

MashUpABQ!

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December 2, 2012

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“Now, more than ever, as a City we must understand, uncover, and embrace technology and innovation. These initiatives can help save taxpayer dollars, provide more efficient services, and take Albuquerque to the next level with technology.”

—Mayor Richard J. Berry

1 Overview

MashUpABQ! was created by a team of students in the Informatics Laboratory at the University of New Mexico under the direction of Professors Heileman and Abdallah. MashUpABQ! consists of a Web application and an iPhone/iPad application that work together in order to allow City employees, Albuquerque residents and visitors to collaborate through data-driven interactions. These interactions take place within a mashup framework that includes the City of Albuquerque data sets, as well as data sets from other arbitrary sources. In addition, users may add their own annotations to any data set, which may include photos taken through the MashUpABQ! iPhone/iPad application or the Web application itself. Using the iPhone/iPad app, these annotations are automatically tagged with location information that allows them to be displayed as a part of the mashup framework.

The goal of MashUpABQ! is to enable collaborations over data sets that allow new information to be uncovered, leading to discoveries that may produce more efficient city operations, and an improved standard of living for Albuquerque residents. Specific examples of how the Web and iPhone applications associated with MashUpABQ! can be used to achieve these goals are provided in Section 3.

2 MashUpABQ! Apps

MashUpABQ! consists of two applications, a Web application that contains the mashup framework along with a backend database that stores annotations, and a iPhone/iPad application that allows users to create annotations and also associate photos with specific annotations.

2.1 Web App

The Web application, accessible via <http://abqcity.herokuapp.com>, provides a mashup framework that integrates Google Maps with arbitrary data sources. The mashup interface is shown in Figure 1. In this figure, the map appears on the left, and the available data sources that may be mashed and displayed on the map appear in the panel at the right. The data sources initially shown in this panel include all of the City of Albuquerque data sets that are “geo-locatable.” A user may select any combination of the data sets shown in this panel, and they will be displayed on the map after the “Display” button is clicked.

In the case of Figure 1, a user who is interested in visiting a historic site in the City has mashed-up the Registered Historic Places, Transit Routes and Bike Paths. The user is then able to click on any of the items that are displayed on the map in order to learn more about

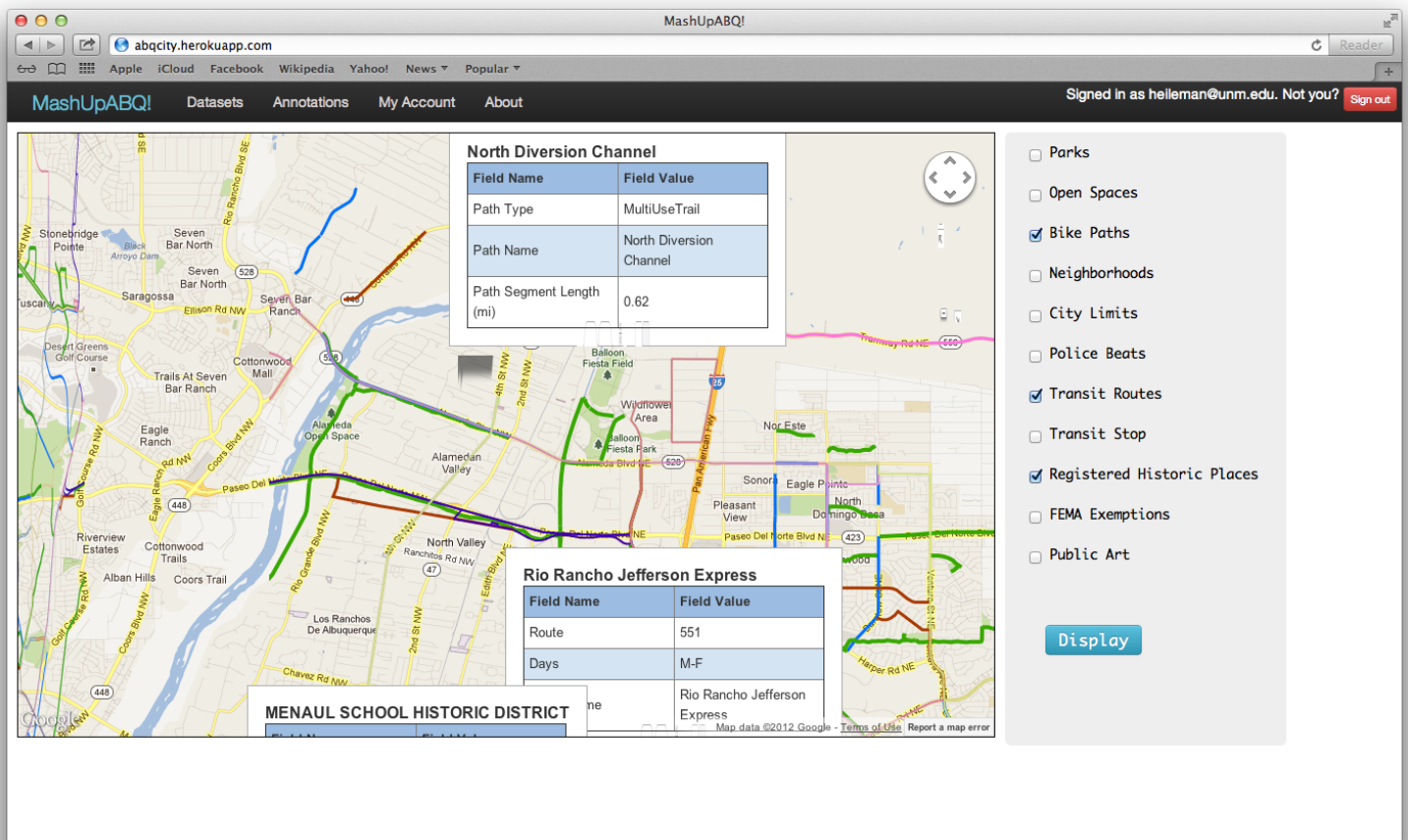


Figure 1: The MashUpABQ! mashup framework.

them. In this case, the user is interested in visiting the Menaul School, and he has been able to explore his options with regards to taking the bus, riding his bike, or both.

There are two types of users associated with the Web application, administrators and regular users. A regular user (or user) may sign up and create an account. Once this step is completed, users may mash up any number of the available data sets, and may make annotations to the data sets according to anything they may have discovered while exploring and combining the data sets.

Administrators have the same capabilities as users; however, they also have the ability to create new data sets. Currently the application is configured so that only an administrator can create a new data set, but any other user may contribute to the data set once it has been established. The application could easily be configured to allow any user to create a new data set; however, the proliferation of data sets may lead to a site that is difficult to navigate. Thus, we envision that users may make suggestions regarding new data sets to an administrator, and she may select among these in order to create ones deemed appropriate. Indeed, the capability of accepting suggestions, e.g., a “Suggest a New Data Set” button, could easily be added to the application.

The framework supports the addition of new data sources in a very flexible manner. Specifically, an administrator may create a new data source by simply giving it a name, as shown in Figure 2. In this case, the annotations associated with this data source are stored in the backend database associated with the Web application. If other data sources already exist online, they can also be pulled into the mashup framework, as long as they are “geo-locatable.” Specifically, any online data source related to Albuquerque that makes use of the Keyhole Markup Language (KML) can be pulled into the MashUpABQ! Web application. An administrator only needs to supply the URL of the data source, and the application will take care of the rest. In order to experiment with these administrator capabilities, please log in to the MashUpABQ! application using the email `admin@unm.edu` and the password 123456. Once you have logged in, select the “Add a Dataset” button, and the interface shown in Figure 3 will appear. Through this interface, an administrator may add new data sources (which will lead to the interface shown in Figure 2, or edit the URL associated with existing data sources. In the case of the new Graffiti data source, once it is added, it will appear as a mashable resource for all users, as shown in Figure 4.

Currently the annotations associated data sources are stored in a backend database that is a part of the MashUpABQ! application. The City may wish to serve as the curator of these annotations, but this is not required. An example of the type of annotations that might be associated with the Parks data source is shown in Figure 5.

The MashUpABQ! Web application was built using the Ruby on Rails Web application framework with a Postgres production database backend. The code for this application may be downloaded from <https://github.com/udaykadaboina/MyCity>. The Web application is currently deployed to the Heroku cloud application platform (accessible via <http://abqcity.herokuapp.com>) using a minimal amount computing resources. The current configuration is sufficient for a few users; however, if a larger user base is to be supported, the application’s resources must be scaled up within Heroku. This is very easy to do, but it does involve additional (fairly minimal) costs. Thus, please inform us if you would like us to scale the application’s resources up so that you may test it with a larger user base.

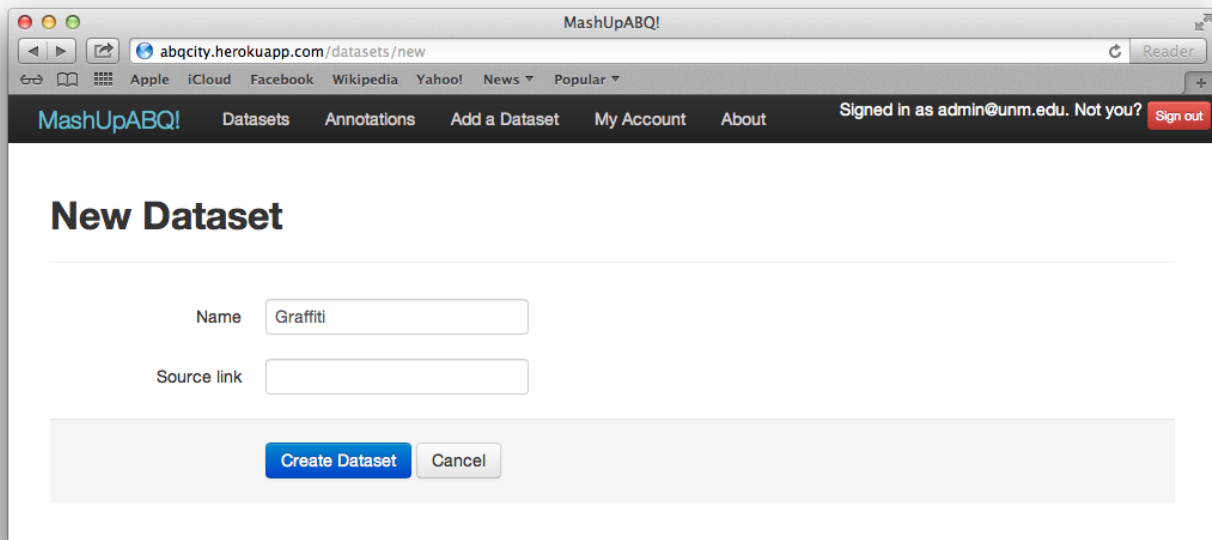


Figure 2: Creating a data source for tracking the appearance of graffiti in the City.

2.2 Mobile App

There are two ways that a mobile device may access MashUpABQ! First, if a mobile user visits `http://abqcity.herokuapp.com` using a mobile Web browser, the MashUpABQ! Web application detects that a mobile device is in use, and modifies the HTML that is delivered to the device so that it scales accordingly. Annotations with attached photos may be uploaded through this interface, but at present the geo-coordinates must be entered manually. Second, we have developed an iPhone/iPad mobile application that works in conjunction with the Web application. This application allows users to annotate a data source through their mobile devices. These annotations may include photos that have location information automatically attached to them. Within the Web application, the annotations with geo-coordinates show up as pins on the map whenever the associated data source is selected.

The iPhone/iPad application is not currently available for download from the Apple App Store, as it must first undergo certification by Apple. We are in the process of making the application available for distribution through this channel. In the meantime, we are able to demonstrate its functionality through a simulator or on a “jailbroken” iPhone or iPad. The interface provided by this application is shown in Figure 6. Notice the in this example a user is able to easily create a geo-located annotation, associate it with a data source, and also attach a photo as evidence. The code associated with the iPhone/iPad application may be downloaded from `https://github.com/phanik29/CityMobileApp`.

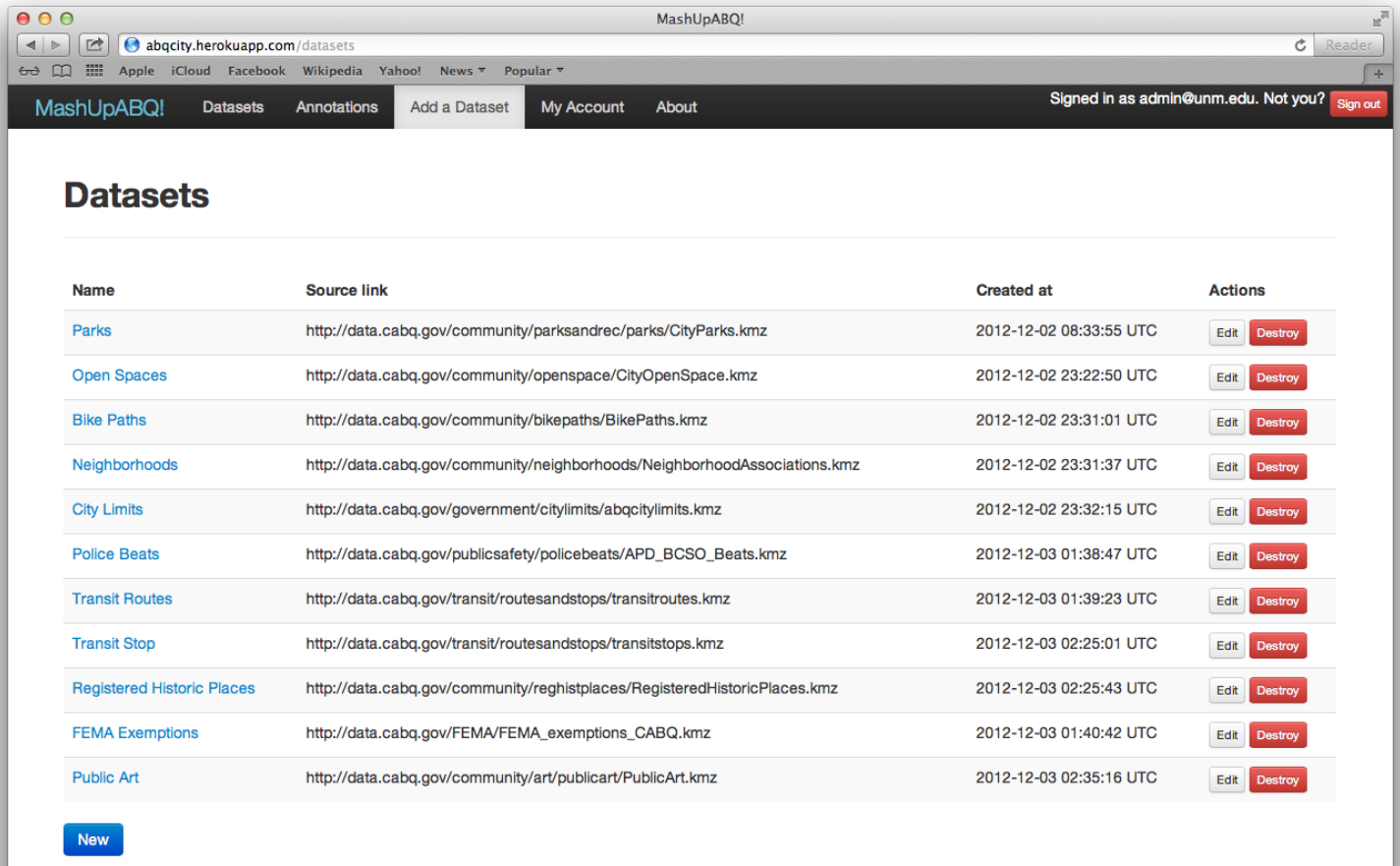


Figure 3: Adding/editing the data sources that may appear in a mashup.

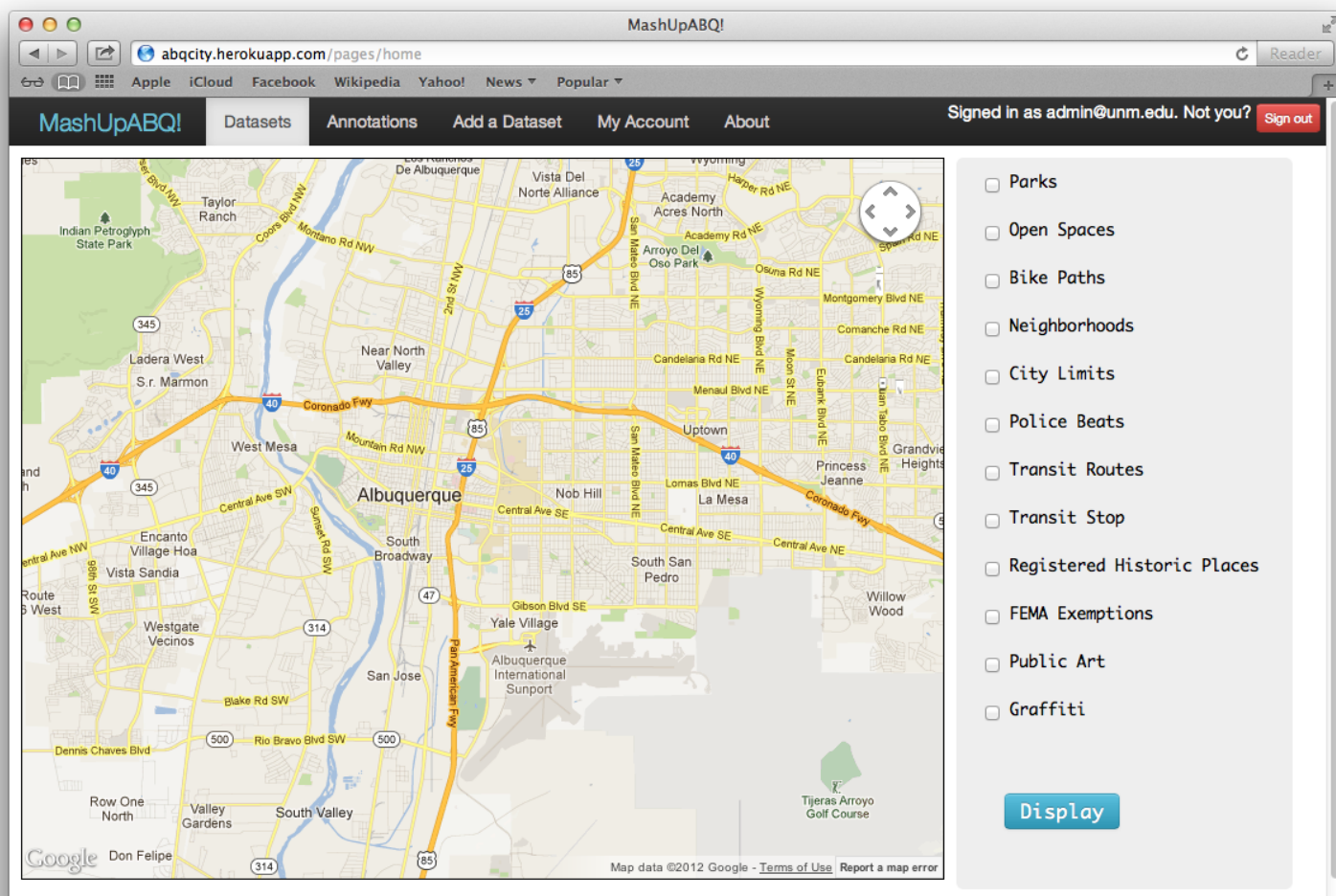


Figure 4: A new data source for Graffiti appears in the data source panel. This data source may now be mashed with any other data source.

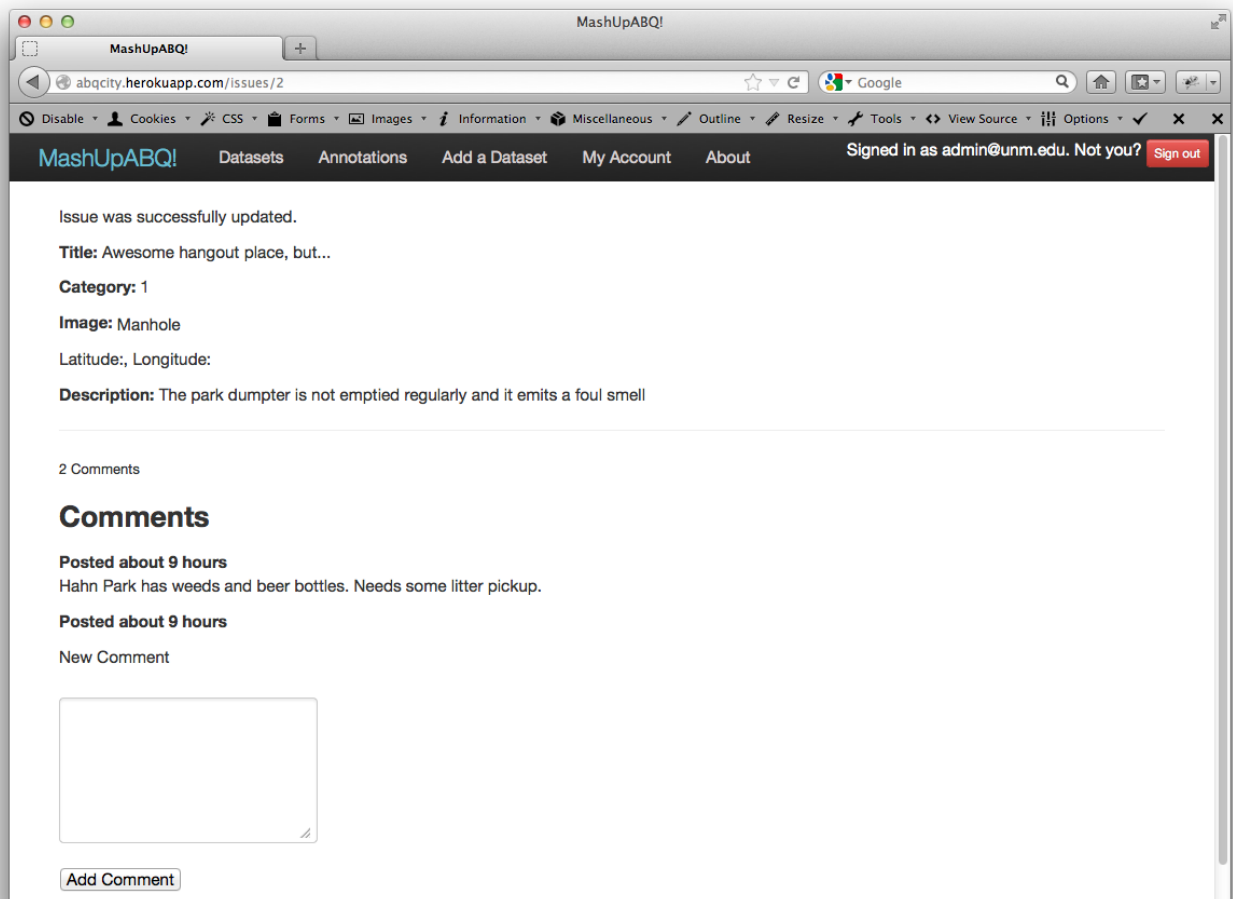
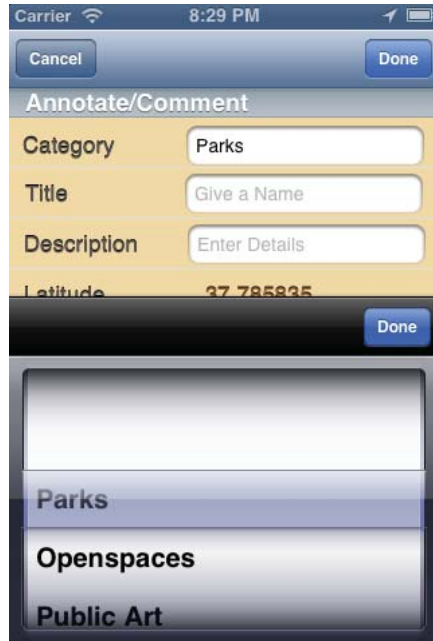


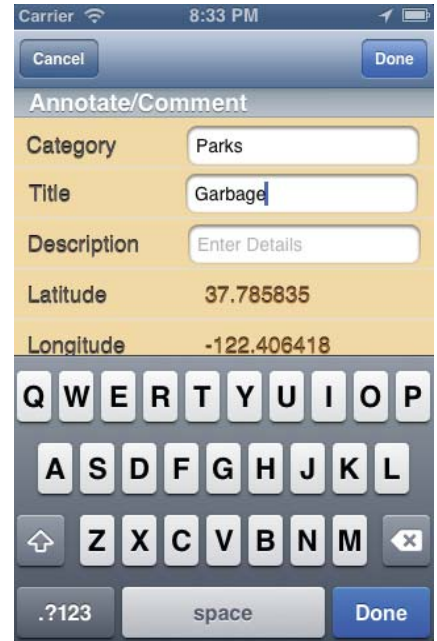
Figure 5: Annotations associated with the Parks data source. These annotations are displayed on that map as pins when the data source is selected for display.



(a)



(b)



(c)



(d)



(e)

Figure 6: An iPhone/iPad app for adding annotations, and associated photos, to data sources. (a) The initial interface, with geo-location automatically added. (b) Selection of the data source the annotation will be associated with. (c) The title of the issue. (d) The description of the issue. (e) Uploading a photo of the issue.

3 Example Uses

MashUpABQ! provides a platform for innovation and decision-making tied to data-driven interactions. Below we provide a few examples of how MashUpABQ! may be used to improve various aspects of City operation or quality of life. It is important to note that these examples are only representative of the potential capabilities of this application. City workers and Albuquerque residents will find inventive ways of using this technology that cannot be anticipated or imagined at this point in time, and this is in fact the reason we created the framework to operate in such an open manner.

3.1 Graffiti Cleanup

A City manager responsible for graffiti cleanup may create a data source for Graffiti that allows users across the city to upload pictures of graffiti incidents (e.g., Figures 2 and 4). This worker may advertise this throughout the city, asking residents to report these incidents using MashUpABQ!. On Monday morning, the manager may review the submitted images and plan clean-up operations for the week accordingly. For example, by looking at the images, a worker can determine the approximate color of paint that may be needed to cover the graffiti, and the City manager can use the map information to plan clean-up routes in manner that minimizes travel and therefore conserves gasoline. Indeed, optimal route planning is an application that could be easily added to MashUpABQ! in a future iteration.

The Graffiti data source, constructed as described above, might prove useful to other entities within the City government as well. For instance, Police can use the images to classify the graffiti (e.g., is it gang related?), and also study its relation to other data sources. For example, by mashing the Graffiti data source with transportation-related data sources, Police might be able to determine the transportation modality that many graffiti vandals are using (e.g., are many of the incidents close to bike paths?). Given the mashup capability, it also becomes much easier to view the relationship between graffiti incidents and neighborhoods, allowing the Police to plan interventions accordingly, and the City to market selectively to these areas.

3.2 Issue Reporting

There are actually a number of issue-reporting web applications that are being marketed to cities across the country. These applications allow users to simply log an issue, and possibly attach a photo to their reports. City workers can then use the web application to track how these issues are dealt with. The MashUpABQ! application automatically includes this functionality; however, with the additional important benefit that these issues can be mashed-up with other issues. This may prove valuable if the issues confronted by the City are related in any way to other data sources. For example, the MashUpABQ! can be used to visualize reported issues by Neighborhoods, their relationship to Police Beats, Public Art, etc.

4 Future Development

The current version of the MashUpABQ! applications are only the beginnings of what we have planned. We plan on incrementally enhancing these applications over time. Some of the upcoming planned enhancements are listed below, and we expect other suggestions for improvements will be provided by City workers and Albuquerque residents. The planned near-term improvements include:

- Data source groupings – The data sources currently listed in the righthand panel are “flat.” As more data sources are included, we will build a tree-based structure that groups the data sources according to their area, and allows users to expand and contract these groupings.
- Android platform support – Once the iOS development is completed, we will work on a similar Android version. Using an Android device, you may currently add an annotation, but the geo-location is not automatically added.
- User management – The user management for administrators is currently very simple. In the future we will add role-based access control to the system.
- Ability to move notes on map – Currently the notes appear on the map in a static location. In the future we will allow these to be moved around on the map, allowing a City worker to create reports with appropriate notes shown on the map.