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## FINAL REPORT

# Development of Mobile Mapping Technology to Facilitate Dialogue between Transportation Agencies and the Public

OTREC-TT-12-01

February 2013

# DEVELOPMENT OF MOBILE MAPPING TECHNOLOGY TO FACILITATE DIALOGUE BETWEEN TRANSPORTATION AGENCIES AND THE PUBLIC

## Final Report

## OTREC-TT-12-01

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16. Abstract

The purpose of this proposal, Development of Mobile Mapping Technology to Facilitate Dialogue between Transportation Agencies and the Public, was to develop enhancements in mobile application functionality as well as develop a model that facilitates a direct, two-way exchange of data between citizens and transportation authorities. The project demonstrated a process by which transportation authorities are now able to "push" quantitative data to public users and also instantly "pull/receive" qualitative assessments back. Data is exchanged live and dynamically. Application users can reference current spatial data and provide mobile feedback instantly at the moment of observation. Through the application, road authorities and decision makers have real-time access to collected data for analysis by planners and researchers.

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# DISCLAIMER

# EXECUTIVE SUMMARY

The goal of this grant was to take the technological innovations for deploying survey instruments to mobile phones, developed under a previous OTREC grant, and publish them as globally accessible mobile applications (apps) for use in a variety of transportation planning settings. Under this grant, three applications have been developed for three distinctly different user groups. The first, JLA Involve, was developed and deployed for JLA, a Portland, OR.-based public involvement firm, to support their work with the City of Tualatin, OR., in updating their Transportation System Plan (TSP). The second was developed and deployed for the City of Eugene, OR., and allows citizens to submit bike-lane service requests directly to the City's internal Work Ticket (MMS) system for quickly responding to and resolving requests. The third application, Make It So, was developed and deployed by University of Oregon (UO) transportation researcher Marc Schlossberg, and makes generalized mobile survey instruments available to other transportation researchers around the world through Apple's App Store. All are utilizing Esri's API for iOS or Android to maximize the potential for recipients of mobile-generated data to incorporate it directly into their existing spatial data management/GIS systems and workflows. Two graduate students were funded to work on this project.

# 1.0 BACKGROUND AND OBJECTIVES

Communities, agency transportation planners and researchers nationwide are engaged in efforts to foster dialogue between themselves and the public they serve.  The National Highway Research and Technology Partnership's *Highway Research and Technology* report identifies the need to improve understanding of the interactions between transportation agencies and society as a priority, and sees an emerging technological structure that is heavily linked to information technologies.  In this project, we seized the potential to generate real-time, two-way dialogue between the agencies responsible for planning, creating, and maintaining such infrastructure and the citizens who use it.

This project focused on the evaluation of walking and biking environments by furthering the development of mobile phone applications used to assess the variety of elements that comprise these infrastructure systems.  The purpose of this proposal was to develop enhancements in application functionality as well as develop a model that facilitates a direct, two-way exchange of data between citizens and transportation authorities. More specifically, the project objectives were to:
1. Develop a two-way dialogue/exchange around pedestrian and bicycle infrastructure.
2. Put a more sophisticated tool in the hands of users.
3. Engage road authorities directly in the process.
4. Reduce cost.

# 2.0 PROJECT DESCRIPTION

**2.1 "JLA Involve" – Public Involvement Application**
We worked with JLA, a Portland-based public involvement firm, to create a mobile survey app called "JLA Involve" for use in their work with the City of Tualatin in updating their Transportation System Plan (TSP). This provided an excellent testing environment to determine how a mobile app would be used by both citizens and planning professionals. Our previous grant used a recruited pool of users (engaged, active members of the planning topic), but didn't test how overall use and adoption might actually be implemented. This was something we were eager to explore.

This app was put into side-by-side use with other, traditional public involvement methods. Advertising and recruitment was done at an equal level as other methods and was handled entirely by JLA and City of Tualatin staff. This was an important aspect for ascertaining the true potential of a mobile tool for soliciting citizen input. We wanted to see if the public would really use it and to what degree. In particular, we wanted to see how citizens, familiar with existing modes of public involvement in transportation planning projects, might embrace a new technology, as well as how professionals in the field of public involvement would make use of the incoming data as compared to traditional modes.

Project staff at the UO InfoGraphics Lab developed the JLA Involve app in similar fashion to FixThis 1.0 (funded by previous OTREC grant – see below), but shifted from the basic Apple Map Kit/Google Map interface to Esri's API for iOS to take advantage of more sophisticated spatial functionality and custom mapping tools. This also provided an opportunity to more easily incorporate the resulting data into traditional GIS databases and software for mapping and analysis, rather than translating Google Maps KML files. The survey instrument was designed by JLA and City of Tualatin staff and incorporated into the application.

**2.2 "iBikeEugene" - Bike Path Service Application**
Working with the City of Eugene's Public Works Maintenance Division, we developed a custom mobile application that puts citizen bike-lane/path-work requests directly into the City's internal Work Ticket system (MMS). This provided an excellent parallel testing environment to determine how a mobile application could be best integrated into existing agency workflows. Our previous work produced data that was external to the public agency responsible for maintaining local transportation infrastructure. Our work on this project with the City of Eugene Public Works Maintenance staff indicated that an application producing citizen-generated data and maps on an external website or web application (something we or another external group would host) would actually be counterproductive and would not be something they could support. Our goal was therefore to explore a method by which citizen-generated requests for service to bike lanes could be fed directly to their MMS in a manner they could embrace and support and, most importantly, enable city staff to respond to and address incoming requests.

**2.3 "Make It So" – Mobile Survey and Mapping Application**
The development of the JLA Involve app laid the groundwork for how to publish an iPhone application to Apple's App Store in a way that conformed to Apple's strict app development

criteria.  In particular, protocols for how an application can access a user's GPS location and transmit that location to another data service needed to be addressed. The previous version of FixThis was directly loaded to iPhones that either we supplied as part of the grant or project participants provided themselves. This is known as "local provisioning" and does not require Apple to review and approve the application for publication.  It is a frequently used testing method prior to full Apple App Store publication.

Building on these methods, Marc Schlossberg has made refinements to the original survey instruments used in the FixThis prototype iPhone app, and created three new surveys that can be purposed to any transportation project. These surveys are being incorporated into Make It So and will be published to Apple's App Store in January 2012.

# 3.0 OUTCOME AND RESULTS

## 3.1 JLA Involve
The JLA Involve app was published in Apple's App Store on August 3, 2011.

City of Tualatin Transportation/Planning staff (10 total) engaged the citizens of Tualatin at 12 public events over the summer, such as the Farmers Market, Concerts in the Commons, Crawfish Festival, etc. At these events, staff hosted an information booth to inform citizens of the Transportation System Plan Update and the opportunities for public involvement in the process, featuring the JLA Involve app as a new mode for input. JLA planners estimate hundreds of citizens saw the poster, which contained a large iPhone image, and received information about the new mobile survey app. In addition, the app and its incorporation into the Tualatin TSP Update process was mentioned in an article in the Oregonian.

The JLA Involve app has an "about" screen that identifies OTREC as the funder and points users to the OTREC website. The Tualatin TSP Update and JLA Involve app segment of this OTREC project was successful at introducing the concept of mobile survey/mapping apps being incorporated into public involvement and transportation planning projects. JLA received very positive feedback from participants and other colleagues and perceive the technology as viable and something they wish to continue to use in the future. However, in contrast to the great response and excitement for the app, it was actually used very little (downloaded only 103 times). A great number of these downloads were from outside the United States and the total number of data points sent back to the server from within Tualatin were minimal. We saw a greater number of points being logged outside Oregon and outside the United States. We also received several inquiries from planning/public involvement firms about using this technology to develop a similar app for their projects.

Both the staff at JLA and the project staff at the InfoGraphics Lab were surprised by the low use of the published app, especially in light of how much enthusiasm and interest there was when the application was launched. However, JLA indicated their continued interest in using the app on upcoming projects and still see it as viable technology. Their experience has shown that nearly all of the new methods they've tried have had initially low use on the first pass. Some initial observations are that their typical participants tend to be citizens in their 50s or 60s, and that this demographic may be less likely to be early adopters of mobile technologies.

## 3.2 "iBikeEugene" - Bike Path Service Application
Two native mobile applications have been created for the City of Eugene, one for iPhone and one for Android, that are successfully sending mobile service requests for Eugene's bike lanes directly to the Public Works Maintenance MMS system. These mobile requests are incorporated into the same workflow methodology as internally logged, dispatched, serviced work ticket items. Service requests are assigned to an employee, the employee is dispatched, and the request is resolved. Both iPhone and Android versions of the apps are currently being used internally among City of Eugene staff for final beta testing and awareness building within different City departments. The apps are scheduled to be released for public use (in Apple's App Store and Android Marketplace) in January 2012. Both applications will have "about" screens that will reference OTREC as instrumental in funding the development of this technology. The City of Eugene and UO are both currently preparing press releases and other PR materials that also will

cite OTREC as instrumental in this collaborative endeavor between a local government and university.

Adapting the technology and primary methods from the other OTREC-funded applications was fairly straightforward, and we were able to easily capitalize on the early implementations of FixThis and JLA Involve to develop this application. The largest hurdle to clear was developing a legal agreement that would address the intellectual property, licensing and nondisclosure aspects as well as ongoing maintenance of the application. In order to develop this kind of application, the City needed to expose secure and sensitive data/web services to the lab to accommodate the transfer of service requests from our application running on the mobile device. The UO's Director of Technology Transfer was instrumental in developing the contract language that satisfied both parties. The application code and software "tools" developed by the InfoGraphics Lab remain our property and are available for use on future projects, but the back-end procedures and methods of the City's systems remain protected and exclusive to only their use. A portion of cost share from this OTREC grant for Ken Kato and funds for graduate teaching fellow Dana Maher were used to develop these applications. The City provided funding for other key staff (not on the OTREC grant) to develop and maintain the application.

This application and the collaboration with the City of Eugene are excellent outcomes of this OTREC-funded grant. A key question of this grant was how best to link citizens with the agencies that service transportation infrastructure. We see tremendous potential with the City app in that the connection between using the app and seeing an issue being fixed is so clear. In a presentation to the City Council's Bike and Pedestrian Subcommittee, committee members and citizen members of the audience were extremely enthusiastic and eager to embrace the technology and encourage citizens to make use of it. We see it as successful as it removes us from the role of data collector, manager, steward, etc. – a role that we cannot perform without dedicated funding – and puts data directly in the hands of those with the mandate to work with citizens to improve their local transportation issues.

### 3.3 Make It So
As noted above, Make It So will be published to Apple's App Store in January 2012. This application will make direct citation to OTREC. This app and the surveys it contains will be globally available. User-generated data will be fed to the database servers of the InfoGraphics Lab and exposed to Marc Schlossberg for use in further research.

### 3.4 Related Technology Transfer of the OTREC-Funded Project
Related to the mobile survey explorations funded by this grant, the InfoGraphics Lab developed another mobile application for the UO – "UOregon" for iPhone (Android to be released in January 2012). Many of the same team members working on the OTREC project worked on the UO project and, although it wasn't funded by OTREC and doesn't incorporate a mobile survey component, many of the spatial and mapping concepts in the app drew inspiration from the OTREC explorations.

The UO application has been wildly successful for the InfoGraphics Lab. The application has been downloaded more than 70,000 times since September 2010 and maintains a 4-star rating in the App Store. The app has an "about" screen that directs users to a mobile website to learn more

about who created the app. This site makes direct reference to OTREC and its grant funding as laying the groundwork for the innovations in this highly successful application.

This application resulted in our being awarded a Special Achievement in GIS Award from ESRI, from over 100,000 entries worldwide. This award was announced at the ESRI 2011 International User Conference in San Diego, attended by over 12,000 people and publicized by ESRI on their website, blogs, and Twitter feeds. The official website for the award winners identifies OTREC and the grant as laying the groundwork for the collaborations and innovations of the application (http://events.Esri.com/uc/2011/sag/list/?fa=Detail&SID=1263).

In addition, at the 2011 ESRI International User Conference, the UO application was awarded the Best Mobile Application by attendees (apps were running on devices in the main exposition hall). We also presented two talks (each attended by 200-300 people) and a poster at this conference, all of which identified OTREC. Both of the awards and the resulting publications have referenced OTREC and pointed readers to our mobile application webpage, which mentions OTREC and has a direct link to OTREC's website. Our website analytics indicate this page in our website has been uniquely viewed over 2,500 times. Two of the publications that covered the application, ArcNews and ArcUser, have combined circulations over 100,000.

# 4.0 FURTHER ACTIVITIES

Each of the applications and projects completed under this grant are continuing on with other funding.

JLA remains excited by the potential to integrate mobile survey apps into their public involvement projects. They have included a mobile survey application component in several of their RFP responses and have received positive feedback from the potential project sponsors. The app will remain in the App Store and as projects (and funding) emerge, more surveys will be added and new functionality developed. The lab has also made plans with JLA to develop an Android version as well.

The City of Eugene and the lab have established an interagency agreement by which to support the iBikeEugene app as well as continually innovate it and develop added functionality. Under this agreement, the lab and City are beginning to explore added functionality that will place the citizen-generated transportation infrastructure service requests directly onto the mobile device (iPad is expected prototype) within the City's response vehicles. This has the potential to dramatically reduce the time and resources needed to respond to a request.

The InfoGraphics Lab and Marc Schlossberg will continue to collaborate on the Make It So app, and will continue to mature the underlying technologies and concepts behind both Make it So and FixThis. The InfoGraphics Lab and Marc Schlossberg will support the Make It So app while it's in the iTunes store and in use. Together, they plan to seek funding and partnerships to maintain long-term support of citizen-based transportation mobile GIS/mapping applications. In particular, they are looking to adapt some of the most innovative elements of the UO app – such as the advanced routing functionality – to the Make It So app.

# OTREC
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