Open Bike Initiative (OBI):  
A Project to Develop, Pilot and Share an Open Source-inspired Model for Bicycle Sharing

Open Bike Initiative 1.0 Implementation Guide  
Version 2.0  
December 18, 2013

Abstract: The Open Bike Initiative (OBI) is an ad hoc project focused on developing, piloting and disseminating an open source-inspired model for bike sharing. OBI was developed to address two primary issues that drove its creators to take action: 1. a corporate transportation system in need of alternatives to motorized transport and 2. a bike share market in need of greater choice to empower consumers. With these concerns in mind, the OBI creators set out to use technology and the open source ethos to design a different type of bike sharing program. Due to technology challenges, the OBI team has created two types of bike sharing programs, a low-tech OBI 1.0 model and a more technologically sophisticated OBI 2.0 model. This white paper outlines and discusses OBI 1.0, which can be implemented quickly and relatively cheaply using a customized Google account, text messaging, a few spreadsheets and a bit of human power.
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1. Introduction
Employees at Intel’s Hillsboro, Oregon campuses began developing the Open Bike Initiative (OBI) as a way to address transportation challenges common to many organizations: limited options for completing the ‘last mile’ between public transit and campus, lack of alternative transportation options, inadequate connectivity between multiple sites spread out over a large area, and barriers to entering the bike share market as a consumer. Exploration of existing bike sharing services and their operations introduced the OBI creators to industry-wide issues such as bike theft and vandalism, bikes built robust to the point of inconvenience, and limitations of a market rooted in vertical integration of all aspects of bike sharing infrastructure and services. The OBI team set off to create a bike sharing program that could fill the gaps in organizations’ transportation systems while opening up the possibilities of a more horizontal bike share market.

As employees at a technology company, the OBI creators sought technological solutions to these organizational and industry-wide challenges. The technological vision for OBI includes bikes equipped with GPS trackers, a smart lock system, an anti-theft alarm, and web and mobile user interfaces. While this is still the primary vision behind OBI, a fast-approaching launch deadline forced the OBI team to create a low-tech bike share system that could be implemented quickly and cheaply.¹ Thus, OBI has proceeded as a two-phase program with OBI 1.0 as the low-technology program and OBI 2.0 (forthcoming) as the more technologically advanced program.

While implementing the low-tech OBI 1.0, the team realized that it could offer this system to organizations as a do-it-yourself bike share program. To that end, the team has created this white paper to provide step-by-step guidance for setting up and managing a bike share program based on OBI 1.0. For each step this guide provides general considerations and strategies followed by what the OBI team did and any lessons learned during the Pilot. Technical instructions for installing the OBI 1.0 program and setting up various Google applications are contained in a separate technical guide available on the OBI website, http://openbikeinitiative.org/. Please note that this guide is a work in progress, and updated versions will be posted on the OBI website.

2. Overview
Preparations for the OBI pilot were categorized into four main areas: organizational, physical, technical, and participant setup. By identifying and dedicating time and effort to each area, the OBI team was able to develop the pilot in a multifaceted, comprehensive manner. Engaging with different organizational groups during the planning process yielded useful feedback and helped inform different employee groups about the program. Simplicity and utility were the driving ideas behind the physical and technical planning; this is why OBI 1.0 offers a realistic way to implement a do-it-yourself bike sharing program. Throughout the planning and implementation of OBI 1.0, the team focused on the participant experience. This focus resulted in the creation of an active community of OBI participants as well as overall participant satisfaction with the program.

¹ For a detailed explanation of the costs of OBI 1.0, please see Appendix C.
2.1 Planning Strategy
Predicting use cases of the OBI bikes was one of the most important steps in the development of the pilot program because it drove the recruitment efforts, communications to various stakeholders, and physical layout of the program. The OBI team analyzed connectivity between different Intel campuses, to the community immediately surrounding Intel campuses, and to Portland, the nearest urban center to identify the most likely use cases. Intel employs over 16,000 people at its various campuses in Hillsboro, Oregon. Hillsboro is a suburb of Portland and is approximately 21 miles away from the city center. As shown in Figure 1, Hillsboro is located to the west of the Portland metropolitan area and is connected to Portland most directly via the MAX Blue Line Light Rail service. While the MAX provided a mass transit option for Portland dwellers to work in Hillsboro, there was still a missing link between the transit stations and Intel campuses. Thus, the first use case that OBI used for planning purposes was completing the “last mile” from the MAX station to the Ronler Acres campus.

Figure 1: Hillsboro and Surrounding Areas

Source: Trimet (http://ride.trimet.org/?tool=routes&find=100#)

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2 See Figure 2.
The OBI team identified several additional gaps in Intel’s transportation system including the lack of connectivity between the different Intel campuses and the lack of travel flexibility when having to rely on the shuttle service for intra-campus trips. To provide a way for employees to get from the Hawthorn Farms MAX stop to the Ronler Acres campus, there was an OBI rack at Intel’s Hawthorn Farms campus near the MAX stop. Participants who traveled between the Hawthorn and Ronler campuses could also utilize those bikes. To encourage biking for intra-campus transport, bikes were located at various sites on the Ronler Acres campus, which is approximately the size of the Portland, OR downtown core. The team also thought about the distances between on and off campus sites such as restaurants, grocery stores, and Intel’s Jones Farm campus to ensure that these distances realistically could be covered by bike trips during the work day.

**Figure 2: OBI 1.0 Pilot Rack Placement and Routes**

The following sections provide more detail and guidance about the components of the OBI 1.0 program.
2.2 Program Basics
The bicycles were stationed at six official OBI racks (with two racks each at the Hawthorn Farms and RA2 locations) on Intel property. Each bicycle was locked to a rack with a 4-digit combination cable lock. A user wishing to ride a bicycle would walk up to a bike and send an SMS message consisting of the bike number to the specially created OBI phone number. Then the user would receive a response message containing the lock combination. Although helmets were not required, a user could obtain a helmet by texting the box number to the OBI phone number to receive the unlock code. The user could then ride the bike anywhere before returning it to any of the official OBI racks. To return the bike, the user simply locked it up to an OBI rack. OBI suggested a two-hour time limit on individual rides to ensure the availability of bikes.

The simplicity and ease of use of the OBI 1.0 system made it very successful. The simplicity of the system also means that while it can provide some data about bike share usage, at this time it does not have the more sophisticated data generation capabilities of some other bike share systems. The OBI 1.0 technology allows bike share managers to accurately track data such as ride number, time of ride, bike usage, and helmet usage as long as participants text every time they ride. The technology is not able to provide information such as starting and ending locations, ride distances, duration of rides, and routes. However, the OBI 2.0 technology will have the capability to generate this information. The information that the OBI 1.0 technology does provide is still very valuable for evaluating and iterating bike sharing programs.
2.3 Launch Specifics
The OBI 1.0 launch at Intel utilized the following equipment and services:\(^3\):

- 30 bicycles
- 30 combination cable locks
- 25 adjustable adult helmets
- 1 bike for towing/ load balancing purposes (could be different from the bike share bikes to provide more flexibility in gearing, be able to connect to a trailer, etc.)
- 1 bike trailer (OBI customized it to fit 2 bikes and the bike maintenance kit)\(^4\)
- 4 large storage boxes to hold helmets and other supplies
- 4 locks for the storage boxes
- 6 bike racks dedicated to the bike share program
- 4 bike pumps
- 1 bike maintenance kit
- 6 bike racks
- Support staff (2 interns for daily management\(^5\) of the program)
- A Google account

3. Organizational Setup
Communication with relevant organizational stakeholders throughout the process is essential for smooth planning and implementation. The specifics may be different depending on organizational structure and relationships, but human resources, site management, legal, privacy, and safety/security departments should be contacted early on to secure support and buy-in for the bike share program. Some of these departments will also need to be consulted on policies and procedures concerning safety, privacy, legal terms and site management. Support from upper management would also be useful to cultivate, as it could motivate participation in the program.

The OBI team consisted of Intel staff from various departments, so the team was able to collectively identify and meet with all relevant stakeholders. Other organizations at which employees rather than management are driving bike sharing efforts should consider building a team with diverse backgrounds and contacts to more easily build organizational support.

\(^3\) See Appendices C and D for a detailed list of equipment brands, sources and costs.
\(^4\) Instructions for building the bike trailer are in Appendix G.
\(^5\) OBI was developed by a group of full-time Intel employees, so while the interns managed the daily operations of the program, there was considerable additional staff time from other employees throughout the development and implementation of the program. The full-time employees donated the time they spent on OBI, so they are not accounted for in the OBI cost breakdown. The involvement, combination and cost of staff will vary depending on how organizations choose to develop and implement their bike sharing programs.
4. Physical Setup
The steps for acquiring and setting up the physical components of the bike share are:
1. Purchase or lease bicycles.
2. Customize bicycles to fit needs.
3. Install bike racks and/or signage for designation of bike share racks.
4. Purchase cable locks with both combination and key unlocking mechanisms.
5. Purchase helmets, storage boxes and padlocks to install next to racks.
6. Number the bicycles, combination locks and their keys, and storage boxes. Then set the codes for all locks and record the codes.
7. When the program is ready for launch, distribute bicycles and supplies to each rack location.

Below is a more detailed description of each of these steps.

1. Purchase or lease bicycles.
   Assembling your bicycle fleet can be done in many ways depending on your needs and resources. For example, if your campus is primarily flat and most participants are experienced riders, you might opt for single speed bikes with lighter or geometrically different frames. Evaluate bike geometry, weight, visual appeal, and other characteristics to ensure that users of all sizes and genders will feel comfortable on the bike. Some participants might be reluctant to use certain styles of bikes, such as ones with step-through frames because they consider them to be “women’s bikes” so it might be important to dispel this notion by explaining how these frames are well-suited to commuting and bike sharing.

   OBI leased 30 medium size (19") Breezer Uptown Fleet Low-Step bikes because of their ability to accommodate a wide range of riders comfortably while needing minimal maintenance. The step-through frame comfortably accommodated work clothes and different body types, while the internal hub allowed for shifting without the maintenance concerns of derailleurs that can readily be bent or damaged.

   Mid-way through the Pilot, many of the bikes began experiencing issues with gear slipping and loose bottom brackets. The OBI team worked with local bike mechanics to quickly address these issues so bikes were not taken out of

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6 While OBI chose 30 bikes based on cost considerations, a good rule of thumb for determining the ratio between participants and bikes is 10 participants for every bike. This ratio can help you determine how many bikes to purchase based on quantified interest in bike sharing or it can be used to cap the number of participants in a bike sharing program.
circulation for too long. The team also created a maintenance log to track maintenance issues and notice trends in mechanical issues with the bikes. The pervasiveness of the gear slipping and loose bottom bracket issues caused the OBI team to reach out to Breezer to find solutions to these issues. Working with Breezer and local bike mechanics allowed OBI to address maintenance issues with minimal impact on participants. It is important to plan for regular maintenance as well as ad hoc maintenance to ensure that the bike fleet remains safe for participants. Maintaining contact with local bike mechanics and bike manufacturers can be very helpful in case maintenance issues arise.

2. Customize bicycles to fit needs.
   Adding some equipment to the bikes can greatly increase the utility and comfort of the bikes. Fenders, lights, mirrors, baskets, racks and bells are examples of additional equipment that could be installed to customize the bikes to your needs. Some bikes come with additional equipment such as fenders and racks, so this could be one way to decrease costs.

   The OBI bikes came with fenders, a rear rack, and a bell so there was no need to purchase these separately. OBI did install front baskets and seat retention cables (see Appendix F for instructions) to meet the needs of the riders while improving loss prevention.

3. Install bike racks and/or signage for designation of bike share racks.
   There are many different types of bike racks, so you should consider the location of the racks, how many bikes they must hold, their ease of use, and other factors while choosing racks. For example, a rack style that requires permanent installation might not be appropriate for a pilot or seasonal bike sharing program. Using a combination of racks to cater to different locations might be a useful strategy, but all racks should contain signage and other branding elements that clearly designate the racks as part of the bike share. It is important to provide separate bike share racks to ensure that bike share bikes do not crowd existing racks too often. Depending on the number of people using personal bikes on a campus, it may also be important to clarify that non-bike share bikes should not utilize bike share racks. This will help prevent congestion at bike share racks.
   Make sure the racks are in visible, well-lit areas located near building entrances. Signage should capitalize on consistent and appealing branding while providing relevant information for users. Signs should be made out of an all-weather material, such as styrene, to ensure durability and visual quality. Special care should be taken to ensure signs have UV-safe coatings or are otherwise protected against fading and degradation under sunlight.
OBI identified the best placements for the racks and then worked with site management to ensure that the racks would not interfere with building operations. The racks were purposely placed near existing bike racks to attract attention from existing riders, while signage was used to delineate the racks for OBI use only. The OBI signage contained pre-ride checks, the OBI phone number, a map showing rack locations, a rider guide and a brief description of the bike share project. Figure E-2 contains an example OBI rack sign.

4. Purchase cable locks with both combination and key unlocking mechanisms.

Combination locks are necessary for operations. It is recommended that the locks also have a key function in case a lock combination is lost or reset by a user. Remember that the combinations to such locks must be changed manually, so you should create a systematic way of changing the combinations and recording the new combinations in the system spreadsheets to cause as little interference with participant usage as possible. Changing the lock codes is important because otherwise users can refer to previous texts that contain lock codes to unlock and possibly steal bikes. Without the incoming text to request a lock code, it is very difficult to figure out who accessed a bike, so it would be challenging to track down the bike thief. Failure to change lock combinations frequently also reduces your ability to track rides based on the texts received because riders might choose not to text when they can more easily refer to codes already stored in their phones.

OBI used Abus 1640 cable locks which include keys to unlock the locks as well as a metal file to “pick” the locks to figure out unknown combinations. The files merely allow someone to figure out a lock combination once the person has opened the lock with the key; they cannot be used to open the lock. With the keys and files, the OBI managers were assured that they would be able to open and reset any properly functioning lock without needing to know the combination. While the keys and files make it easy to manage the locks, it might be cumbersome to keep track of individual keys for each lock if a bike share has many bikes. Managers of larger bike shares might want to explore locks that have a common master key to reduce the number of keys to manage. To prevent user confusion while OBI managers were changing lock combinations, the managers used the Google phone application to update lock codes in the spreadsheet as soon as the codes were physically changed. Changing combinations during low periods of usage is another way to avoid user confusion. The OBI managers were not able change the combinations as frequently as they would have liked. This meant that users did not have to text every time they used a bike because the codes for bikes that they had used previously were stored in their phones. The combination of the
stored codes and infrequent combination changes posed a security threat because it would difficult to pinpoint someone who stole a bike using a code they accessed days before the theft. Participants referring to stored codes instead of texting each time they rode also created gaps in ride data during the pilot. OBI addressed the challenges posed by the locks by reminding participants to text every time they rode, counting rides to be able to extrapolate unrecorded rides, and exploring a gamification element to encourage participants to text every time they accessed a bike.

5. Purchase helmets, storage boxes and padlocks to install next to racks.
   Helmet laws vary in different states and cities so it is important to ascertain whether or not helmets must be provided to bike share participants. Even if helmets are not legally required, some amount of them should be provided to enable people without their own helmets to participate in bike sharing. If possible, the storage boxes should be secured next to each bike share rack. The padlocks secure the contents of the boxes, while water jugs or bricks can be used to weigh down and secure the boxes themselves. It is also recommended to store a bike pump, cleaning supplies (such as cloths to wipe down wet seats) and hand sanitizing wipes in each storage box. If wipes or cloths are provided, be aware that managers should periodically check the boxes for used wipes or clothes to prevent mold.

   In Oregon helmets are not required, but OBI encouraged their use and provided some helmets for greater user safety and comfort. OBI secured the boxes by weighing them down with 2 gallon-sized jugs of water. OBI used Bell SOLAR 54-61 cm (Sept. 2012 edition) helmets, Suncast 47 gallon boxes and Master Lock padlocks.

6. Number the bicycles, combination locks and their keys, and storage boxes. Then set the codes for all locks and record the codes.
   Bikes, locks and keys should be numbered starting at 10 because as the OBI team learned during the pilot, some participants were confused as to how to text one-digit numbers (e.g. whether to text “1” or “01”). The method used to number the bikes and locks (stickers, permanent marker, etc) should be tested to ensure it will withstand all types of weather and frequent contact with people. The locks should have the same number as their corresponding bicycle (e.g. bike 14 has lock 14). If the locks have keys, number the keys to correspond to the bike and lock numbers, so it is easy to locate the right key for each lock. Record the serial numbers of the bikes as you number them in case of theft. It is helpful to purchase padlocks that use letter combinations instead of number combinations for the helmet boxes.
This will help prevent confusion and user error regarding which code unlocks a bike and which unlocks a box. If possible, using a different range of numbers for the helmet boxes can also reduce user error. For example, the OBI bikes were numbered 01-30 and the helmet boxes were numbered 90-93. The lock codes for the bikes and boxes must be recorded in the Google spreadsheet for the system to work. It is recommended that bike share managers download a copy of the code spreadsheet on every day to ensure that they always have up-to-date local files containing the codes. All other numbers should be recorded in a separate Google spreadsheet and in local files in case of a system outage.

OBI created custom stickers (see Figure E-1) to put on the bikes to number them. These stickers were not only more durable than most store-bought options, they were designed with the OBI branding elements to make easier to identify as bike share bikes. OBI used store-bought stickers on the locks and had to replace some of them because the stickers fell off during rainy weather. The OBI team had to replace some of the box locks and one of the bike locks during the pilot. In anticipation of such equipment failure, it is helpful to have extra box locks and bike locks to ensure the security of the bikes and helmets at all times. Some OBI participants rode during the entire pilot without realizing that the boxes next to the racks were part of the bike share, so signage and branding should be used to mark the boxes as part of the bike share.

7. When the program is ready for launch, distribute bicycles and supplies to each rack location.

The distribution of bicycles is highly dependent on the site and the users. Extra load balancing and maintenance efforts might be required at the beginning of the program as usage patterns are established and participants get used to the bikes.

The OBI team began the pilot with more bikes located near the MAX stop than at the Ronler Acres campus to anticipate heavy last mile usage. After studying ride data, it was clear that more participants were using the bikes for intra-campus travel, so some bikes were moved from near the MAX to the Ronler Acres campus.

5. Technical Setup

While this is a low-tech model, there are some technical preparations required for implementation. The OBI 1.0 program consists of several Google applications⁷ that are used to receive and send information in conjunction with code that scans the relevant user and request

⁷ All images of Google applications used in this guide were captured in November 2013. The appearances of updated versions of the different applications could differ considerably from what is presented in this guide.
information to direct the Google application responses. The OBI Pilot occurred in the summer of 2013; you should ensure that Google still offers the services (Gmail, Google Voice, and Google Drive) that are necessary to create this system. If Google no longer offers some of these services, other programs could be substituted into the program. For example, Skype could provide an alternative should Google discontinue Google Voice. Figure 3 should enable you to see where substitutions are possible and which programs govern which aspects of the program. Below is a list of the various Google applications along with explanations of their functions and hyperlinked logos.

**Google Voice**- routes communications between users and bike share managers as SMS messages or phone calls

**Gmail**- categorizes and stores incoming messages; serves primary interface for creating communications to users

**Google Drive**- stores the lock combination and user information spreadsheets that the server scans to determine what response to send to users

In order to use Google applications, you will need a Google account. It is recommended that you create a new account solely for bike sharing purposes to ensure that the program works smoothly.

The advantages of using Google:
- one login for everything
- easy to use tabs to navigate between functions (like during activation)
- remotely accessible
- can also run on phones through the app
- free

The OBI code stitches together the Google applications to create a simple, effective system for managing the bike share. Interactions between the Google applications, the server running the code, and the bike share managers form the backbone of the OBI 1.0 program. The following diagram shows the basic structure and interactions of the OBI 1.0 program.
Detailed instructions for setting up the various Google applications and the program code are provided in a companion document, the OBI 1.0 Technical Guide, available at http://openbikeinitiative.org/.
6. Participant Setup
The first task for setting up participants is to inform people about the bike sharing program and how to participate in it. Methods of communication such as email, flyers, signs, etc. should be used to reach as many people as possible with the message that there is a bike sharing program. Once potential participants have expressed interest in the program, they need to have access to program details such as:

- Registration process;
- Bike check-out process;
- Safety and legal terms; and
- User protocol or a list of rules and recommendations.

Consult with HR and Legal to determine the appropriate process for communicating and obtaining agreement to required legal and safety terms. Legal and safety terms; user rules and protocol; and other information should be available prior to registration to allow potential participants to fully assess whether or not they want to join the program.

OBI communicated with potential participants through a group website on Intel’s internal network, a video, digital signage, email and flyers. Appendices A and B contain the legal and safety terms that OBI used. The OBI team also learned that the program attracted a fair number of people who were unaccustomed to cycling and wanted more guidance on how to do it safely. The OBI group page was a great resource for people to post questions and receive feedback from other OBI participants and the OBI team. These forums helped new riders gain confidence and contributed to OBI feeling more like a community. Hosting a bicycle commuting class was another approach that OBI used to address this issue. Providing FAQs about cycling and bike sharing and hosting a cycling safety workshop before the launch of the program are some ways to engage potential participants and make them feel comfortable enough to ride.

6.1 Recruitment and Registration
Recruitment is a key component for implementing a successful bike share program. OBI participants were recruited through a variety of efforts including messages on Intel’s internal digital signs, a video, outreach at the MAX public transit station, and by word of mouth. A registration process should be in place before any recruitment occurs in order to efficiently convert people from interested parties to participants in the program. People recruited for OBI were directed to the program’s internal blog, where they could register to participate in the pilot. All registered participants were manually added to the Google spreadsheet to keep track of who was eligible for activation.
Because of limitations of the OBI registration tool, participants had to take an additional step to “activate” their registration. Participants could access bikes only after completing the activation step. The day before the launch of OBI, registered participants received an email instructing them on how to activate their registration. Participants were also provided the rules, legal terms, and safety guidelines that governed OBI and were informed that by activating their registration, they were assenting to those terms and rules. This email also informed registered people that they could send an email to OBI to leave the program altogether. Activation involved the following steps:

1. The user sends a text message to the bike share’s Google Voice number, containing the word “activate,” and the user’s e-mail address (or other identifying information, such as a name).

2. The Gmail account will automatically send a response to the user alerting her that her account should be activated in “X” amount of hours/days. Make sure to utilize this buffer time, as people may activate when bike share managers are not available. OBI told users it would take up to 24 hours for activation to be completed.

3. Confirm that the person activating is a registered participant in the bike sharing program by searching for her name in the registered users Google spreadsheet. To get to the spreadsheet, click on the Google apps menu in the top right corner of Gmail. The click on the Google Drive logo.
4. Click on the Assets Spreadsheet and check for the person’s name in the “Users” sheet of the spreadsheet.

**Figure 5: OBI Assets Spreadsheet - Users Sheet**

5. If the person has registered, activate her by copying and pasting the Unique Google Identifier (contained in the < >) and participant phone number into the spreadsheet. Also change her activation status by putting a “Y” in the column labeled “Active.”

**Figure 6: Unique Google Identifier**

**Figure 7: Activated User Entry in Spreadsheet**

<table>
<thead>
<tr>
<th>From</th>
<th>Active [Y/N]</th>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="mailto:19715991624.19017778888.zQwFlsNIJK@txt.voice.google.com">19715991624.19017778888.zQwFlsNIJK@txt.voice.google.com</a></td>
<td>Y</td>
<td>Sample, Mary</td>
<td><a href="mailto:ms@email.com">ms@email.com</a></td>
<td>(901) 777-8888</td>
</tr>
</tbody>
</table>

6. Reply to the participant’s email. Hitting reply in Gmail will autofill a message that says “Your account has been activated, thank you!”

Managing registered and activated participants is fairly straightforward with the Google spreadsheet. However, because the system was designed around the registration tool that OBI used, the system does not automatically enroll participants in the program; a person needs to
input the Google Unique Identifier and other information into the spreadsheet. Registrants can be added or removed from the spreadsheet by adding or deleting rows of information, which makes it easy to keep track of participants and update contact lists.

The OBI registration process posed challenges for participants because it involved multiple steps and participants had to be manually added to the system. Streamlining the registration process so participants can provide registration information, assent to terms and conditions, and send the required text to the bike sharing system in as few steps as possible would improve the their experience. Additionally, clear communication about the registration process helps prevent participants from becoming frustrated when a bike sharing program does not work as they expected. Such communication should happen before and during implementation of the program, and instructions should be disseminated through various channels such as emails, organization-wide blogs or websites, text messages, etc. Streamlining registration as much as possible also helps reduce confusion.

6.2 User Protocol
Rules for the pilot were distributed to users through the program website prior to registration and in an email received upon registration. OBI used these protocols:

1. Obey the law. (See this booklet for an easier-to-read summary)
2. Follow the Intel guidelines for cycling on campus.
3. Do not unlock an OBI bike for anyone other than you. Do not share combinations with anyone.
4. Always return bikes to an official OBI rack (or contact us if impossible for some reason).
5. Use all reasonable efforts to return bikes within two hours of your original check out.
6. If you borrow a helmet, return it to an OBI lockbox when you lock your bike (or contact us if impossible for some reason).

As the OBI managers gained more experience with running the pilot, they realized that additional protocols were needed to address emerging issues. For example, bike maintenance issues forced OBI to develop a system for reporting and signaling bike issues. The OBI team used its internal website to update user protocols to include users sending an email (from an independent email account, not the Gmail account) when a bike had an issue as well as users turning the bike seat backwards to show other participants that the particular bike should not be ridden. Texting before every ride was another user protocol that OBI added in response to program management experiences.
6.3 Daily Use Instructions
These were the basic user instructions for the OBI 1.0 program. Figure E-3 provides a graphical version of the daily use instructions.

1. User chooses a bike to ride.
2. User texts the 2 digit number (e.g. 08) to the Google Voice phone number.
3. User should receive a response containing the lock combination within 30 seconds.
4. User unlocks the bike and stores the lock in the front basket for the trip.
5. User can access a helmet by texting the helmet box number to the Google Voice phone number, exactly as she would for a bike.
6. User rides bike for up to “X” hours (OBI used 2 hours though there was no way to enforce this policy).
7. Upon completion of activity, user should lock bike up at a sanctioned bike rack.

Ensuring that participants followed the correct process for accessing the OBI bikes was essential for a positive user experience. Even though OBI instructions were communicated to all registered participants before the launch of the program, some participants still had trouble accessing the bikes. The OBI team addressed this issue by creating a graphic with step-by-step instructions for how to use the bikes. This guide was posted on the OBI group page. Another solution was to forward calls to the Google Voice phone number to the daily OBI managers so they could answer questions about how to use the bikes in real time.

7. Implementation and Operations
Implementation and operations require dedicated staff time to distribute the bikes and supplies for launch, handle registration and activation, respond to emails and calls, change lock combinations, balance distribution of bikes and maintain equipment. Ongoing recruitment efforts (if applicable) and participant engagement also require staff time. While much of the staff effort is expended in creating and setting up the bike share program, daily operations management is essential to providing a good user experience. Having a manager available to respond to emails and calls about the program during all work hours builds participant trust and support. If your organization employs people for multiple shifts throughout the day, the manager might have to decide how to respond to calls and emails that come in during non-standard shifts. The time commitment required to manage a bike share based on the OBI 1.0 program could vary greatly depending on the size of the program and other specifics. When creating the bike manager position, it might be useful to consider whether the manager will have to dedicate all hours to running the bike share or whether the manager could undertake additional responsibilities.

OBI had two part-time interns fulfill the bike share manager role. Hiring one full-time manager or allowing several employees in a department such as security or maintenance to share the work load are other ways to staff the management role. For OBI, recruitment, registration, and
communication with participants made up the bulk of the daily managers’ work. Changing lock codes on a regular basis was another task that required significant effort. OBI purposely wanted to study whether load balancing could happen organically, so it was undertaken only when participants specifically requested it.

8. Conclusion
The OBI 1.0 system provides a quick, easy way to implement bike sharing on a campus. The program would be especially useful for gauging interest in bike sharing before investing in more sophisticated bike sharing systems. It could just as successfully serve as a low-cost, permanent bike sharing program. The OBI team hopes that by publishing this guide, the Technical Guide, and the code, many organizations can create their own bike sharing programs that are customized to fit their needs. The OBI team welcomes all questions and feedback about its work; please contact us at info@openbikeinitiative.org.
Appendix A: Legal Terms

OPEN BIKE INITIATIVE SUMMER 2013 PILOT PROJECT – LEGAL TERMS

Privacy. We will be collecting information from and about you. During Phase 1\(^8\) this will include your name, email address, mobile phone number, and frequency of your use of the OBI bikes. We also plan to survey you about your use of the OBI bikes, and we will ask certain limited demographic information in these surveys. Also, in connection with one specific component of Phase 1 (the text message-based distribution of lock codes) we will be using a tools (primarily Google Voice and a spreadsheet that will sit on Google Drive and include the mobile phone number that you activate) that reside outside the Intel firewall and that are controlled by a third party. We will minimize the amount of data that is exposed to these tools and limit the use of such data as much as we can. Data that sits on Google’s servers will be subject to their applicable policies.

Later, in Phase 2, we will also be collecting detailed GPS location details from all of the bikes as they are used – i.e., we’ll be able to see exactly where and when you take a bike. This information will be used only for the purpose of operating the pilot project and creating aggregate data about the uses and users of the OBI bicycles.

The information we collect may be seen in personally-identifiable form by OBI project team members from Intel and from our academic partner Portland State University. We plan to make aggregate (non-personally identifiable) information publicly available when we publish our project results. We will not retain personally-identifiable data after completion of the project, except that we may retain a record of the fact of your participation and basic contact information in order to communicate with you about future Intel bike share projects. We will abide by Intel’s privacy practices in connection with all of the information we collect (see http://www.intel.com/privacy).

Media Release. One goal of the pilot project is to document our experiences and make that information publicly available. We plan to occasionally video record and photograph users of the OBI bikes. As an important exception to the privacy rule outlined above, please understand that you could appear in a video or photo that we produce and provide to specific third parties or publish in a publically accessible forum. Similarly, if you provide us feedback about the pilot, we may publish that feedback (unless you specifically communicate to us that the feedback may not be used in this manner). You agree that we can use your image and your feedback as described in this paragraph, without compensation.

Liability. You personally assume any risks and liabilities associated with incidents that occur as a result of your violation of one of the pilot project rules.

Updates to these legal terms. We may need to update these terms during the course of the pilot project. If we do, we will notify you by email. Three days after we’ve sent the email, the new

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\(^8\) The two phases of OBI development were previously referred to as “Phase 1” and “Phase 2.” Now they are referred to as “OBI 1.0” and “OBI 2.0.”
terms will be effective. Your continued participation in the pilot will demonstrate your agreement to the updated terms. You are free to withdraw from the pilot at any time, of course.
Appendix B: Safety Guidelines Disseminated to Users

Our friends at the Bicycle Transportation Alliance assisted us in creating the following high-level safety guidelines for the pilot:

- Helmets are strongly recommended while biking. Provide your own, or check one out at our official OBI bike racks (subject to availability).
- Avoid biking through parking lots.
- Choose a route on which you will feel safe and comfortable.
- Follow all traffic laws; always ride the same direction as other vehicle traffic and obey stop signs and traffic signals.
  - **Signal** all turns.
  - Yield to pedestrians and walk bikes on sidewalks close to buildings
  - Take special care around large trucks and work zones. Verify that you’re not in the blind spot of a large vehicle by making eye contact with the driver through their window or rear view mirror.
  - You must provide your own front and rear lights to use the bikes after dark or in low-visibility conditions. Bright/reflective clothing is also recommended.
  - Ride safely, predictably, and have fun.

This booklet also provides excellent safety guidance.
Appendix C: OBI 1.0 Pilot Costs

The following table provides a breakdown of the costs of the OBI 1.0 pilot. Costs of promotional and other non-essential items are not included in order to focus on the costs of implementing an OBI 1.0 system. This provides a rough estimate of how much money it takes to run such a program. However, costs such for items such as technical development and support (which were donated to OBI) could significantly impact operating costs.

Total cost: $34,893

Table C-1: OBI 1.0 Pilot Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost/ Unit</th>
<th>Units</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breezer Uptown Fleet Low Step (Community Cycling Center)</td>
<td>$549</td>
<td>30</td>
<td>$16,470</td>
</tr>
<tr>
<td>Full-time Project Manager(^9) (intern) (Business Education Compact)</td>
<td>$14/ hour</td>
<td>1</td>
<td>$6,720 (for 3 months)</td>
</tr>
<tr>
<td>Bike Racks (Urban Racks) (includes shipping cost)</td>
<td>$707</td>
<td>6</td>
<td>$4,242</td>
</tr>
<tr>
<td>Theft Resistant Seatpost Modification (Community Cycling Center)</td>
<td>$49</td>
<td>30</td>
<td>$1,470</td>
</tr>
<tr>
<td>Abus 1640 Combination Cable Locks (Universal Cycles)</td>
<td>$36</td>
<td>30</td>
<td>$1,080</td>
</tr>
<tr>
<td>Wald Front Mounted Basket (Community Cycling Center)</td>
<td>$32</td>
<td>30</td>
<td>$960</td>
</tr>
<tr>
<td>Bell “Solar” Helmet Universal Sizing (Community Cycling Center)</td>
<td>$35</td>
<td>25</td>
<td>$875</td>
</tr>
<tr>
<td>Surly Bill Bike Trailer (lease) (Clever Cycles)</td>
<td>$216.66/ month</td>
<td>3</td>
<td>$650 (for 3 months)</td>
</tr>
<tr>
<td>Signage for Racks (Gillespie Graphics)</td>
<td>$120</td>
<td>5</td>
<td>$600</td>
</tr>
<tr>
<td>Giant Cypress Bike for Load Balancing (Community Cycling Center)</td>
<td>$445</td>
<td>1</td>
<td>$445</td>
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<tr>
<td>Suncast 47 gallon Boxes (Target)</td>
<td>$89</td>
<td>4</td>
<td>$356</td>
</tr>
<tr>
<td>Park AK- 38 Advanced Mechanic Tool Kit (Community Cycling Center)</td>
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<tr>
<td>Maintenance (during the Pilot) (Community Cycling Center)</td>
<td>$50</td>
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<td>$250</td>
</tr>
<tr>
<td>Park PCS 10 Folding Repair Stand (Community Cycling Center)</td>
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<td>$175</td>
</tr>
<tr>
<td>Topeak Floor Pump (Community Cycling Center)</td>
<td>$44</td>
<td>3</td>
<td>$132</td>
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<tr>
<td>Master Lock (Target)</td>
<td>$21</td>
<td>4</td>
<td>$84</td>
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<tr>
<td>26” x 1.75” Schrader Tube (Community Cycling Center)</td>
<td>$5</td>
<td>15</td>
<td>$75</td>
</tr>
<tr>
<td>Park Bag 15 Storage and Travel Bag for PCS (Community Cycling Center)</td>
<td>$24</td>
<td>1</td>
<td>$24</td>
</tr>
</tbody>
</table>

\(^9\) OBI had two part-time interns sharing the role of Project Manager. One full-time manager would be adequate for managing a 30-bike program. However, more bikes would probably require additional staff.
Appendix D: OBI 1.0 Equipment List

The following list contains all of the equipment that was used in the OBI 1.0 Pilot. For numbers, sources, and costs, please refer to Table C-1 above.

- Server with the following specifications:
  - 1-2MB of HD space.
  - Around 12-13MB of memory for running the program.
  - A .NET Framework to run (4.0), so any OS that can run that .NET Framework could run it.
  - If running as a Windows Service, a Windows OS to run, in addition to the .NET Framework requirement.
- Breezer Uptown Fleet Low-Step Bike (2013)
- Abus 1640 Combination Cable Locks
- Urban Racks Corral and Hanger Racks
- Giant Cypress Bike (2009)
- Wald Front 198 Multi-Fit Basket
- Park PCS 10 Folding Repair Stand
- Park Bag 15 Storage and Travel Bag for PCS
- Bell “Solar” Helmet 54-61 cm (2012)
- Surly “Bill” Bike Trailer
- Park AK-38 Advanced Mechanic Tool Kit
- Topeak Joe Blow II Floor Pump
- Master Lock 643DWD or 643D Lock
- Schrader Tubes
- Suncast 47 Gallon Boxes
Appendix E: Visual Elements

Figure E-1: Sample Bike Number Sticker

Credit: Joel Morrissette

Figure E-2: Sample Bike Rack Sign

Credit: Joel Morrissette
Figure E-3: OBI User Instructions Graphic

1. Approach the bike rack

2. Locate Bike # on either side down tube or back fender

3. On mobile phone, text 971-599-1624 the # located on the back of the bike. (Ex. If bike is #04, txt 04)

4. In 30 seconds or less, you will receive a 4 digit combination

5. Set combination on lock to the same 4 digit combination received via SMS.

6. Tuck the lock into your basket & enjoy your ride.

Credit: Robinson Eaton
Appendix F: Seat Retention Leash Instructions

The following is a description of a leash mechanism designed to discourage theft and prevent over extension of seats and seatposts. The leashes were constructed of materials common to a bicycle shop. One custom, but simple tool was needed to install the leashes. The construction of the tool will be outlined as well.

**Star Nut Setting Tool Instructions:**
A standard star nut setting tool (Figure F-1 left) will be solid. Since we need to have a cable running through the star nut as it is set, we needed to improvise a star nut setting tool with a hollow center for the cable to pass through (Figure F-1 right). The tool was made from the following:

- ½” “deep” socket
- ½” flanged nut
- Barrel adjuster bolt and nut from brake caliper
- Epoxy

**Figure F-1: Standard Star Nut Setting Tool (left) and Custom Hollow Tool (right)**

1. Grind or file the barrel adjuster bolt to fit into the square drive end of the socket.
2. Grind or file a channel (deep enough for the brake cable to drop into) into the flanged face of the nut.
3. Use the epoxy to secure the flanged nut into the hexagonal drive end and the barrel adjuster bolt into the square drive end of the socket.

Figure F-2 shows the sequence along with the orientation of the star nut and brake cable.
Seat Retention Leash Instructions:
Figure F-3 is a preliminary drawing which describes the concept of the leash; join a cable from the seatpost to a fixed point lower inside the frame to restrict removal of the seatpost from the frame. The cable should be long enough to allow adjustment of the seatpost within its recommended range. The drawing shows the cable looped around a cartridge bottom bracket; space constraints between the frame’s bottom bracket shell and the bottom bracket forced us to rethink the attachment method (see Figure F-5).
1. The Breezer Uptown Fleet bicycles used for the OBI pilot were equipped with 27.2mm (od) seat posts.

**Figure F-4: Star Nut and Lower Section of Seat Post**
2. With a road style brake cable laced through the center hole, we installed a star fangled nut from a 1” threadless headset into the bottom of the seatpost. The brake cable bead is too large to pass through the center hole of the star nut and will limit the seatpost from moving any higher than the cable length dictates.

3. Install a fastener to clamp the cable low on the frame. The Breezers had a threaded hole and bolt on the underside of the bottom bracket shell that held a cable housing clamp. We drilled a small hole adjacent to the bolt. The cable will be routed through the seat tube, into the bottom bracket shell, around the cartridge bottom bracket, through the small hole and clamped by a fender washer added onto the factory bolt.

**Figure F-5: Fastener Clamp Placement**

4. Remove seatpost, invert and secure.

5. Thread the star nut onto the improvised starnut setting tool.

6. Lace the brake cable through the star nut and star nut tool.

7. Lay the tail of the brake cable into the channel carved into the nut flange.

8. Hammer the star nut into the bottom of the seat post (depth is not important as long as the star nut is fully engaged an you can still retrieve your tool).

9. Remove crankset and bottom bracket from the bike.

10. Thread the brake cable tail down the interior of the frame’s seat tube, through the bottom bracket shell and out the small hole that was drilled previously.

11. Install the seatpost, clamping it at its maximum recommended height.
12. Reinstall the bottom bracket working it around the cable - be careful not to cross thread the bottom bracket as the cable may want to push the bottom bracket from center.

13. With the seat post at maximum extension, pull the brake cable through the bottom bracket and clamp under the fender washer and factory bolt.

14. Cut off the excess cable and install end cap.
Appendix G: Bike Trailer Instructions

The trailer was outfitted to haul tools, supplies and bicycles in between bike share racks on Intel campuses. The following steps detail the components and modifications that made up the OBI trailer.

1. The trailer used was the Surly “Bill;” dimensions and specs are available through the Surly website. The OBI team used a dedicated bike to pull this trailer. The hitch attaches to the tow bike’s axle with a long bolt replacing the quick release skewer. This trailer is not compatible with internally geared or solid axle hubs.

   Figure G-1: Surly “Bill” Trailer

2. Several car roof rack options were explored to attach bikes safely to the trailer. The Breezer “Fleets” that were used in the OBI pilot presented two issues with off the shelf roof rack designs.
   - The “kneeling” type; where the front wheel is removed and the fork tips are clamped interfered with the fenders
   - The “boom” type; where a pivoting arm clamps the bike’s down tube wasn’t compatible with the Breezer’s frame geometry and tubing diameter.

As an alternative, we found retail display trays which braced the bike’s wheel. The Surly trailer has 6mm threaded fittings at several locations on the frame. We attached two lengths of channel strut (commonly available from construction supply outlets) and attached the bike trays to the channel strut. We attached adjustable wheel straps from a traditional roof rack to stabilize the bikes.
3. A “round trip” container was added to hold tools, air pump, replacement parts etc. Many of these types of containers can be locked shut. Padlocks were used while the trailer was parked or unattended.

Our trailer held two bikes, but the width of the Surly trailer would allow for three bikes if they are arranged with the center bike facing the opposing direction.

Figure G-3: “Round Trip” Container on Trailer
4. Here is the trailer fully loaded. The trailer easily handled the weight demands and maneuvered relatively well. The trailer served as a practical solution for balancing the bike inventories between racks and attending to on-site repairs.

Figure G-4: Fully Loaded OBI Trailer