Elevate: Ensuring Access to Food for Homeless Populations

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Abstract
We present a text-message system that increases access to hot meals for homeless populations. Homeless people in the United States face several challenges, a crucial one being food insecurity. Through contextual inquiry, we found that although the homeless community is aware of various sources of free food, most of the information is spread through word of mouth. This leaves knowledge incomplete, inconvenient for those on the move, and difficult to remember. We address these issues with a system that allows homeless users and their supporters to update and receive notifications about locations serving free hot meals in a given area, using technology they already have access to – their (often non-smartphone) mobile phones. The system was prototyped, and an initial round of testing was completed with a homeless community in southern Michigan.

Author Keywords
ICT for Homeless; Food insecurity, Improving information access, Underserved populations

ACM Classification Keywords
H.5.2 [User Interfaces]: User-centered Design, Interaction Design, Input Devices and strategy;

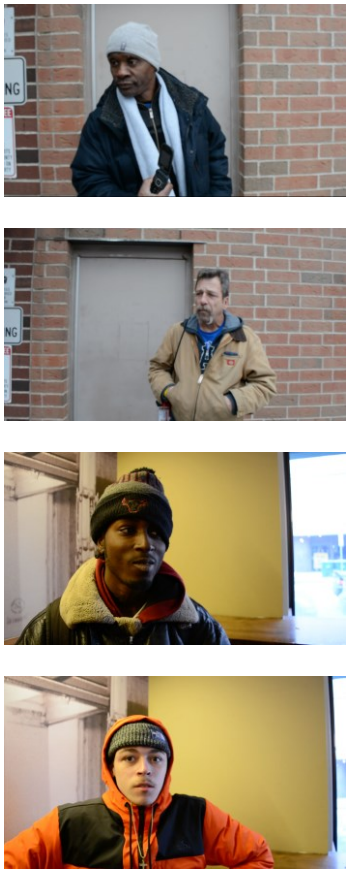

Figure 1: Interviews conducted of residents of a local homeless shelter in Ann Arbor, MI. [Verbal consent was received to use these photographs in publication.]

Introduction

About 565,000 people experience homelessness in the United States [6]. The Stewart B. McKinney Act defines homelessness as: "an individual who lacks housing (without regard to whether the individual is a member of a family), including an individual whose primary private facility (e.g., shelters) that provides temporary living accommodations, and an individual who is a resident in transitional housing" [7]. Homeless individuals are often on the street, sometimes by choice, or are constantly moving from shelter to shelter due to the high demand of shelters [8]. To meet their daily needs, homeless individuals are often on the move throughout the day [1]. One study found that local transportation was cost-prohibitive even for very basic needs [1].

The homeless have various information needs ranging from transportation, education, housing, job search, and basic needs such as food [1]. Hunger and food insecurity are still pervasive issues in the United States. One study found that 39% of homeless parents had problems with public assistance, which included information needs around emergency food [1]. The US Conference of Mayors conducted a survey across 25 major cities in the United States, and found that 71% of the cities reported an increase in requests for emergency food assistance, and that 78% of the cities reported an increase in the number of visits to emergency kitchens each month [10].

These information needs, especially about food, are predominantly satisfied through word of mouth with social networks among the homeless community, as well as face-to-face and written communication with social workers [2]. Although these communication channels are effective, we found in our own interviews with homeless people that information through word of mouth is incomplete, difficult to remember, and often leads the homeless to travel unnecessarily long distances, which causes them to spend more than needed on public transportation. There is no consistent way to access this information easily, verify it, or ensure that the information is comprehensive.

One way to disseminate this information easily and ensure that it reaches the intended audience more pervasively is through the mobile phone. Mobile phones have successfully penetrated socioeconomic barriers, and are now common even within the homeless community [4]. Government initiatives such as the Lifeline Assistant Program (so-called "Obama phones") have resulted in approximately 13 million people in the United States with mobile service they might not otherwise have [9].

Previous efforts to address the information needs of the homeless population have found that using technology that is familiar and visually simple resulted in openness, and increased engagement with the system, as opposed to a visually attractive system, which created a perception of restriction [3].

Our solution leverages the insights from the research mentioned, to develop a basic text-message system to serve the homeless population with access to food. Using contextual inquiry, iterative interaction design techniques, and usability tests, we designed a text-message service solution which helps those on the move find hot meals that will help them plan ahead, find complete information, as well as save time by

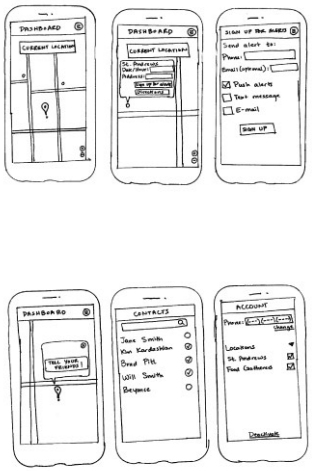

Figure 2: Paper prototype wireframes of the proposed smartphone application. Usability tests were performed using these designs with users.

visiting locations close to areas that are most frequented by each individual.

Methodology

This paper describes five phases of our work: (1) initial interviews with homeless individuals; (2) a smartphone app design; (3) a paper prototype study; (4) a redesign with an SMS-only text-based system; (5) a Wizard-of-Oz study of the text-based design.

Interviews were conducted with 13 homeless participants over a 6-week period, all of whom that either stayed at or frequented a well-known shelter and community kitchen in Ann Arbor, Michigan. An interview protocol was used to drive semi-structured interviews, and it was revised several times as we gained more information. Questions centered on general problems that they faced on a day-to-day basis and how the need for information around food was currently being met in the homeless community. In addition, interviews with two social workers that worked at food organizations, buttressed our findings from a different perspective.

After the initial interviews, we went through two rounds of design and testing with homeless participants, as described below. Though at one point, we brainstormed five different design ideas, this paper will only describe the two that we took back to potential users.

Findings from Initial Interviews

We found that the homeless community is very close-knit, and the desire to share information is high. Information is largely communicated through word of mouth. Although several claimed that this method of information seeking worked for them, others talked about how there were many people that traveled all the way from Ypsilanti, a neighboring city about eight miles away from Ann Arbor, multiple times a week because the only sources of food they were aware of were in Ann Arbor. This was especially an issue due to the limited amount of free bus tokens they received from government programs. An older gentleman mentioned that while word of mouth works, it was difficult for him to remember all the places he hears of, especially when it comes to specific dates and times that meals are served.

Interviewees also revealed that they are constantly on the move, and often find themselves in areas they are unfamiliar with. In these circumstances, finding food and shelter are top priorities. We found that most relied on their mobile phones to find information about community kitchens or churches serving free hot meals, talking to the homeless population in the area, or interacting with social workers.

Smartphone App Design

We used qualitative data from the first round of interviews to design wireframes of a smartphone mobile application. The smartphone application allowed users to find places serving hot meals closest to them based on their location, which was determined via GPS. They could sign up for daily push notifications associated with specific food sources. It also allowed users to share these locations with friends and family by sending an automatically generated message through the application.

User Study with Paper Prototypes

These paper prototypes were then taken to the shelter and community kitchen, and tested with three

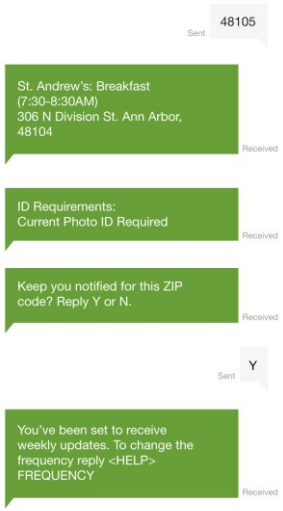

Figure 3: Example of the how a user interacts with the text-message-based system and corresponding system responses which provide the user with the required information

participants. Initial reactions from participants were positive, and they believed that it addressed their needs in finding hot meals. However, users noted that accessibility to a smartphone was low, and very few had smartphones with data plans. Further research suggested that data plans usually did not exceed 500MB [5]. Such constraints caused us to reconsider the smartphone solution.

Redesign

Insights from the paper prototype user tests and additional interviews led us to pivot to an SMS text-message based system, which would work on all mobile phones. We designed a system that possessed all the features our users required to meet their needs.

The system allows the user to enter in their zip code to receive a list of all locations serving free hot meals for that week. We chose to use zip codes as opposed to other forms of location (such as address or city name) because interviews revealed that our users were aware of the zip code they were in (because of other social services affected by zip code). In addition, from a usability perspective, zip codes are much easier to type and remember than entire addresses. Finally, areas represented by zip codes are reasonable with respect to daily travel and likely presence of homeless services.

When a zip code is texted to our system, the information sent back contains the name, address, days and times food is served, as well as identification requirements to receive a free meal. (Identification documentation required to receive free meals was something we learned about after interviewing social workers). The user can also choose to receive weekly notifications of all the locations and corresponding information for the zip codes they enter. We changed daily or frequent notifications to weekly notifications after finding that some users have a limit on the number of text messages they can send and receive. One study notes that a user can send and receive anywhere from 500 to unlimited text messages per month, depending on their plan [11]. Finally, users can also update the database by sending a text message with any new information they discover.

Our system is open not only to homeless individuals but to social workers who work with them. We found that social workers often receive information about free hot meal locations through emails and phone calls from other organizations, but they have inconsistent access to word-of-mouth knowledge of the homeless population. The information social workers have is also maintained in silos, often within digital spreadsheets. Therefore, having a central database for all food resources takes the onus off individual social workers from maintaining their own lists, but still gives them access to crowdsourced information that can be used to better help their clients. The social workers we interviewed said they would be happy to volunteer their time during work hours to monitor, maintain, and update such a database.

Overall, the feature capabilities were designed to allow our users to receive information about sources of free food that are convenient to their location, complete, concise (so as not to cost more than necessary), and catered to their desire to share information with their community.

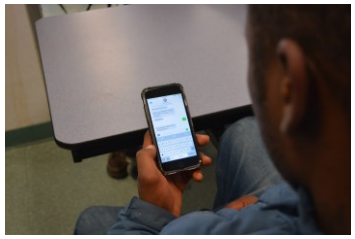

Figure 4: Wizard-of-Oz usability test of the SMS text-message system conducted with a potential user who is a resident at a local homeless shelter

Usability Evaluation

We did a short usability test of the designed system using a Wizard of Oz methodology, where users were asked to pretend that they were looking for a place that serves hot meal and interact with the system (text responses were sent back to users by one of us, in accordance to the design). Users were asked to text their zip code to a number, and the following interactions with their phones were observed. The general feedback about the system was extremely positive, especially since the solution did not require Internet or Wi-Fi, and leveraged technology that was used frequently by the user population.

However, there was some confusion on the update capability, as to what information was supposed to be entered to produce the results they wanted. To address this, we added a "Help" feature to provide guidance on the format required to update the database. If a user needs help using our system, they can text "Help" and receive instructions about the options available to them, as well as the content and format of messages required to get the information they need from our system.

Discussion

In the initial phases of the project, we wrestled with the desire to implement a technically more sophisticated system to address the needs of our users; but our research showed that a technically sophisticated solution would be addressing the needs of only a subset of the population we wanted to serve. Therefore, we revised our idea to keep the focus on a solution that is more accessible and useful to the majority of our target population.

Despite its advantages, the text-message system still runs into the problem that people who cannot read cannot make direct use of it, and some of the people we interacted with struggled to read. On the one hand, there were indications that even if one person could not read, others would be able to read the information on their behalf. On the other hand, we believe that some amount of training may be required when the users are initially introduced to the system. The effectiveness of the solution can be a large factor in spreading awareness through word of mouth. In addition, leveraging the users' desire to share information with others, instances of peer training could be viable options to ensure users clearly understand how to use all functionality that the system is capable of to help themselves, as well as others in their community.

Future Use

We believe our platform has significant potential to address a variety of information needs of multiple vulnerable populations in the United States. For the purposes of this project we focused on the homeless population and food insecurity. However, this platform can be extended to include food insecure populations in general (many of whom may have homes), and organizations that provide groceries, non-perishable foods, and fresh fruits and vegetables. Since the solution can be used by anyone with a mobile phone with few constraints, the information is easily accessible. Other information needs such as shelter, jobs, and transportation to name a few, can also be addressed using this system.

Conclusion

The homeless population is one that is rich with word-of-mouth information. However, word of mouth has a

number of drawbacks that could be better addressed. This project's aim was to understand the homeless population in a particular part of the Untied States, their information-related needs, and how they could be addressed. We arrived at a viable mobile solution that is easy to use, familiar, and effective in addressing information needs around food for the homeless community.

Acknowledgements

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