Introduction
Bike share programs around the world are getting larger. But at the same time they are getting smaller. New technologies are making it easier and more affordable privately operated bike share programs to propagate.

If you are looking at setting up your own bike share program for your commercial or residential property, college, corporate campus or hotel/resort, you have multiple ways to deploy a system based on your goals, your audience, and your budget.

This paper will describe the three most common deployment types – Point-to-Point, Ride-and-Return and Distributed – and highlight the advantages and disadvantages of each method.

Overview
Bike Share systems come in all sizes. But they all have the same goal – providing as many people with access to the bicycles as often and as reliably as possible.

Riding bikes is habit forming, and forming habits means systems need to be designed to maximize convenience and availability of the bikes. This is why bike share suppliers have come up with different approaches to accomplishing this, including different locking technologies, different bikes, and different deployment methods, all intended to give you the flexibility to deploy your system to best meet your needs.
Point-to-Point
Point-to-Point (or A2B) is a station-based system that allows riders to checkout and return bikes to any available station in the system.

This deployment type is common in large, distributed bike share programs, such as municipal programs and large campus programs. It also provides the most flexibility and convenience to riders.

If you have used a large municipal bike share system, you know that bikes constantly travel from station to station. This is called Point-to-Point (or A2B) style riding. And it’s an essential part of a municipal system intended as a supplement to the public transit system. These systems need to provide ultimate flexibility to riders, as the majority of rides are one-way trips. However, if you have ever showed up to a bike station to rent a bike only to find it empty, than you also understand the downside of Point-to-Point systems – bikes aren’t always where you need them when you need them.

Point-to-Point systems typically provide a membership rate, or provide an initial rental period for free (typically 30 minutes) before riders are charged a fee. This approach encourages riders to return bikes to stations quickly. The theory is that if bikes are only used for short-term rides, and returned to a station quickly, this will reduce idle time of the bikes, increase availability, and increase overall system utilization. This is the hallmark of municipal programs where bike share is an extension of the transit system, designed for last-mile and short-range trips that are better served by bike than by bus or train.

To accommodate this type of deployment, bike share programs need to build ‘excess capacity’ into the system – more stations than they have bikes. This number can vary from 50% - 100% excess capacity. That’s as many as two stations for every bike. Which is one of the biggest disadvantages of owning and operating a Point-to-Point system – they are more expensive to deploy.

Another downside to operating a Point-to-Point system is that bike travel is not always reciprocal. In other words, bikes tend to move in one direction more than others (i.e. everyone rides downhill, but no one rides uphill), so bikes tend to congregate at certain stations. This means bikes need to periodically re-balanced (redistributed) across the stations. This requires time and resources. If you are managing a system yourself, you will need to determine your operational means for performing this.

A final downside of this system is that since these systems charge a fee for rides after the initial grace period, these systems tend to discourage people from using the bicycles for longer or more recreational riding, and instead limit the bikes to short-term utilitarian purposes.

Ride-and-Return
Ride-and-Return (or round-trip) is a station-based system that requires riders to return bicycles to the same station that they checked it out from.

This deployment type is common in small and privately operated systems (which may only have one location), where access is limited to select group of riders, and the system is being self-managed.

With Ride-and-Return systems, riders are typically ‘members’ of the program, and it is available to them as an amenity, or for a monthly fee, like a fitness club membership. Since these types of deployments typically don’t charge per use of the bike, riders can use the bikes for more recreational purposes, without the risk of being charged for
each minute. These systems tend to get deployed in environments where the bike share is for round-trip rides to/from a specific location. In other words, if the bikes are positioned outside a specific office building, residential building or dormitory, Ride-and-Return makes sense because the users of the bikes are eventually going to return to the same location.

Ride-and-Return programs offer advantages for these types of location-based systems. The first is that if riders are required to return the bikes to the same place that they checked it out, then bikes are always going to be balanced across the system. No operational time or resources are needed to re-balance the bikes. Second, Ride-and-Return systems also tend to be less expensive to deploy because you have the same number of stations as you do bikes, so the equipment costs are lower than Point-to-Point systems that require ‘excess capacity’. And finally, with most Ride-and-Return systems, when someone has the bike, these bikes provide locks that allow riders to lock it temporarily while they shop, dine or attend meetings/classes. This means the bike will always be there when they come back, so they won’t get stranded without a ride. This is different from a Point-to-Point system, where leaving a bike at a station runs the risk of the bike not being there when you come back.

However, this type of system is not for everyone. Ride-and-Return systems are really only practical for smaller scale systems, or systems that are location-based, not station-based. Because of this, Ride-and-Return provides less flexibility to riders because riders are responsible for bringing the bike back to where they started, which may not always be practical.

**Distributed**

A distributed bike share system is not station based. With these systems, the locking technology and mechanism is built into the bicycle, and can be used to lock the bicycle to itself, or to a fixed object – such as a pole or bike rack. But for most part, bikes can be left just about anywhere, as the technology is built into the bikes. Distributed systems work best in a contained environment with natural boundaries to keep bikes within a certain distance of those participating in the system. Think of it as a circle. As the circle grows, the size of the geographic area grows exponentially, so the number of bikes you’ll need grows exponentially as well.

One of the primary advantages of a Distributed system is that it offers riders maximum flexibility to stop and lock the bike as close as possible to their final destination. They are not required to find a nearby bike station to lock the bike to. In addition, Distributed bike share systems use sophisticated technology to track bikes, so riders can find available bikes nearby on a map on their phone.

One of the downsides to the Distributed deployment is that if bikes can be left anywhere, they will be left anywhere. This means bikes aren’t always in predictable locations, and often times they are in locations that really aren’t convenient to the majority of the participants in the program. By contrast, with station-based systems, bike stations are spaced within certain distances of each other, and positioned to provide equitable access to all participants within the service area.

The biggest danger of bikes not being in convenient or predictable locations is many riders simply won’t make the effort to hunt down bikes if they are in a hurry, or if the available bikes are in the opposite direction the rider needs to go.

**Summary**

As bike share continues to expand beyond municipalities into commercial or residential property, college, corporate campuses, and hotels/resorts, and the options for implementing bike share grow proportionally, it is important to focus first on how you want to deploy your system to best serve your audience.
<table>
<thead>
<tr>
<th>Deployment Type</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point-to-Point</td>
<td>1. Convenience of picking up and leaving bikes at any available station</td>
<td>1. More expensive to deploy</td>
</tr>
<tr>
<td></td>
<td>2. Ideal for one-way trips</td>
<td>2. Bikes need to be periodically re-balanced across stations</td>
</tr>
<tr>
<td></td>
<td>3. Short-term free rentals</td>
<td>3. Discourages people from using the bicycles for recreational riding</td>
</tr>
<tr>
<td>Ride-and-Return</td>
<td>1. No operational time or resources are needed to re-balance the bikes</td>
<td>1. Only practical for smaller scale systems, or location-based systems</td>
</tr>
<tr>
<td></td>
<td>2. less expensive to deploy than Point-to-Point</td>
<td>2. Provides less flexibility to riders</td>
</tr>
<tr>
<td></td>
<td>3. won’t get stranded without a ride</td>
<td></td>
</tr>
<tr>
<td>Distributed</td>
<td>1. Enables riders to stop and lock the bike as close as possible to their final destination</td>
<td>1. Bikes aren’t always in predictable locations</td>
</tr>
<tr>
<td></td>
<td>2. riders can find available bikes nearby on a map on their phone</td>
<td>2. Riders unwilling to search for bikes</td>
</tr>
</tbody>
</table>