Designing toward location-based services for the homeless population: Exploring a crowdsourcing approach for collecting the location-based needs of the homeless population

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Abstract

In this workshop paper, we report our ongoing project on developing location-based crowdsourcing services for the homeless population. Our service aims to provide food or medical care to the homeless population in a strategic location and at time in a predictive manner. Currently, services to the homeless are provided mostly through walk-in shelters and kitchens. Organizations such as Pittsburgh's Operation Safety Net have demonstrated the benefits of delivering services such as basic medical care directly to the homeless. However, little data exists on where the homeless gather or how they move across the city to use different services; most of these services function based on the information transmitted through word of mouth by service providers and the homeless population. As a first phase of our project, we are working with service providers, the non-homeless, and the homeless in the Pittsburgh area to develop a mobile phone based method of gathering data on how the homeless spend the time and the services that are needed at these locations throughout the city. We have built a prototype where multiple-stakeholders (service providers, homeless population, and everyday citizen) can report the locations of the homeless and services that they might need. We are conducting interviews with the stakeholders in order to understand what benefits and risks that they see in this kind of location-based service. We report the preliminary findings from the service providers and the non-homeless population.

Introduction

Homelessness is a devastating problem affecting people across the nation. A recent (January 2015) point-in-time count found that 564,708 people were experiencing homelessness across the United States (The State, 2016). That represents a 2% reduction from the previous year as the U.S. economy improves after the 2007 recession (The State, 2016). Yet, in Pittsburgh alone, 1,414 people remain homeless (Born, 2015) with an even larger number of untracked, undocumented homeless population during the summer. A significant threat to wellbeing for those who are homeless, especially those who are chronically homeless, is accessing services. While some shelters may co-locate services such as medical, legal, social and food, others do not. Those who are homeless are then required to spend resources and time traveling between distributed services. Additionally, subsets of the population who are homeless may feel uncomfortable accessing these services as they exist for reasons ranging from discomfort at acknowledging their current homelessness to previous disrespectful treatment or harassment at the facilities.

Instead of having the homeless community access services through fixed facilities, we are developing an application to gather data on how the homeless population spends time throughout the city and what services that they need in different locations and times, so that services can be distributed to those locations. This push-model of the service is also increasingly being adopted by non-profit organizations. For example, Pittsburgh's Operation Safety Net (https://www.pittsburghmercy.org/operation-safety-net) has demonstrated the benefits of delivering services such as basic medical care directly to the homeless. Many might not have ever received this medical care if it were not for the organization. However, little data exists on where the homeless population gathers or how members move across the city to use access services; most of these reach-out services function based on the information transmitted through word-of-mouth by service providers and the homeless population; and service providers acknowledge that there are homeless populations in the city that they are currently unaware of, especially those who recently become homeless, yet they do not know where they are and there is no method to communicate with them. Our goal is to develop a method and service for data collection and communication, in order to have a more complete picture of the homeless problem, and learn their location-based needs.

Research Questions

We explore two research questions: 1) What are social and ethical considerations in collecting data for these location-based services, especially whey they involve the homeless population? 2) How do they vary according to stakeholders?

Existing Technological Applications for the Homeless Population.

Existing applications explore various means of using location as to support the homeless community. For example, a recently deployed product in Pittsburgh called BigBurgh (www.bigburgh.com) allows members of the homeless community to report another member of the homeless community in need of immediate aid to service providers. Additionally, various applications directed toward the non-homeless population attempt to take advantage of their encounters with the homeless population. A microfunding application called WeShelter (www.weshelter.org) allows

users to 'unlock' donations for local homeless shelters by tapping on a button when they are near a person who is homeless (the idea being that it is funneling the desire to help). However, the actual funding mechanism is an ad that plays while you tap the button. NYC Map the Homeless (www.nycmapthehomeless.com) allowed users to take pictures of homeless people they encountered and tag the photo with labels such as "#Violent," "#PassedOut," "#NeedsMedicalAid," or "#AggressivePanhandling." The photos then appear on a map for all users to see. While the creator claims the intention was to support the homeless community by bringing attention to a typically invisible population, the application received negative press for stigmatizing the homeless community. (Advocate, 2015). Our goal with the development of the location-based crowdsourcing application is to collect data that can be used to serve both the short-term and long-term service needs of those experiencing homelessness. In the short-term, service-providers can use the data to address immediate needs such as delivering medical care or blankets while in the long-term data patterns can be used to make strategic decisions such as where to locate facilities or how to plan routes.

Challenges for the project

The Identity of Homelessness. The homelessness itself as an identity is complex. For example, in a study on the use of young people experiencing homelessness and social network sites, "concerning homeless status, even with attending a drop-in for homeless youth, six participants indicated they were not homeless." (Woelfer et al., 2012). Because the identity itself is slippery, defining who to locate with the application becomes a challenging and problematic issue. We are hoping to frame the application not around who is 'homeless,' but around who might utilize the services or have needs that the application could provide. These may be able to alleviate some of these identity issues.

The Vulnerability of Homelessness. Additionally, as this is a vulnerable population, we do not want to do anything that would expose anyone to risk or harm by disclosing their location. Research into the homeless population in Los Angeles found that the mobile phones and WiFi access in areas like libraries were seen as a 'safe haven' from the frustrations and dangers of life around them (Gui et al., 2016). We do not want to do anything that would reframe these technologies as spaces of distrust or danger to an already vulnerable population.

Non-Homeless Perception. Since inputting location data on those who are experiencing homelessness requires an increase of visibility of the homeless problem, we must be wary of the effect this can have on the perception of the non-homeless population as well. The SXSW Hotspots Project, where homeless people were paid to be live WiFi hotspots for the attendees of the conference, demonstrates the strong negative reaction that non-homeless may have when the homeless population becomes more visible (Koepfler et al., 2014). The project was resoundingly disparaged on social media and the web and commentators were outraged that the homeless workers were being taken advantage. However, many of the commentators did not engage with the homeless directly or have any realization that "11 of 13 people were able to do something with that money and move themselves out of homelessness" (Koepfler et al., 2014, p. 13).

Non-Homeless Resistance to Sharing Data. Another issue to consider is the public's resistance to sharing location data. Tang et al. have found that people are willing to share different specificity of location data depending on the type of application. Users are often willing to share their exact location with purpose-driven applications that involve a utilitarian direct request and one-to-one sharing. On the other hand, users are more likely to share semantic location names or use 'insider knowledge' to obscure the actual location with social-driven sharing applications. The application we are developing would sit in-between a purpose-driven application and a social-sharing one. The is one-to-many but is also purpose-driven. Since we do want exact location data, framing will be particularly important (Tang et al., 2010).

Preliminary Interviews and Speeding-Dating with Service Provider

We spoke with a male, middle-aged staff member who served as a supervisor of community health at an organization that serves the homeless population. Our goal was to understand how their organization currently collected, stored and disseminated location information on their homeless constituents as well as get the participant's perspective on how their homeless constituents might react to our service concepts. During the session, we conducted an interview focusing on how services were currently being deployed and how location data was collected, stored and disseminated. Then, we conducted a speed-dating session (Davidoff et al., 2007) with the participant. We showed the participant seven potential service concepts in order to understand how their homeless constituents might react. The service concepts ranged from having homeless shelter guests report where they were going to spend the day as they exited in the morning to having service providers report unserviced needs through an application (Figure 1).

Findings

Homeless Population's Locations in Relation to Services. The participant confirmed our assumptions about the time constituents spend accessing distributed services. He indicated that the local homeless population will often spend their time throughout the day in-between service providers.

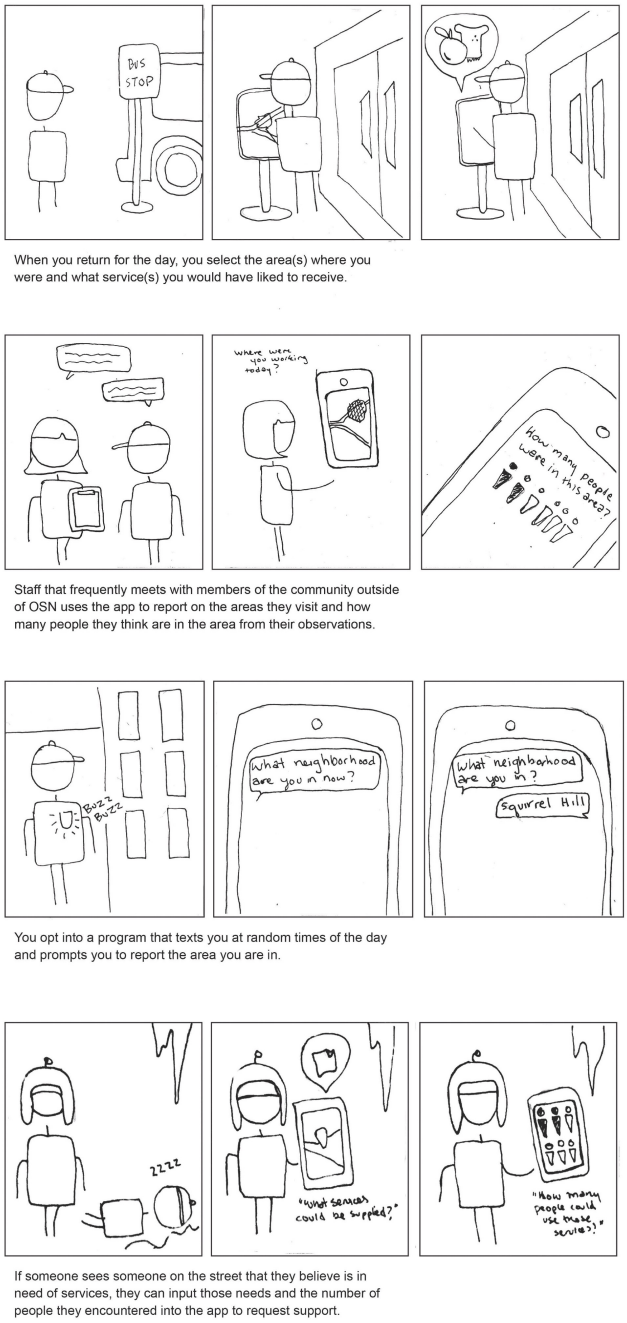


Figure 1. Example of a completed scenario building exercise where participants selected cards most likely to encourage them use the service.

The participant explained that one could draw a line between food kitchens and find the shortest path and along that line is where you will find many of the city's homeless population.

Storing and Sharing Location Data. Currently, the whereabouts of their constituents is being spread mostly through word-of-mouth. Those in the homelessness services community who have access to that information are very limited. Staff members feel uncomfortable with sharing location information with organizations with whom they do not have a close working relationship. However, the participant indicated that more information or a way to aggregate information on constituent location and pair it with needs would be greatly appreciated. For example, the participant recounted that at times, certain constituent gatherings are given more supplies than can be utilized. Those extra supplies create waste which makes the community more visible. The increased visibility of the community creates hostility between the homeless and non-homeless populations. The participant indicated that having a way to more precisely know the exact needs for a location would remedy this issue.

Likelihood of Self-Reporting. The participant expressed hesitancy about his homeless constituents self-reporting their location. The participant said that "my guys are in survival mode" meaning that they believed they (constituents) would struggle to see the benefit of inputting location information when they had many short-term concerns. Responding to the scenario depicting members of the home less population self-reporting where they would be spending the day, the participant believed that those who were more recently homeless would be more likely to see the benefit and be willing to self-report.

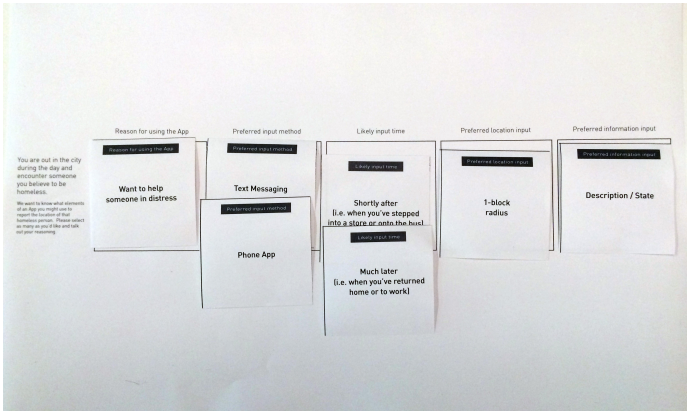


Figure 2. Example of a completed scenario building exercise where participants selected cards to complete aspects of the service.

Preliminary Interviews & Scenario Building with the General Public

Study Design

The goal of this study was to understand the non-homeless population's general attitudes toward the homeless population, understand their perception of an application to input location data and understand what features they would prefer (Figure 2). We recruited 8 participants for the study: 6 women and 2 men between the ages of 21 and 65. Most participants (6) had no in-depth knowledge of services presently serving the homeless in the area. Two partici-

pants had extensive knowledge of services presently serving the homeless in Pittsburgh and were currently volunteering with organizations serving the local homeless population. One participant had been homeless previously for a two-week period.

Findings

Reasons for Using the Service. Wanting to help someone in distress was listed most commonly (N=5) as the primary reason for wanting to use the service. One participant who did not select distress indicated that was her primary motivation but she thought that supporting that community was a better way of addressing that issue. Many participants (N=6) also said that supporting the development of services for the homeless and supporting community were secondary reasons. One participant indicated that he would be most motivated to use the application by gamification elements that would allow him to compete with his friends. He was the only participant that said he would be unlikely to use the application.

Willingness to Input Information. Many participants indicated they would be willing to input description and number of people (N=5). Whether a participant was willing to input needs was dependent on the participant's familiarity with the homeless community and whether they believed they would engage in conversation with the homeless. For example, several participants said it was difficult to know needs from just looking at someone, while both participants who had experience volunteering with the homeless community were willing to input needs. One participant who was currently volunteering said that when you talk to someone they will often indicate needs.

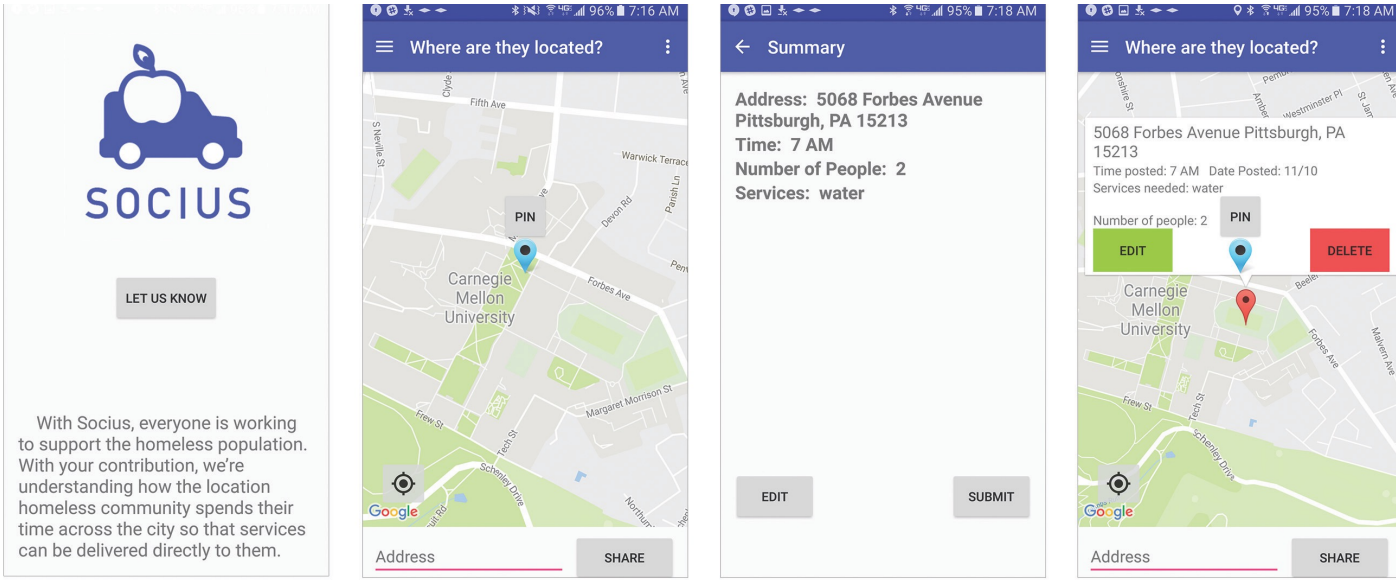
Getting Feedback. While most participants said that they did not want real-time data on where other users were reporting the homeless, participants wanted feedback on how their inputs were affecting the homeless community (N=2). Several indicated that real-time data would make them uncomfortable. However, one participant said that an incentive for continued use of the application would be to know how she would be helping to support her local homeless community.

Preferred Input Methods. Nearly all participants (N=7) preferred the phone application, mentioning reasons from not having to remember phone numbers or URLs to being able to cache data. The second most popular method was text messaging (N=5) with one participant saying she did not really use apps on her phone.

Inputting Location. All participants said that they would most likely input location data in the moment. Participants also said they would input data shortly after or much later depending on context such as location and who they were with and how busy they were. Similarly, inputting exact GPS coordinates was the most popular response (N=7) with several participants indicating they would like their phone to know where they were so all they would have to do is click.

Initial Service Concept

In the initial prototype, the non-homeless public opens the application during or after an encounter with someone they believe could utilize homelessness services. The user is prompted to enter the location of the encounter, either by allowing the application to gather their current GPS loca-



Input location | Input times, number of people, and needs | Review entry

Figure 3. Screenshots from application prototype

tion or by dragging a pin marker to the appropriate location. Then, the user is prompted to input the optional number of people they encountered, a description of the person(s) and the needs they might have. They are then able to see the location pins they have placed (but no pins other users have placed). Service providers would be able to see the aggregated pins of all users. Service providers would be able to enter information similarly to the non-homeless population. However, service providers would also have the ability to mark needs as addressed or pending for others with service provider access to see.

Discussion and Future Steps

Overall, the non-homeless population was more willing to share location data for their encounters with the homeless population than we originally expected. We believe that, rather than trying to incentivize a large population to use *Figure 3. Screenshots from application prototype* the app, it would be beneficial to focus on a population who cares about the homeless issue or who is already engaged with the homeless population through volunteer work or professional experience. This audience is already intrinsically motivated to support this community, is aware of the vulnerability of this population and is more comfortable seeking out and assessing needs.

There is a clear opportunity to leverage the ability and willingness of the non-homeless population to input this location data for the service providers' need for more and more accurate data. If infrastructures for both are linked, the application could address both short-term and long-term service needs. The general population appears to be motivated by short-term service needs — holding a model of the application where they see someone in distress, input it and it is immediately addressed by the service provider. In this way the application could act as an extension of the BigBurgh application serving a wider audience. However, in addition, as data is aggregated, data patterns could also be used by the service provider to make long-term service decisions such as where to locate a new medical clinic or how to distribute daily resources like the navigation path of the medical van.

As research continues, the research team will continue the interviews with the service providers and the homeless population to understand how acquiring data will be perceived from their perspective. The prototype will be developed and the UX flow and UI design will be refined so that it can beta tested with all participant types. If the application is well received by the communities, we would like to discuss the possibility of integrating the service with existing service providers within the Pittsburgh area.

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