BC Vancouver Biking Assistance Application Report

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Introduction:

The City of Vancouver is one of the most bicycle friendly city in North America. It has an wide and extensive bicycle network spread out the city that is well used by the citizens and visitors. Based on the 2011 Canadian National Household Survey, cycling accounts for approximately 4.4 percent of all trips to work in the City of Vancouver. More and more people are becoming aware of the importance of cycling and its critical role that it can play in creating green and livable community. The city's transportation plan "sets a target that two-thirds of all trips by 2040 will be made by walking, cycling, or transit [1]." The plan also sets a target to work towards zero traffic related fatalities and places emphasis on safety for pedestrians and cyclists.

This project is constructed from using two applications. ArcGIS Online is an online, collaborative web GIS that allows you to use, create, and share maps, layers, and data. This platform allows user to explore data, create maps, and share stories [2]. The end result can be further modificated with the help of ArcGIS Web AppBuilder. The Web AppBuilder is an intuitive "what-you-see-is-what-you-get" application that allows user to builder 2D and 3D web application without writing much coding. It includes powerful tools that allows user to build apps with ready to use widgets. The end result can be used to produce HTML/JavaScript apps that run on any device [2].

Goal:

The main objective for this project is to construct a user friendly bicycle assistance app for providing the riders useful information which can improve bikers' biking experience and safety. This application provides users knowledge, such as, where are high accident prone area or where are high percentage bike theft locations. These information along with the bike routes can allow bikers to create their own safe and personal biking route. Additional information such as locations of bike racks, bike shops, bike pumps and etcetera can be used to further assist the bikers.

Data:

Geographic Coordinate System - GCS_WGS_1984

The metadata used to construct this project can be subdivided into:

1. Bike Racks Data

Retrieved from: City of Vancouver Open Data Catalogue

Data type: CSV files

Data set description: This dataset contains locations of installed bike racks on the city property. The CSV file required minor modifications of adding additional information columns for georeferencing the address to identify location. It includes information such as Street Number, Street Name, Number of Bike Racks and the Year installed.

2. Collisions Data

Retrieved from: ICBC

Data type: CSV file

Data set description: This data set provides the location of cyclist collision located in the City of Vancouver during the year 2012.

3. Crime Data

Retrieved from: City of Vancouver Open Data Catalogue

Data type: CSV file

Data set description: The release of Vancouver Police Department crime data is intended to enhance community awareness of policing activity in Vancouver. This data set is organized into showing only the bicycle related theft during 2015 for the project's purpose.

4. Bike Routes Data

Retrieved from: City of Vancouver Open Data Catalogue

Data type: Shapefile

Data set description: This data set contains information about the bikeways in the City of Vancouver. It includes information about the type and the length of these bike routes.

5. Bike Shops/Gas Stations Data

Retrieved from: Google Map

Data type: CSV file

Data set description: Each entrance point were located on Google Map and manually entered the coordinates location into the CSV file. This data file contains the coordinates of bike shops and gas stations (bike pumps) located within the City of Vancouver area.

6. Public Restroom Data

Retrieved from: City of Vancouver Open Data Catalogue

Data type: CSV file

Data set description: This data set contains locations and attributes of all public washrooms that are on city streets and public parks.

Target Users/ Potential Scenario:

With the increasing percentage of people using bicycle as a sort of transportation, the target users for this application are steadily increasing. This application is designed to assist bikers from the City of Vancouver region. These targeted users can vary from recreational bikers, visitors, commuters, students and athletes.

The Usability Goals aimed for this project are:

1. Efficient to use
2. Easy to learn
3. Easy to remember how to use

Here are three Potential Scenarios for users to use the application:

1. Bikers wanting to find closest bike racks

Example: Billy, a 22-year-old male student that recently moved to the City of Vancouver, who loves riding his bicycle during his spare time. However, due to being new to the area, he does not know where are the closest bike racks located close to his apartment.

2. Bikers wanting to find the safest locations to ride

Example: Anna, a 34-year-old female bike athlete, who trains whenever she has the opportunity to. Her main concern is to avoid all high accident prone areas, so she can maintain her physics without the possibility of injury/collision with other vehicles.

3. Bikers want to avoid parking their bikes close to high bicycle theft rate area

Example: Dillon, a 56-year-old business man, who bikes to work for health reason. However, he recently had his bike stolen when it was parked close to his work. Dillon would like to find a bike rack that is far away from areas that has high chance of bike theft.

Methods:

This project is constructed using the ArcGIS online and ArcGIS Web AppBuilder platforms. The first step was to brainstorm couple suitable scenarios for sketching the storyboard. By doing so, this can help identify potential target users and have a brief understanding of the goal of this application. After narrowing down the target users and goals, the next process was to create a low fidelity model as a rough idea of what the final product might look like.

There are two parts of building this application. First, need to create the base map that would be used as the foundation for the application. This base map is generated on the ArcGIS Online platform. But to begin this process, the necessary data must be gathered before hand.

Majority of data were retrieved from the City of Vancouver Open Data Catalogue as referred in the data section. However, these data files required minor adjustment to be suitable for the platform. For example, the Bike Racks file needed additional information to specify the address for georeferencing the coordinates. Although, most of these data can be found online, there is one file that had to be manually gathered. The coordinates and background information of bike shops and gas stations (bike pump) were retrieved from Google Map and recorded as a CSV file. After the retrieval of data, these files are then uploaded to the Online platform for building the foundation map. Some minor analytics are performed on several files for creating the Hot Spot layers. Second, the map generated from the Online platform is then used as the base of the application. The ArcGIS Web AppBuilder provided templates that can be tweek to desired interface. With some trial and errors from using the provided tools, the product was slowly shaped.

Issues Encountered:

There are several issues that came upon during the process of making this application. The first issue encountered led to a few days stall for the progress. To use the ArcGIS Online and Web AppBuilder, user first need to set up a developer account. This account comes with 50 free credits as a test trial. However, before I acknowledge this policy, I had gone over the credit amount and led to suspension of my account. Therefore, to free the account, the plan was upgraded to 20 dollars/ month plan with 200 credits. These credits did not last long and soon the account was once suspended. The reason these credit burned through so quick was because of georeferencing the uploaded CSV files. This issue was resolved with the help of another ArcGIS platform and will be discussed later on. The next plan upgrade was 90 dollars/ month with 900 credits, which was just unnecessary for this project. To resolve this issue, an email was send to ESRI and the response was to, either join the UVIC organization or purchase more addition credits (150 bucks). Thankfully, Christopher Bone had agree to help me set up an UVIC account.

After gaining access to the new account, I had to abandon the map created on the previous account and restart a fresh one due to the account suspension. The UVIC account had some tools disabled due to the excessive amount of credits it charges. For example, the georeferencing tool was not allowed for this exact reason and was the main reason that my old account got suspended twice. This forces me to find an alternate solution for uploading my data file. With the help of ArcGIS ArcMap, these data files can be first georeferenced on this platform

and further exported as a layer file. This layer file is then compressed into a readable ZIP file for the ArcGIS Online. The UVIC account also limited the use of a lot of tools, which shifted the final product from the original plan. Regardless of this set back, the finished result still contains the usabilities that was set from the start.

Results/ Conclusion:

The finished product can be exported into multiple platforms from IOS to Android system. This allow wider selection of target users to have access to this application. The end result can be adjusted based on the user's preferences to assist their needs. For example, the Hot Spot map can be toggled between three modes: Collision Areas, Bike Theft Areas, and Bike Racks Areas. The location points can also be adjusted to helpful bike stops, bike racks locations, and public restrooms. These adjustments allow the users to have the information that is best suited for their need. Around the Main Map area, it contains useful information that might interest the bikers, mostly act as information bulletin. This was different than the original vision; the idea was to have two miniature screens presenting picture and background information based on the selected point. Due to the limitation of time and lack of experience of this tool, this idea and others had to be abandoned.

The ArcGIS Online and the Web AppBuilder are some powerful tools that allows user to easily construct a helpful app. With more awareness of the importance of cycling, the biking community in the City of Vancouver is steadily growing. This application is aimed to provide assistance to this climbing population. In conclusion, this experience had presented many frustrating scenarios, but had taught new skills and valuable lessons, such as, to solutions that can be worked around the issues.

To Yvonne, Maycira, and Tianming:

Thank you all so much for the help! Really Appreciate it! This had been a very interesting class!

Appendix:

[3] Public Washrooms:

- <u>Automated Public Toilet:</u> are available to use 24 hrs a day and undergo a cleaning cycle after each use
- <u>Comfort Station:</u> Comfort Stations are staffed washrooms with long opening hours
- <u>Washroom in Park:</u> Washroom located in park

[4] Bike Routes:

- Project Bike Lanes: A dedicated bike lane that is physical protected from motor vehicle traffic or an off-street pathway
- Local Street: A shared relatively quiet neighborhood street with bike pavement markings and/or signs
- Painted Lanes: A dedicated bike lane that is defined by paint lines and located between a sidewalk or a parking lane and a moving vehicle lane
- Shared Lanes: A shared traffic lane on a relatively busy street with bike pavement markings in place

References:

[1] Cycling Safety Study Final Report, City of Vancouver, Retrieved on March 28th 2018, from http://vancouver.ca/files/cov/cycling-safety-study-final-report.pdf

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[6] Lower mainland Bicycling Collision, ICBC, Retrieved on March 28th 2018, from http://www.icbc.com/about-icbc/newsroom/Pages/Lower-Mainland-Crash-Map.aspx#!/

[7] Vancouver bike lane traffic hits record high in June, CBC, Retrieved on April 8th 2018, from http://www.cbc.ca/news/canada/british-columbia/vancouver-bike-lane-traffic-hits-record-high-in-june-1.3166162