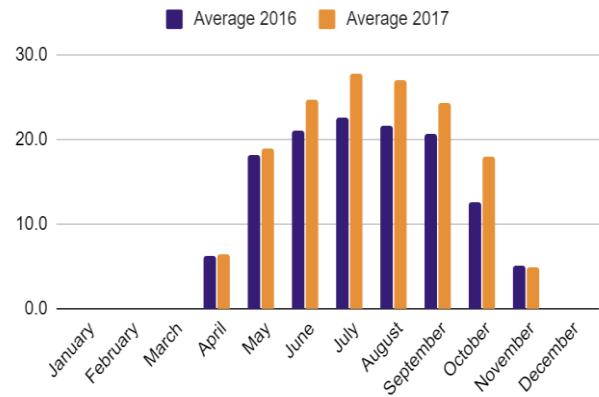Ridership between members and non-members 2017

Additionally, we see as with other years that summertime sees the highest ridership throughout the year, and that 2017 saw much higher average trips per day for almost every month:

Total Trips in 2016 & 2017

Average trips per day per month (in thousands)

As of now, ridership only seems to be increasing, most notable so during the summer. Therefore, it is my suggestion that the company apply the promotion geared towards non-members during the summer months in particular. This has the potential to increase membership, as detailed in the next section.
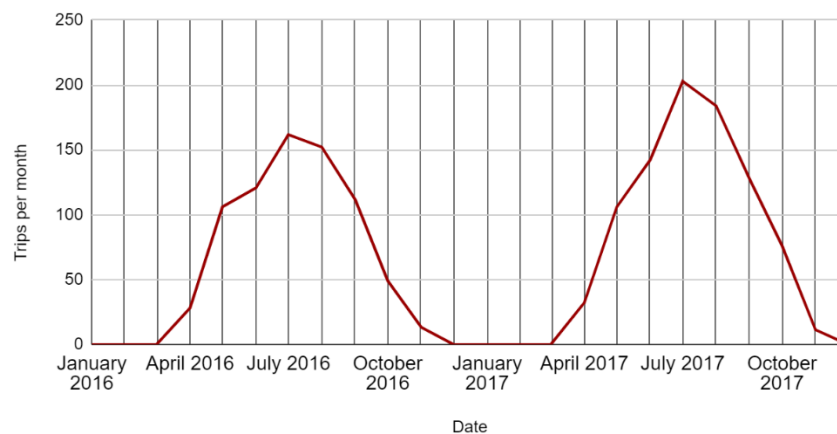
Membership

Membership numbers are up from 2016 as detailed earlier, however there seems to be a noticeable number of non-members that use the program during the summer:

Percentage of membership holder trips
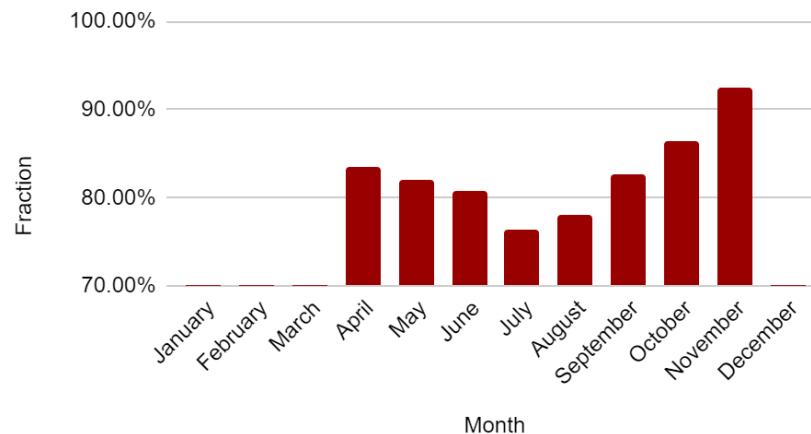
Non-member ridership 2016-2017 (thousands)

During the summer months when tourism is high, demand for BIXI bikes is at its peak, which may be attributed to tourists, or by locals who use this chance to explore during the agreeable weather. This time (June through august) is the optimal time to apply the promotion in order to convert non-members, as the demand by non-members surges during this time.

Bike Distribution

There have been a small number of complaints that more popular stations seem to lack bikes during peak hours of the day. Below our analytics team have found which stations see the most use. The 5 most popular starting and stopping stations have been provided.

Top 5 starting stations		Top 5 ending stations	
Station Name	Trips	Station Name	Trips
Mackay / de Maisonneuve	97,150	Berri / de Maisonneuve	103,720
Métro Mont-Royal (Rivard / du Mont-Royal)	81,279	Mackay / de Maisonneuve	99,128
Métro Place-des-Arts (de Maisonneuve / de Bleury)	78,848	Métro Place-des-Arts (de Maisonneuve / de Bleury)	95,343
Métro Laurier (Rivard / Laurier)	76,813	Métro St-Laurent (de Maisonneuve / St-Laurent)	86,886
Métro Peel (de Maisonneuve / Stanley)	72,298	Métro Peel (de Maisonneuve / Stanley)	76,551

These are the stations that need to be more carefully monitored for bike distribution. In order to see when the stock is needed, an analysis of our most popular station (Mackay / de Maisonneuve) and its usage throughout the day is provided below:

Mackay / de Maisonneuve starts and ends		
Time of day	Number of starts	Number of ends
Morning (7:00-11:00)	17,384	27,351
Afternoon (12:00-16:00)	30,718	30,817
Evening (17:00-21:00)	36,781	31,011
Night (21:00-6:00)	12,267	9,949

As you can see, peak usage in Mackay / Maisonneuve does not begin until the afternoon, meaning users are not utilizing BIXI for the morning commute or rush hour. Rather, it seems to be for shorter trips that last approximately 13 minutes or so. The station is located in downtown in a Concordia university campus and is also in close proximity to many shops and restaurants. This suggests users may simply use the bike service to avoid the gridlock of traffic normally found in downtown areas, and to also explore what the area has to offer.

 Most people don't seem to use the BIXI for the commute as stated earlier. The afternoon sees ridership increase as businesses open and classes start around this time. The peak occurs in the evening, when nightlife begins and the bars and restaurants open. The high number of starts in the evening suggest people begin leaving to other restaurants or bars at this time as they may want to explore. The consistent number of ending stations may be a result of users finding the station a convenient place to leave the bike as the high number of starts leave the racks empty, or that the area is within walking distance of shops. It could also be university students getting from class to class using the bikes.

Round Trips

Round trips make up 2% of all trips. These are usually users who want to quickly explore the city and scout prime locations to visit later. Here are the following stations (with 500 uses or more) with the highest amount of round trip users:
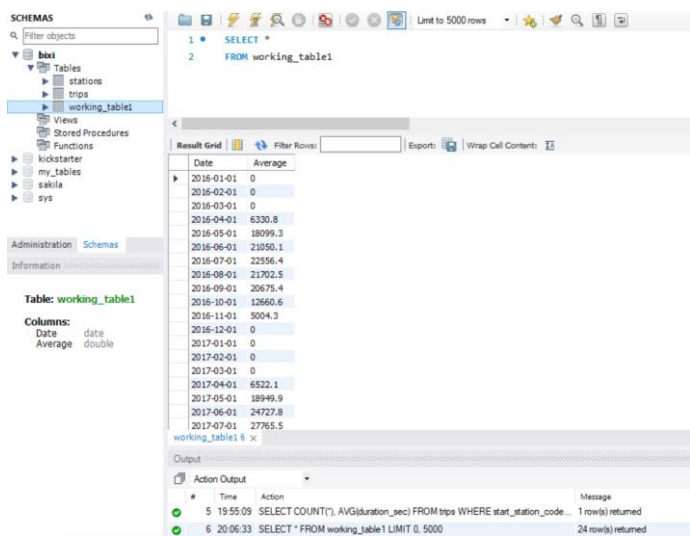
Location	% of round trips
Métro Jean-Drapeau	30.2%
Métro Angrignon	23.3%
Berlioz / de l'Île des Soeurs	20.4%
LaSalle / 4e avenue	20.1%
Basile-Routhier / Gouin	19.3%
Parc Plage	18.5%
Gare Canora	17.9%
LaSalle / Sénécal	14.7%
Casino de Montréal	14.4%
Quai de la navette fluviale	13.8%
de la Commune / Place Jacques-Cartier	11.1%
Jacques-Le Ber / de la Pointe Nord	11.0%
Place du Commerce	10.8%
Collège Édouard-Montpetit	10.0%

The stations with the highest percentage of round trips are near parks or walking trails, nice and relaxing areas to be enjoyed at a leisurely pace. These round trips also tend to last longer than average, around 22 minutes. Plenty of time to enjoy the sights and take in the nature.

Conclusion

BIXI trips are currently on the rise, and our riders seem to be more engaged. We of course need to pay attention to the summer months in order to make the promotion as effective as possible and convert as many members as we can.

Appendix

QUESTION	SQL CODE NEEDED
1.1 # of trips in 2016	```SELECT COUNT(*)
FROM trips
WHERE YEAR(start_date) = 2016```
1.2, # of trips in 2017	```SELECT COUNT(*)
FROM trips
WHERE YEAR(start_date) = 2017```
1.3, # of trips in 2016 broken down by month	```SELECT MONTH(start_date),COUNT(*)
FROM trips
WHERE YEAR(start_date) = 2016
GROUP BY MONTH(start_date)```
1.4, # of trips in 2017 broken down by month	```SELECT MONTH(start_date),COUNT(*)
FROM trips
WHERE YEAR(start_date) = 2017
GROUP BY MONTH(start_date)```
1.5, Average # of trips per day for each month, for all years. (wow)	```SELECT MONTH(start_date), COUNT(*)/(DAY(LAST_DAY(start_date))) AS Average
FROM trips
WHERE YEAR(start_date) = 2016 /*Change to 2017 for 2017*/
GROUP BY MONTH(start_date)```
1.6, Save question 5 results in a table called working_table1	
2.1, # of trips done by members and # of trips don by non members in 2017	```SELECT is_member, COUNT(*)
FROM trips
WHERE YEAR(start_date) = 2017
GROUP BY is_member```
2.2, members/total trips each month.	```SELECT MONTH(start_date), COUNT(*)
FROM trips
WHERE YEAR(start_date) = 2017 AND is_member = 1
GROUP BY MONTH(start_date)

          THEN USE:

SELECT MONTH(start_date), COUNT(*)
FROM trips
WHERE YEAR(start_date) = 2017
GROUP BY MONTH(start_date)``` |

	And divide these 2 tables by each other.
3.1, what time of year does bixi have the most demand?	The summer months, June through september.
3.2, what's the best time to offer non-members a promotion?	When demand by non-members is at its peak. For non-members, there is a strong peak during the summer months of July and August. The beginning of summer (June or July) would be the best. SELECT is_member, MONTH(start_date), COUNT(*) FROM trips WHERE YEAR(start_date) = 2016 /*switch to 2017 for 2017*/ GROUP BY MONTH(start_date), is_member HAVING is_member = 0
4.1, 5 most popular stations? Don't use a subquery for this.	SELECT stations.code, stations.name, COUNT(*) AS num FROM trips JOIN stations ON trips.start_station_code = stations.code GROUP BY stations.code ORDER BY num DESC LIMIT 5 /*Switch to end_station for comparison*/ Took 6.8 seconds to load.

4.2, 5 most popular stations? Use a subquery for this. How much faster did this load?	SELECT frequency.code, stations.name, frequency.frequency
	FROM(
	      SELECT start_station_code AS code, COUNT(*) AS Frequency
	      FROM trips
	      GROUP BY start_station_code
	      ORDER BY Frequency DESC
	      LIMIT 5
	      ) AS Frequency JOIN stations
	ON frequency.code = stations.code
	
	This took 3.4 seconds to load.
	
	/*1ˢᵗ, the table containing the 5 most popular stations (trips table) was generated, then this new shortened table (contained in the parantheses) was joined with the stations table to egt the name of the station.*/
	
	Done in half the time!

5.1, How is the number of starts and ends distributed for the station *Mackay / de Maisonneuve* throughout the day?	SELECT CASE
	      WHEN HOUR(start_date) BETWEEN 7 AND 11 THEN "morning"
	      WHEN HOUR(start_date) BETWEEN 12 AND 16 THEN "afternoon"
	      WHEN HOUR(start_date) BETWEEN 17 AND 21 THEN "evening"
	      ELSE "night"
	      END AS "time_of_day", COUNT(*)
	FROM trips
	WHERE end_station_code = 6100 /*Switch end with start for start station*/
	GROUP BY time_of_day

5.2, Explain the differences you see and discuss why the numbers are the way they are.	This data suggests not many people want to use the bikes at night. The peak occurs in the afternoon and evening, meaning many people don't typically use the bikes to get to work. Most of the commutes happen from 6-9am. There are high variations in the starting station, with a steady rise from morning to evening, while the end station sees a more or less consistent stream of users. The location is a hub of shops and Concordia university. Additionally, trips during the afternoon last ~13 minutes limiting the trips to a 3km radius. While the stream of people entering the city varies, the stream of people arriving hardly varies. This suggests many people come to the station during the morning

	(classes and shops are open) then leave around the evening when everything starts to close or is already closed.
| 6.1, Write a query that counts the number of starting trips per station. | ```
SELECT start_station_code, COUNT(*) AS total
FROM trips
GROUP BY start_station_code
``` |
| 6.2,Write a query that counts, for each station, the number of round trips. | ```
SELECT start_station_code, end_station_code, COUNT(*) AS round
FROM trips
WHERE start_station_code = end_station_code
GROUP BY start_station_code
``` |
| 6.3,Combine the above queries and calculate the fraction of round trips to the total number of starting trips for each station. | ```
SELECT total_trips.start_station_code,
round_trips.round/total_trips.total
FROM
(       SELECT start_station_code, COUNT(*) AS total
        FROM trips
        GROUP BY start_station_code
) AS total_trips JOIN
(
        SELECT start_station_code, end_station_code, COUNT(*) AS
round
        FROM trips
        WHERE start_station_code = end_station_code
        GROUP BY start_station_code
) AS round_trips
ON total_trips.start_station_code = round_trips.start_station_code

/*Combines both queries so that the total trips (from query one) can
be combined with the round trips we are interested in. These are
kept in sperate tables contained in the parantheses*/
``` |
| 6.4, Filter down to stations with at least 500 trips originating from them and having at least 10% of their trips as round trips. | ```
SELECT sum_trip.start_station_code, stations.name, fractions
FROM
(
        SELECT total_trips.start_station_code,
round_trips.round/total_trips.total AS fractions
        FROM
        (       SELECT start_station_code, COUNT(*) AS total
                FROM trips
                GROUP BY start_station_code
        ) AS total_trips

            JOIN

        (
                SELECT start_station_code, end_station_code, COUNT(*)
AS round
                FROM trips
                WHERE start_station_code = end_station_code
                GROUP BY start_station_code
        ) AS round_trips

        ON total_trips.start_station_code =
round_trips.start_station_code
        WHERE total_trips.total>=500 AND
(round_trips.round/total_trips.total)>=0.1
) AS sum_trip JOIN stations
ON sum_trip.start_station_code = stations.code


/*Taking the query form 6.3, I added filters in the form of WHERE
statements to filter it down to stations that had more than 500
trips and had a fraction of more than 10%, then joined it to the
stations table so that the names could be read rather than the
station code.*/
``` |
| 6.5, Where would you expect to find stations | People usually use bikeshare for tourism. Quickly taking in the sites and then moving on to the next for more exploration. Therefore, stations close to parks, beaches or any other nature like trail will see a high number of round trips. |

with a high fraction of round trips?	