Worker-Community: Using Crowdsourcing to Link Informal Workers with Potential Clients

Rocío Abascal-Mena, Erick López-Ornelas, J. Sergio Zepeda-Hernández, Bárbara E. Gómez-Torrero, Gilberto León-Martagón, and Héctor Morales-Franco

Universidad Autónoma Metropolitana – Unidad Cuajimalpa
Departamento de Tecnologías de la Información,
Avenida Vasco de Quiroga 4871, Colonia Santa Fe Cuajimalpa,
Del. Cuajimalpa de Morelos, Distrito Federal, C.P. 05300, México
{mabascal,elopez,jzepeda}@correo.cua.uam.mx,
{barb.torrero,leon.gilberto,hubein2}@gmail.com

Abstract. Crowdsourcing is an emerging paradigm that is changing the way people establishes contact and works with others. The crowd is used to make people collaborate and solve problems that are difficult to answer without having many brains working together. Some of the applications of crowdsourcing include the capacity to create new employment opportunities to informal workers who seek for potential clients in the street. This paper presents Worker-Community, a new platform to link informal workers with potential clients in Mexico City. Our approach is based on the study of informal workers in order to know how they reach potential clients and the study of these clients to know their needs. A contextual study was carried to propose a prototype to create employments and assure security to all the people involved.

Keywords: crowdsourcing, Human Computer-Interaction, usability, recruitment system, collaboration.

1 Introduction

Nowadays, we find that all around the world there are millions of people unemployed. Part of this problem comes from the recent global economic crisis but also to the lack of connection between workers and potentials job opportunities.

A recent study made by the Statistic and Geographic National Institute of Mexico (INEGI)[1], in 2012, showed that about 21 millions of Mexican people are part of the informal economy, unemployment and low job conditions. In 2013, 830,000 people joined this group having precarious conditions in their works: unstable salaries, no social security services, no job benefits and lack of health care. From the previous study, the amount of people that work in the informal economy is around 14.2 millions, a quantity close to the number of regular registered workers (15.2 millions of Mexicans). This is not a small problem considering that, if there are not solutions,

[1] Instituto Nacional de Estadística y Geografía, http://www.inegi.org.mx/.

G. Meiselwitz (Ed.): SCSM 2014, LNCS 8531, pp. 287–297, 2014.

Mexico will become a country where informal economy is bigger than registered economy. Also, this problem has some social consequences: informal workers are victims of corruption, insecurity and social distrust. The society needs programs to help informal workers such as plumbers, construction workers, carpenters, electric workers, welders and others (that are out of the big companies but that have the skills to serve well to society) to get jobs in a more organized and secured way.

To help to solve this problem we have created a prototype named Worker-Community, a crowdsourcing project to link informal workers with potential users around Mexico City. Our solution envisages a design problem related to Human Computer Interaction (HCI), where two disciplines were involved (Design, and Information Technology) to get a solution for it.

The rest of the paper is organized as follows. Section 2 describes what is crowdsourcing and we present some examples of systems that are oriented to the recruitment of workers. In section 3, we focus on explaining the main problem and the application of the User-Centered Design Methodology to solve it. Section 4 presents the usability testing and the results that were obtained. Finally, we present the conclusions and the future work in section 5.

2 Crowdsourcing to Guarantee New Employment Opportunities

Collective intelligence is a form of intelligence that emerges from the collaboration of many individuals. It is a distributed intelligence that is constantly coordinated in real time and which leads to effective mobilization of competencies. In the field of human computation, this kind of human mobilization is being exploited to enable humans and computers to work together and solve hard problems that neither of them can solve alone [1]. This is known as crowdsourcing. Often, this kind of cooperation is given by open calls trying to recruit people in order to achieve an objective in common. In reality, the most prominent examples of crowdsourcing platforms, that we find, allow the people that participate to be encouraged by something that they are going to get or win at the end of the task. This gain can be to earn money (real or virtual), have fun, socialize with others, obtain social recognition or prestige, do altruism, learn something new or even create self-serving resources. Crowdsourcing has been used for a wide variety of applications like: open innovation markets and prices [2], competition markets [3], collaborative knowledge creation (like Wikipedia) [4], citizen science [5], social search and polling [6], human sensing [7], gamification [8], prediction markets [9], and others. In this paper, we focus on the use of crowdsourcing to facilitate the recruitment of workers. We present some of the most famous applications around the use of crowdsourcing to recruit workers.

Global crowdsourcing is emerging in order to impact poor communities in developing regions [10]. Even if crowdsourcing has not yet delivered all its potential it is a new way to empower people and to make the things work by enabling collaboration. The most prominent example is Amazon Mechanical Turk[2] (AMT), a

[2] http ://www.mturk.com

marketplace for work where businesses and developers ("requesters") can get access to an on-demand, scalable workforce ("workers") [11]. These requesters use AMT to post "Human Intelligence Tasks" (or "HITs") which typically involve basic computing and language skills – such as tagging photos according to their contents, rewriting sections of prose, transcribing audio, choosing representative screenshots from a short video clip, responding to survey questions, or performing internet research. The results are returned to the system. Requesters gain a task realized and workers gain a payment corresponding to their work. In this system, in difference with traditional works, we don't find long-term contracts or payments based on the hours that were worked.

Paid crowd work offers remarkable opportunities for improving productivity, social mobility, and global economy by engaging a geographically distributed workforce to complete complex tasks on demand and at scale [12]. Also, it enables the improvement of existing services and the creation of new ones. Reducing task completion time has become one of crowdsourcing's holy grails. Increased payment leads to higher work output, which translates to faster completion times [13]. An example of this is VizWiz that allows blind people to take a picture and ask questions that are answered in nearly real-time by asking multiple people on the web [14].

We also find ChaCha[3] a search service that uses humans to interpret search queries and select the most relevant results. As well as AMT, others crowdsourcing systems allowing the recruitment of workers are Rent-A-Coder[4] which provides a ready labor pool of software coders to firms seeking discrete and fairly straightforward coding projects. In the case of oDesk[5] and Elance[6] crowdsourcing platforms offer a wide array of professional services, including design, engineering, writing, web development and administrative support. Other kind of crowdsourcing company is OnForce[7], which maintains a network of information technology professionals who can be dispatched to needy companies, on demand.

As crowdsourcing marketplaces grow, requesters face new challenges to recruit good workers for their work and to establish rules to have productive results. This is the main problem of our work where requesters need to recruit somebody but also it is important to preserve their integrity by applying rules from the beginning of the establishment of the contact.

3 Applying User-Centered Design Methodology (UCD) to Implement a Crowdsourcing Solution

The development and research of our project is based on the User-Centered Design Methodology (UCD), comprising five stages. By using this methodology we created a prototype based on the needs of the users. In this way, we have carried out interviews

[3] http://www.chacha.com
[4] http://www.rent-acoder.com/
[5] https://www.odesk.com/
[6] https://es.elance.com/
[7] http://www.onforce.com/

with two kinds of users: (1) the informal workers and (2) the potential clients. As well, we have made a research in order to know the statistics of informal workers in Mexico City. Based on these interviews, we have applied an ethnographic study to understand in a better way our users. The results lead us to the development of a prototype that was evaluated and tested using the Wizard of Oz experiment. We also made a usability study that shows the interaction between the users (informal workers and potential clients) and the prototypes.

In our approach, we chose a place in Mexico City where we find an example of a need of collaboration between people in order to improve economy stability. The selection was easy because, despite of all, there are many places where informal workers offer their services. The center of the Mexico City, better known as Zocalo, has a long reputation of being a meeting point where informal workers and potential clients can get an agreement. We interviewed the workers by asking them about their social and economical situation.

We found out the fact that the number of workers has been reduced because of two reasons: (1) the lack of job offers to people and (2) a government regulation that allows to establish at the Zocalo to only the people that belong to a small and bad organized syndicate. Despite many critics, many of the workers are happy with this regulation because it avoids to strangers and not trusted people to offer their services without any guaranty of their job. This eliminates the possibility to find people that are part of criminal groups and pretend to be workers. We find, from the interviews, that some years ago the Zocalo was invaded with criminal groups that wanted to cheat potential users. This problem motivated them to get together and fight against it. Now, the honest workers try to regulate their own work using a membership. For example, if they know that one of their members has done a bad job, the rest of the workers fix it up. Sometimes the worker with a bad job is ejected from the Zocalo. This is a "solution" to try to convince potential clients of their security.

3.1 Interviews with the Users: Workers and Potential Clients

In this section, we present the interviews carried out with the two kinds of users: workers (Fig. 1 shows an example) and potential clients.

User 1- Workers. When we asked to the workers about their professions we found: plumbers, construction workers, electrics, welders, carpenters, domestic workers, taxi drivers and more. These were the most common professions but there are workers that have several skills, they can either work as a plumber or as a carpenter. Other interesting information was the fact of the spot's workplace rotation: when a worker gets a job opportunity by a pedestrian or a phone call he goes to attend the call and let one member of his family in their spot workplace. With this action they make sure that there is always somebody of his family ready to get another job opportunity. Unfortunately, there is no way to know how many workers really are. Neither them nor the government can say the exactly amount of workers because of the lack of communication between them. However, many of the workers estimate that they are about 300 workers that use this area (even if they are the real owner of the place or just a family member).

Fig. 1. Workers waiting for potential clients

In the place we find that there is a difference between the ages of the workers. We can find people of 60 and 70 years old, that refuses to leave their place because of the job opportunity or just the spot workplace they have. An example is Mr. Venustiano Martínez (76 years old construction worker) he has been working for almost 30 years in that place. We also met some younger workers like M. Federico Cansino (27 years old). He left his home to study a career on mechanics but, still now, he had not yet found any stable job opportunity. So, we find that there are workers with studies and others that have learned from the experience all over the years. In the study area we saw that the oldest workers are the ones with less job opportunities (clients). The main reason seems to be their age. Potential clients prefer to employ younger workers in order to avoid any accident of these workers.

As well as the case of ages, the interviews showed a big difference between workers education levels. There are many of them that only have the elementary school, third grade mostly (oldest workers), while others have high-school grades and a few of them have a professional training.

The workers experience with technology is linked to the previous results, one part of the workers (60 to 70 years old) have not experience with computers while the youngest ones have it, at least the essential. In the case of mobile phones, many of them don't have one, while others have at least a cheap one. It is important to say that we could not find any Smartphone. Although the fact that not everybody has mobile phones all of them were willing to try to buy and use one in order to be connected with potential clients.

This kind of workers cannot afford any publicity service like the yellow pages, web page or other way that could help them to get new clients. The only thing they have, are recommendation from others clients and cardboard signs they made with their phone number, their profession and skills. This is not trivial because many of the signs they made do not inspire the people to trust and employ them.

User 2- Potential Clients. Our potential clients or social group is the Mexico City's low middle class. From INEGI information we know that 35% of the Mexico's population belongs to the low middle class. In Mexico City the middle class is about the 32%. The income of this social group is about $500.00 to $666.00 US Dollars by month. These salaries are not enough to support a family. Some experts in the study of social groups coincide in saying that middle class could disappear in the future if their economical situation continue in the same way. For this social group it is very hard to search for workers by using services provided by big companies because of the expensive bills. This social group always needs to hire workers to do maintenance of their houses and small business. Because of their economic situation they require of informal workers to reduce the costs of the work. We interviewed many potential clients and they wanted to try the program Worker-Community (our proposal), especially because of the fact that they can hire people from their computer or mobile phone.

The low middle class is composed of several kinds of people: we can find members of these families with university degrees, but also with just the elementary school. Because of their salary, many of them can get mobile phones or even smartphones. Also, lot of them have the elemental experience with computers, they use Internet, whether in their house or in a cybercafé. All these facts show that they can use the Worker-Community program and we do not have to worry about any special training for them. We just need to remember that the low middle class in Mexico City is more than 3 million people that could be our potential clients to this program, this support the idea of our crowdsourcing system.

In the next section we present our crowdsourcing system, which enables the collaboration between informal workers and potential clients by preserving security and quality.

3.2 Design of Worker-Community

Analyzing the interviews and comparing them with the contextual inquiries carried out at the Zocalo of Mexico City, we could see that potential workers are afraid to make a recruitment of somebody that they don't know. Trust is important in order to establish collaboration and enable new jobs. It is therefore evident that our help is needed.

The design of the system, based on the UCD Methodology, had to be functional and attractive to both users. Our application has two types of interfaces: one for informal workers and the other for potential clients. The first interface is an Internet terminal booth so informal workers can interact with it (Fig. 2). The second interface consists of a web page where the clients are going to be able to get information about the services and personal information about the workers that they can recruit. As we saw previously, a big percent of low middle class can have Internet, either by their mobile phone, computer at home or a cybercafé. The web page allows the access to the list of services, the possibility to describe their problem as well as they can have a closer look to the workers they are going to hire.

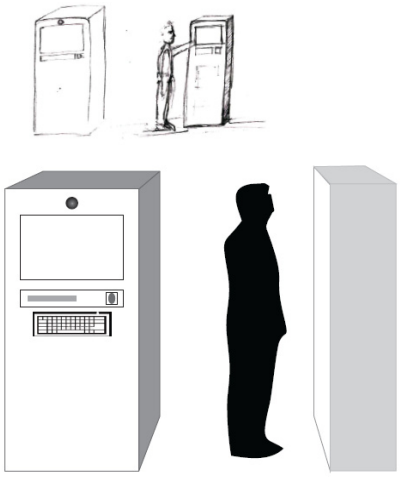

Fig. 2. Internet terminal booth for informal workers

Our decision of using an Internet terminal booth, that will be located in strategic points of the Zocalo, is an answer to the insecurity situation that we find at Mexico City. By using the contextual information that we got at the Zocalo, we know that the informal workers don't have a mobile phone or neither computer experience (only a small number of them have). Also, informal workers don't want to leave their place. So, the idea of an Internet terminal booth close to them (in the Zocalo) seems to be promising. In this way, workers can be alert about any job opportunities at the same time that they can watch their place, besides they can do the registration process on site. In this way, our proposition lets the workers, to make a registration in one side of the module and on the other side they will be able to see the job opportunities appearing as the potential clients insert them.

The Internet terminal booth will be a structure that allows us to move it because, as we remember, the Zocalo is a crowded place, and everyday we can find hundreds of people with different purpose: tourists, protesters, normal citizens doing their everyday activities, festivals visitors and many more. In this way, we need a flexible booth to be placed from 9:00 a.m. to 5:00 p.m. from Monday to Friday. On Saturday it will be placed only from 9:00 a.m. to 2:00 p.m. This is the time and days that normally the workers are in that place. After that, the booth could be taken to a more secure place (we propose a control office where personal must be capable to resolve basic computers problems and to talk with the users if they have a problem with the system).

We propose a web interface in order to interact with all the sections of the system. This decision was made from the results of our contextual study with the users. In this

way, we made a prototype easy to be access by the people that will order a work. In this case, they only require an Internet connection and a web browser, this is better than giving them a software to be installed in their computer. The development of the project's interface used HTML5, CSS3 and JavaScript allowing us to generate a simple interface, while in the background the system will work with PHP and Myself.

The design of the interface takes into account the results of the Wizard of Oz experiment. Our prototype covers the necessities of both users that will be operating the program Worker-Community allowing each one of them to do his operations in a secure and efficient way. In this case, both devices (interactive web page and Internet terminal booth) will use interactive elements to attract the attention of the user contributing to keep interaction. The functions of the Internet terminal booth interface are: text capture and pictures. These features will allow users to select a proposed job but also insert new people who are going to accompany the worker. Sometimes, informal worker needs more hands to concrete a job. The potential clients, on the other hand, will also be able to insert job opportunities and receive information about the worker assigned. Both users will be able to share their opinions or ask questions about the collaboration that was established.

As a result of our contextual studies we were able to identify the main features of each interface. For the Internet Terminal Booths - initial settings; enter personal information, personal skills, photo, fingerprint, to explore job opportunities with description and address. It is possible to grade the attitude of the client once the work is finished. For the Interactive web page - initial settings; user authentification, enter job opportunity, specify characteristics of the job, specify payment, and add information about the client and address. For the design of the interfaces we relied on the study of our users' needs. The colors, shapes and style of the interfaces were created focused on users who would use these interfaces. These elements are important for the interface to be functional and usable (see Fig. 3).

4 Usability Testing Evaluation and Results

For our project it was necessary to evaluate the two user groups, informal workers and potential clients. For the informal workers the usability tests took place at the Zocalo; for the potential workers the tests were taken in their houses and cybercafés.

The usability tests (Wizard of Oz prototyping) were done using a simulated touch screen (see figures 4 and 5).

Fig. 3. The first 3 icons were selected at the beginning of our project. The last 3 icons correspond to those that were redesigned after the usability test.

Fig. 4. First contact of informal workers with the system

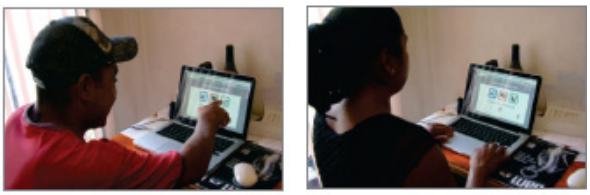

Fig. 5. First contact of potential clients with the system

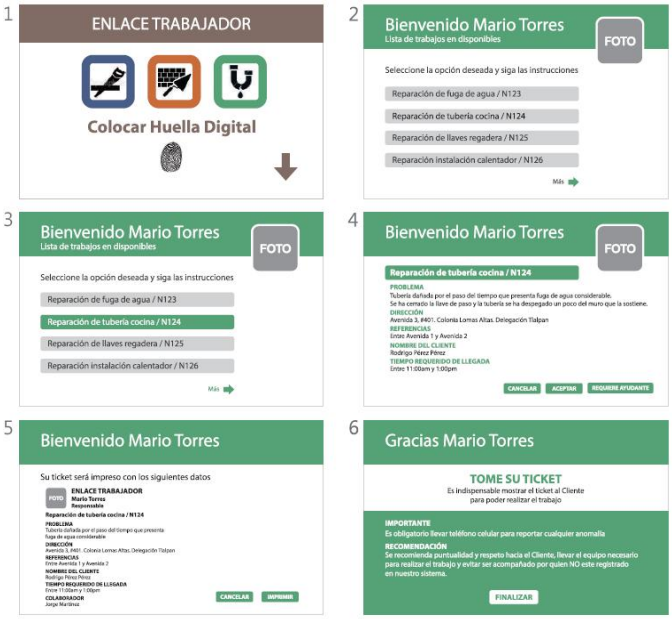

Fig. 6. Interface of the Internet terminal booth to access job offers at the same time that it prints a ticket with the name of the client, address and security information

For the booth the problems mentioned by the users were: problems with the use of the icons, however 80% could understand the iconography used; having no contact with the technology, the users were afraid to interact with the interfaces; but they approved the steps of the process. Improvements were made to the system based on

the results of usability testing. Icons were changed in order to be more understandable (see Figures 3 and 4).

In the case of the potential clients, the majority of users thought that the Worker-Community system was easy to use.

5 Conclusions and Further Work

In this research we presented one problem that occurs in Mexico City: people are more and more seeking for job opportunities but the way to seek is not the better one. We need to support projects, like this one, to help improve the lives of millions of people that are in unfavorable conditions. Worker-Community Project (see Fig. 6) is a program that wants to achieve this goal; this can be used to eliminate unemployment and informality.

Our program use technology to enable collaboration between two different groups of people: informal workers and potential clients. Besides, we have understood the complexity of trying to help groups of workers that have been exploited and excluded from society, many of these turn pretty skeptic even aggressive when we tried to help them. In this way, it is important to have a government supporting for this kind of projects, also it have to be free (no cost to them) in order to give opportunities to all the sectors of our country. This project, also, shows the importance to work in real problems applying the collaboration of the crowd.

Our results have been very enthusiastic and we can assure that the project it is ready to start with great possibilities of success. Further work must include informal workers that are placed in other parts of the city. Also, the creation of mechanisms to monitor the system performance and collaboration between users is necessary.

References

1. Quinn, A.J., Bederson, B.B.: Human Computation: A Survey and Taxonomy of a Growing Field. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, pp. 1403–1412 (2011)
2. Chesbrough, H.: Open Innovation: The New Imperative for Creating and Profiting from Technology, 1st edn. Harvard Business School Publishing Corp. (2003)
3. Leimeister, J.M., Huber, M., Bretschneider, U., Krcmar, H.: Leveraging Crowdsourcing: Activation-Supporting Components for IT-Based Ideas Competition. Journal of Management Information Systems 26(1), 197–224 (2009)
4. Gurevych, I., Zesch, T.: Collective Intelligence and Language Resources: Introduction to the Special Issue on Collaboratively Constructed Language Resources. Language Resources and Evaluation, pp. 1-7 (2013)
5. Robson, C., Hearst, M., Kau, C., Pierce, J.: Comparing the Use of Social Networking and Traditional Media Channels for Promoting Citizen Science. In: Proceedings of the 2013 Conference on Computer Supported Cooperative Work, pp. 1463–1468. ACM (2013)
6. Brambilla, M., Mauri, A.: Model-Driven Development of Social Network Enabled Applications with WebML and Social Primitives. In: Grossniklaus, M., Wimmer, M. (eds.) ICWE Workshops 2012. LNCS, vol. 7703, pp. 41–55. Springer, Heidelberg (2012)

7. Srivastava, M., Abdelzaher, T., Szymanski, B.: Human-Centric Sensing. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences 370(1958), 176–197 (2012)
8. Prpic, J., Shukla, P.: The Theory of Crowd Capital. In: Proceedings of the 46th Hawaii International Conference on Systems Sciences, pp. 3505–3514. IEEE (2013)
9. Venanzi, M., Rogers, A., Jennings, N.R.: Trust-Based Fusion of Untrustworthy Information in Crowdsourcing Applications. In: Proceedings of the 2013 International Conference on Autonomous Agents and Multi-Agent Systems, AAMAS, pp. 829–836 (2013)
10. Gupta, A., Thies, W., Cutrell, E., Balakrishnan, R.: mClerk: Enabling Mobile Crowdsourcing in Developing Regions. In: Proceedings of the 2012 ACM Annual Conference on Human Factors in Computing Systems, pp. 1843–1852. ACM (2012)
11. Schulze, T., Krug, S., Schader, M.: Workers' Task Choice in Crowdsourcing and Human Computation Markets. In: Thirty Third International Conference on Information Systems, Orlando (2012)
12. Kittur, A., et al.: The Future of Crowd Work. In: Proceedings of the 2013 Conference on Computer Supported Cooperative Work (CSCW), pp. 1301–1318. ACM (February 2013)
13. Mason, W., Watts, D.J.: Financial Incentives and the Performance of Crowds. ACM SigKDD Explorations Newsletter 11(2), 100–108 (2010)
14. Bigham, J.P., Jayant, C., Ji, H., Little, G., Miller, A., Miller, R.C., Tatarowicz, A., White, B., White, S., Yeh, T.: VizWiz: Nearly Real-Time Answers to Visual Questions. In: Proceedings of the 23rd Annual ACM Symposium on User Interface Software and Technology, pp. 333–342. ACM (2010)