Mobile Bike Map:
Taking the Bikeways Mapping Application on a Ride

ABSTRACT OF THE PROGRAM

Seven years ago, Montgomery County Department of Transportation and Department of Technology Services GIS Team (DTS-GIS) published an online bike map, which they have kept up to date with new bike trails, bike lanes, and other bikeway features every year. If users wanted to take part of this helpful map with them, however, they were forced to either print it out or else try to use the online map designed for PC viewing within their smartphone's browser. In response to cyclists' need to take the map with them, in 2016 DTS-GIS implemented a new Apple iOS application ("app") that allows cyclists easier access to the GIS database of bikeways in the County. In the current phase of the app, users can not only view the bikeways on the map but also submit service requests, such as suggesting new trail connections or informing the County DOT of bikeways in need of repair. An upcoming addition to the app will automatically tell users about features near them, including bikeways, County facilities, and road construction.

THE PROBLEM OR NEED FOR THE PROGRAM

Even the best browser-based bicycle mapping application only helps those planning their rides on a (stationary) computer before leaving the house. Printouts can get beat up in a hydration backpack, and a browser-based app can be clumsy to use in a browser on the small screen of a smartphone. It was apparent to Montgomery County's DOT and DTS-GIS teams that a dedicated mobile application could provide a more streamlined interface for users who want to take the map with them. Additionally, because mobile app users are on location when using the app, a mobile mapping application has an opportunity to offer features that simply wouldn't make sense to provide to indoor users on their desktops and laptops. Automatically zooming to the current location, describing the nearest bikeway or other map features, and submitting service requests to Department of Transportation staff are all features that make great sense for a mapping application that cyclists will take with them on a ride.

DESCRIPTION OF THE PROGRAM

Because a browser-based version of the application already exists and has been maintained for years, most of the content of the mobile app was already created. A GIS layer of bikeways is updated every spring – in preparation for DOT's publication of the latest folding paper map – for the most recent trails, bike lanes, signed on-road routes, sharrowed (special markings on pavement) routes, and separated bike lanes. This GIS layer is used to update a REST map service of bikeways and related labels and features, which is cached to reduce wait times for screen refreshes. A custom basemap was created as another cached map service that displays streets from the County's own up-to-date GIS street centerline data as plain white lines so as not to drown out the colored lines of bikeways that are placed atop it in the application. Both of these map services already exist, are already maintained on an appropriate schedule, and can simply be slipped into a new mobile application.

Once a basic mobile app (MoCoBikeMap) was created that displayed the correct map features, features not currently available in the browser-based version of the app were added. The first of these was the behavior when a user first opens the app; the map will automatically zoom to the user's current geographic location. Next, the functionality for submitting a service request needed to be designed and added. A user can tap a location on the map, and a clickable option to "Create Service Request" appears. Tapping on this option produces a simple form for contact information, a drop-down menu of possible issues, as well as an option to upload an attachment such as a photo. The possible issues the user can select from a menu include: Insufficient bicycle parking; Missing connection between bike paths; New bicycle path; Maintenance issue, Map issue; and Other.

As an example of the utility of the feature allowing submission of service requests, imagine trail rider and app user John Doe, who nearly falls from his bike after riding over a pothole in the middle of a bike lane. John stops riding and carefully returns to the location of the pothole. He snaps a photo, launches the MoCoBikeMap app, and taps on his current location to submit a service request. He selects "Maintenance issue" from the Category menu, enters his contact information, and uploads the picture of the pothole. The DOT Bikeways Coordinator receives an alert and views the location, contact info, and photo from a separate mapping application on her PC. (See attached screenshots.)

For this first phase of the Mobile Bike Map project, a single developer worked part-time on the project for three months.

The next phase of the project, which is already in the works, will additionally provide the user with lists of nearby features. Most obviously, bikeways within a certain radius of the user's current location can be displayed. Also within a certain radius, places of interest that may serve as destinations or rest stops for cyclists such as recreation centers, libraries, and other County facilities, as well as private facilities such as shopping centers can be listed. Since the County already implements map services showing DOT road and sidewalk construction in the County, the app could also be set up to notify the user if there is any current construction within a specific radius of the current location. The app's developer expects this next phase to take one to three additional months, again part-time.

USE OF TECHNOLOGY

ESRI's ArcGIS Desktop and ArcGIS Server were used to create the local map documents for bikeways and the basemap and then create map services that can be consumed by the application. ArcMap and ArcCatalog 10.2.2 were used. The bikeways data has been maintained for several years by DTS-GIS in a geodatabase using ArcMap. To create the mobile piece, Swift was used to create the iOS app. ArcGIS iOS libraries were used to put GIS functionalities into the app. A feature service hosted on ArcGIS Online was created for the map service requests. And the WebAppBuilder included in ESRI's ArcGIS Online platform was used to create the app that allows DOT to review service requests.

THE COST OF THE PROGRAM

The ESRI products (ArcGIS Desktop and ArcGIS Server) are already licensed by DTS-GIS and used for a variety of projects. The developer of the app has a personal Apple Developer account, for which he pays $99 each year.

The RESULTS/SUCCESS OF THE PROGRAM

The app is currently in its first phase and has not been heavily advertised. Still, as of this writing, 55 users have downloaded the app, likely based on word of mouth from DOTs monthly meetings with the bicycling community. We expect wider use later in the year after the app is more heavily advertised.

Other divisions of DOT and other County departments also see the potential of this mobile map app. Highway services sees applicability of this for pothole report, tree down report, or advising citizens of road closures.

WORTHINESS OF AWARD

The MoCoBikeMap app for iOS allows County cyclists (with an iPhone or iPad) to take the County's bike map with them on rides and while on location report relevant issues to the DOT Bikeways Coordinator.

The app leverages the County's investment on GIS basemaps for an 'about time' app for the cycling public. The editable (by GIS or DOT) GIS DB feature service was utilized to show and manage the issues reported by the cyclists. The app enables the County to provide the cycling public a useful online service right on their iPhones. It takes advantage of powerful online map and editable feature service for both the public using bikeways and the DOT staff responsible for maintaining them.

SUPPLEMENTAL MATERIALS (attached)