

**Meals-on-Wheels Android App**

(Technical Paper)

**The Importance of Public Engagement in Eliminating Environmental Injustice**

(STS Paper)

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**Kevin Luk**

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Signature \_\_\_\_\_ Date \_\_\_\_\_

Kevin Luk

Approved \_\_\_\_\_ Date \_\_\_\_\_

Daniel Graham, Department of Computer Science

Approved \_\_\_\_\_ Date \_\_\_\_\_

Sean Ferguson, Department of Engineering and Society

## **Introduction**

The Meals-on-Wheels program in Charlottesville, Virginia has historically been a paper-based company. Staff members shared all their information through paper, which resulted in an excessive amount of paper being wasted. In recent years, the increased attention towards environmental protection and sustainability caused the Charlottesville Meals-on-Wheels program to reevaluate its paper use. ZippyZen, LLC created a web application and an iOS app for the program in order to decrease the amount of paper being used as well as create a more efficient method of sharing information. However, Android users within the staff were left out of this solution since an Android app did not exist, resulting in them remaining using paper.

The purpose of the technical project is to create an Android application that will allow the Meals-on-Wheels program in Charlottesville to better organize information and continue to reduce paper waste. Our goal is to provide another form of technology that will program participants to stray away from using unneeded paper. Not only will this app create an easier way for staff members to organize data, but the switch to being paperless will be more environmentally friendly and tackle the dangers of destroying the environment.

The focus of my STS research will revolve around exploring the importance of public engagement when it comes to fighting environmental injustices. Learning about how communities have taken the initiative to begin the change that is needed to solve their problems is crucial when assessing methods of mitigating environmental injustice and how communities should go about bringing their issues to light.

## **Technical Topic**

The Meals-on-Wheels program in Charlottesville, Virginia, needed an Android app to go alongside their preexisting web app and iOS app to allow vendors from all platforms to keep track of volunteers and clients and ensure that meals were being delivered to the right locations, as well as continue their initiative to reduce their paper waste.

The design of the Android app was based on the already existing iOS version of the app. As a result, the code base for the iOS app was used as a reference for the new code base for the Android app. I used Kotlin as the programming language to write the app because it is fast to compile and lightweight, and SQLite as the relational database management system due to its ability to be a server-less database. The app was developed in Android Studio, an Android development environment. The work that I focused on within my team was to design and create the screens for the app as well as implement database functionality with the app.

Using the iOS app as a reference, I created the screens for the Android app to match those of the iOS app. I created the basic layout of the login screen, main menu, and individual volunteer and client screens. I also worked on implementing database functionality with the app. This app has offline functionality, meaning that if a user were to sign in to their account and lose connection to the internet, all the information fetched from the server would remain on the phone since it would be stored locally. Room, a persistence library that is part of the Android Jetpack library collection, was used to integrate SQLite into the app. This library adds an abstraction layer over SQLite which simplifies database access and validates SQL queries when the app is compiled. I used a pre-existing database file of volunteer and client information to see if the information could be queried from the app. In the final product, this database file would be retrieved from a server and then stored on the mobile device to allow for offline functionality. I used the Junit5 testing framework for testing the app.

The main problem that my team and I faced was figuring out how to integrate SQLite with the app. Before using Room, it was very tedious to convert between the data retrieved from the SQL queries and data objects since the data is formatted differently. It was also very difficult to ensure that the SQL queries being written were correct. These problems were solved once we learned about the Room persistence library. Another difficulty that my team and I faced was learning how to develop Android apps. No one on my team, including myself, has developed an Android app before or used Kotlin. Much time was spent learning the language and learning how Android apps are developed.

As the Meals-on-Wheels program in Charlottesville continues to grow, there must be a solution for participants of the program to efficiently access information. This solution will increase the efficiency of the program as everyone will have easier access to needed information such as volunteer and client contact information. Also, this solution will slowly eliminate the program's issue of using high amounts of paper since information will now be available on mobile devices. This early prototype of the Android app set a good starting point for future developers to continue the work. Eventually, the Android app will have the same features as the iOS app, allowing for members with Android devices to quickly access information just like their iOS counterparts.

Many aspects of the app still need to be implemented since only a very basic prototype was completed during the internship. One feature that we were working and were not able to finish by the end of the internship was the user authentication feature. During the internship, we used dummy data instead of real staff data so that it would be easier to test how the information would be displayed on the UI. Once the data was properly formatted on the UI, we began to

work on the user authentication feature so that we could simulate a staff member logging into their account to see information about their volunteers and clients.

### **STS Topic**

According to an article by the European Journal of Public Health (2010), numerous studies in Europe and in the USA have found that disadvantaged communities often suffer disproportionately from the impact of waste facilities and landfills. Especially in Europe, there is a pattern where deprived people are overrepresented in the vicinity of waste treatment facilities. Another study also found the “existence of significant racial and ethnic differences in household proximity to neighborhood industrial pollution”(Crowder & Downey, 2010). It was found that households with higher incomes are associated with lower levels of pollution compared to households with lower incomes. Race and ethnicity were also found to play a role in the amount of industrial pollution within an area. Even among householders with similar levels of education and income, black and Latino households tend to reside in areas with more industrial pollution than do white householders.

As the injustices of these groups continue to become more apparent to the rest of the world, we must begin to wonder why these issues have not been solved, especially the cases that have gotten wide exposure. In many instances, affected groups begin to take the responsibility of resolving the issues that they are facing since they are getting little to no help from others. The issues that communities face and how they contribute to solving the issues can be discussed through the framework of public and citizen engagement. Citizen science, a part of public engagement, makes “science more participatory, providing an example of the democratization of science, or, at least, more equitable engagement between experts and the lay public” (Kimura &

Kinchy, 2016). Additionally, another research paper says that community-based participatory research (CBPR) calls for the “equitable and collaborative involvement of community members and researchers in all aspects of research” (Felix, 2007). The relationship between the public and their engagement in their own knowledge and activism provides context as to how certain groups are able to enact change within their communities. Assessing this relationship is vital when describing the role public engagement has in solving environmental injustices.

### **Warren County PCB Landfill**

Public engagement played a key role in the fight for environmental justice in Warren County, North Carolina. The residents of Warren County were outraged after the Ward Transformer Company dumped toxic chemical waste near their community (Wegner, 2012). Residents framed this situation as a form of systematic racism since Warren County had the highest percentage of African American residents in the state and was one of the poorest. These residents worked alongside the civil rights groups and several prominent civic leaders and politicians to protest the Warren County landfill. This eventually resulted in an EPA response of initiating a cleanup of the land site. The engagement of the residents alongside other prominent groups and leaders is the reason why the community was able to stop the company from continuing its waste disposal practices.

### **Flint Water Crisis**

Public engagement continues to play a role in environmental injustice cases today such as the Flint Water Crisis. The Flint crisis began when Flint’s water supply was changed to the Flint River as a cost-cutting measure even though the river water was not properly treated to guard against corrosion, which allowed lead and other contaminants to leach into residents’ water.

Residents began experiencing lead exposure, which can cause brain and nervous system damage to children. Citizen scientists worked alongside an environmental engineer from Virginia Tech and tested the lead levels of Flint's water, to which they found that it contained almost 70 times the EPA recommended amount of lead in safe drinking water (Ruckart et al., 2019). A state of emergency was declared in 2015, and since then initiatives have been taking place to check and replace water pipes to ensure that residents in Flint have clean water.

Public engagement by the residents of Flint ultimately started the process of eventually getting their issues solved. Residents of Flint have framed this problem as not only an environmental injustice but a systematic racism issue. This accusation is important since state officials dismissed the concerns of Flint residents when they reported that their water quality had changed (Arbor, 2019). Like many other instances, these cases are located where poor people and people of color are concentrated (Arbor, 2019). While initiatives are being implemented to fix the water issues, residents of Flint have grown to distrust the state government for their lack of concern at the beginning phases of the crisis. This distrust and lack of concern by the government can be discouraging for others who are facing environmental injustice. However, it may also be motivating to know that public engagement has played a vital role in enacting change. It would be interesting to consider cases where environmental injustice was experienced by white people and to see if their public engagement practices led to quicker actions by the government. It is important to consider the group that is being affected may play a role in how their public engagement is perceived by others.

### **Next Steps**

While the Android app has yet to be completed, the company anticipates the new Android app will provide Android staff members with an easier method of managing and operating their meal distribution program. Currently, the app only allows for staff members to view client and volunteer information. The company is anticipating building a volunteer view of the app, allowing volunteers to access client information such as name, location, and special delivery notes through their phones. Hopefully, the use of this app will increase the efficiency of the program as well as significantly reduce the paper waste that the program generates.

As for my STS research, I plan to conduct a case study on another community that is facing environmental injustice and how public engagement has affected the status of their issues. By doing so, I can learn more about how public engagement plays a role in the fight against environmental injustice and how certain methods of public engagement may result in better outcomes than others.

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