# Part 2 ‑ Experiment and metrics design

**1. What would you choose as the key measure of success of this experiment in encouraging driver partners to serve both cities, and why would you choose this metric?**

I choose the time that the passenger has to wait as a key measure of success of this experiment. While cannibalization rate and increase in the trips completed in the opposite city are also important measures, ultimately it is the customer that has to be happy with the change done by the experiment. Passengers are the main customers, and their satisfaction reflects on the quality of service and customer retention, which ultimately leads to the increase in the total number of trips.

**2. Describe a practical experiment you would design to compare the effectiveness of the proposed change in relation to the key measure of success. Please provide details on:**

**a. how you will implement the experiment**

I would design an A/B test where one group of drivers is given a new toll-free treatment (group A) and the other one is not (group B). The drivers of both cities will be assigned to the groups equally and randomly to avoid any bias in the experiment.

For a week the drivers of both groups will drive the passengers according to the rules of their group, and the passenger wait time of every trip will be recorded. The period of testing is chosen with the goal to cover every weekday to account for weekend seasonality and to be not too long for other factors to influence the results.

The null hypothesis will be that there is a reduction in mean passenger wait time in group A. After collecting the data for 2 weeks I will have the passenger wait times for each trip in both groups, and the mean passenger wait time for groups A and B.

**b. what statistical test(s) you will conduct to verify the significance of the observation**

Statistical significance for an A/B test is how likely it is that the difference between the experiment's control group results and the test group results isn't due to error or random chance. For this experiment I am Ok to have the significance level, measured by p-value, to be 5%.

Let’s assume that the passenger wait time reduction in group A was on average 10% or more. To prove that this is statistically significant, I would:

1) randomly reshuffle the results of groups A and B

2) estimate the number of trips in group A with the passenger wait time 10% or more smaller than the wait time in group B

3) divide the number from 2) by the total number of trips by both groups.

3) is the p-value. If the number is below 5%, then I will consider the results of the experiment to be statistically significant.

**c. how you would interpret the results and provide recommendations to the city operations team along with any caveats**

I will say that 95% of the time there is reduction in the mean passenger wait times of 10% or more when the tolls are waived for drivers. I will caveat that other measures like trips cannibalization rate, customer retention and the growth of the overall driver network should be measured as well to understand the long-term success of this change.