

Crowdsourcing as an IT help tool to determine impact in the health sector

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Abstract. The aim of this research was to propose a solution which applies the Crowdsourcing concept as the use of Information Technology to determine the perception of a social environment, which can perform a raised topic by an entity. In this case, the perception of Ruben Cruz Velez hospital with respect to: What opinion would you give about the Hospital Prevention and Promotion program?, in order to evaluate throughout Crowdsourcing, the Monitoring and Control Inspection (IVC) mechanisms for the provision of health services and component effectiveness, processes and standards of the Mandatory Quality Assurance System and their impact on provision of health services to users in an accessible and equitable manner. It is important to highlight that the development of a web platform that allows citizen participation to evaluate the mechanisms of Inspection of Monitoring and Control (IVC) of the provision of health services, analyzing the effectiveness of corrective actions and their impact on The provision of services to users in an accessible and equitable manner. Undoubtedly, in order to understand the current development and situation of traditional medicine in diverse geographical and cultural contexts, the way it adapts to its environment, and the type of health care available, it is necessary to locate it in the context of the models Health care in which it is inserted. The analysis of the current situation of traditional health systems, seen as subsystems of the total system, serves as a starting point for a more detailed reflection of their dynamics in Colombia, so thanks to the development of the CROWDSOURCING methodology as a tool To understand the current situation will help us to make valuable decisions for the future of the health sector particularly the beneficiary entities.

1 Introduction

The present research is based on work carried out in the Ruben Cruz Velez Hospital of Tuluá, Valle del Cauca-Colombia. Work funded by Unidad Central del Valle-UCEVA.

One of this work motivation is to evaluate, throughout crowdsourcing, the provision of health service and component effectiveness, processes and standards of the mandatory system of quality assurance and its impact on the provision of these services to users in an accessible and equitable manner. And in turn, evaluate and value citizen participation, in order to identify possible gaps and shortcomings of the general health system.

Studies with the use of new technologies, in particular, all those advances related to the internet, have allowed the birth of a new multitude processes and applications, which were based on the network of networks: Web 2.0, evolution of the traditional web (1.0), after the .com bubble sites, and the applications which represent its principles and currently some of their fruits.

It is important to note that "Web 2.0" concept, was coined by O'Really¹ in the year of 2005 and although it is a difficult term to define², the truth is that it has meant a radical change in the way to use the Internet. Specifically, Web 2.0 refers both to a way of using web and technological paradigm, comprises both a set of new web technologies, a set of business strategies as well as a series of social trends³.

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Undoubtedly, within the history and evolution of Crowdsourcing⁴, this was defined for the first time, by an American journalist, Jeff Howe, where in 2006 he defined it as the open call initiated by a company or institution normally performed by an employee directed to an indefinite group of individuals (“crowd”), often large in order to outsource a function⁵. Therefore, Several authors have tried so far to elaborate a definition, some focusing on the use of crowdsourcing as a process of problem solving^{6,7}, others as a way to outsource tasks⁸. However, Crowdsourcing refers to a collective intelligence⁹, and does not have a theoretical basis which is based in this research⁴, although this problem is being remedied.

Nevertheless, within the context of health care, various forms of crowdsourcing have been used for disaster response¹⁰ and a disease outbreak¹¹. These forms of crowdsourcing relied on unpaid volunteers to provide services such as language translation or geolocation. One example is the 23andMe company, which is the largest community of personal genotype, with more than 100,000 subscribers serving the genome, and more than 75% of the community has expressed its willingness to participate in research studies organized by the company¹². In addition, a large case led by the National Human Genome Research Institute, referring to associated tests like type 2 diabetes, prostate cancer, cholesterol levels, and multiple sclerosis¹². It can be highlighted that according to what PatientsLikeMe and 23andMe companies perform, these are types of research studies based on crowdsourcing¹³.

Therefore, PatientsLikeMe & 23andMe, are crowdsourcing operators in health and research studies, studies carried out in improvement areas of disease characterization and measurement, research aspects of drugs use, exploration of social health experience in terms of network user, disease establishment and the basis of traits with genetic associations.

One of the cases of crowdsourcing in health was developed by World Community Grid¹⁴, a non-profit project which aimed to support scientific research projects for the benefit of humanity. The project started in 2004 to accelerate the discovery of a cure for smallpox. The crowdsourcing approach, have allowed researchers to examine the effect of 35 million pharmacological compounds, and finally select 44 of particular therapeutic interest. Since then, WCG has extended its objectives to other areas, such as the human immunodeficiency virus, and two promising inhibitors, which have promoted the AIDS treatment advance. Similarly, WCG Have an active project since November 2011, the GO project Fight Against Malaria, whose objective is to discover pharmacological compounds, which are effective against the more resistant forms of malaria¹⁵.

Nevertheless, scientists of The Scripps Research Institute, La Jolla-California, USA, used IBM network in the World Community to computationally evaluate

millions of candidate compounds against different molecular pharmacological systems of the malaria parasite. Another project is the GO16, where Malaria is just one example of the potential that crowdsourcing offers us, as a proven methodology in other fields, addressed to find solutions to this and other diseases.

2 Material and methods

The present case is addressed to propose a solution, which applies the Crowdsourcing concept for weighting of surveys and determination of the perception, which have allowed a social environment in front of a subject that an entity raises.

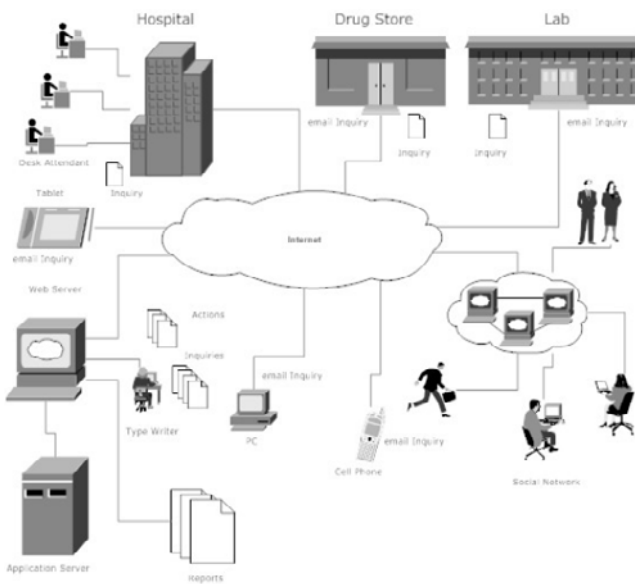
In this case, several alternatives are evaluated and the feeling evaluation is selected throughout an application of regular expressions to the opinion expressed by a community, as well as a weighting of the responses selected to one or more questions that an entity raise.

To obtain the above, the themes are defined as follows:

- a) Implement a security system and database profiles.
- b) Implement an option for handling regular expressions.
- c) Implement an administration for creation of survey topics, creation of questions, opinion topics and association of regular expressions.
- d) Implement a survey processing and opinion processing system with bar graph presentation with the obtained result.
- e) Implement options to allow the people registration in a community who want to participate in the process throughout surveys and opinion.
- f) Implement options to allow surveys to be answered and provide input from the registered community.

Starting from what is stated in the description, the following architecture for the solution is presented as shown in Figure 1.

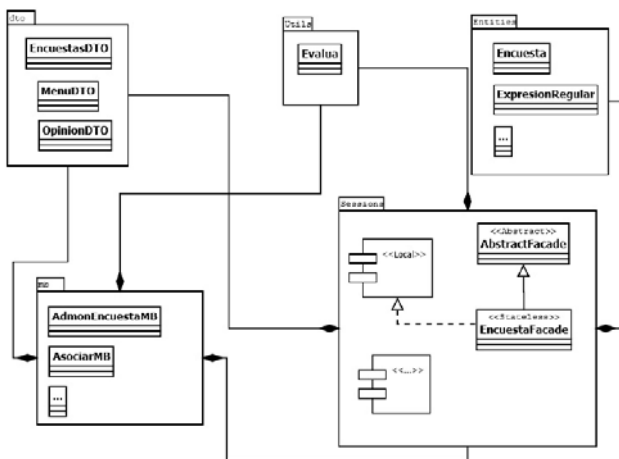
Fig. 1. Architecture



The architecture is based on a JEE Enterprise Java Web Design, using the following components: Front-End: Framework JSF adding to framework PrimeFaces 5.0. Back-End: Framework JSF with EJB 3.0 (JEE). Respectively, allows access to Relational Database: Framework JPA, specifically the EclipseLink component.

The project structure, as shown in Figure 2, is a general structure for developing the solution, creating and locating sources in its packages.

Fig. 2. Project structure



For development a project is created Web JSP using IDE Netbeans 8.0.2 full version. To open the project, simply select the option to open projects from the IDE.

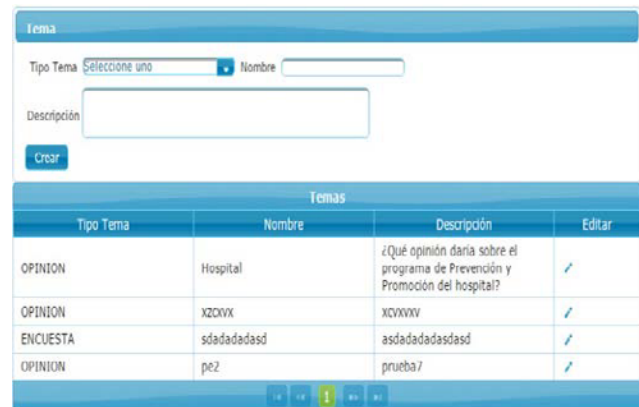
Within the requirements for installation is needed as Software:

- Java development kit version 7 update 80. <http://www.oracle.com/technetwork/es/java/javase/downloads/jdk7-downloads-1880260.html>
- Mysql5.5 <https://dev.mysql.com/downloads/windows/installer/5.5.html>
- Glassfish4.1 <https://glassfish.java.net/download-archive.html>

3 Results

The project considered for the case study, a question to be developed using the crowdsourcing methodology, at the Ruben Cruz Velez Hospital in Tuluá - Valle del Cauca – Colombia, which were performed to get the following results.

Fig. 3. Option “Theme”



To create a theme, you must select one of the options of type, which are Survey or Opinion type. In addition, gives a name to the subject, which is typed in the text box called name. To facilitate a more precise objective, it describes what is wanted with the subject and finally it is pressed the button create with which, a subject is stored in database. The description should be as telling as possible so that those who are going to conduct the survey or say understand what you want with your answers or comments.

Once created the theme, is displayed in the grid which allows a future modification.

If you want to change, press the pencil icon in the grid next to the profile name, after which you can modify the profile. To be stored after modifying, the ✓ icon is

pressed. Otherwise, if you want to cancel, press the X icon. Note that every time you create a theme of a specific type, the previous theme will be closed and the new theme, will be active.

Given these concerns, Crowdsourcing is used as a methodology for health, where an opinion question is performed throughout web and social networks in such a way the Ruben Cruz Hospital users in Tuluá, Valle – Colombia. A particular theme of the hospital, for this case was asked:

What opinion would you give about the Hospital Prevention and Promotion Program?, in order to evaluate, throughout Crowdsourcing, the Surveillance and Control Inspection (SCI) mechanisms for provision of health services and the component effectiveness, processes and standards of the Mandatory Quality Assurance System and its impact on the provision of health services to users in an accessible and equitable manner.

Fig.4. Crowdsourcing for health

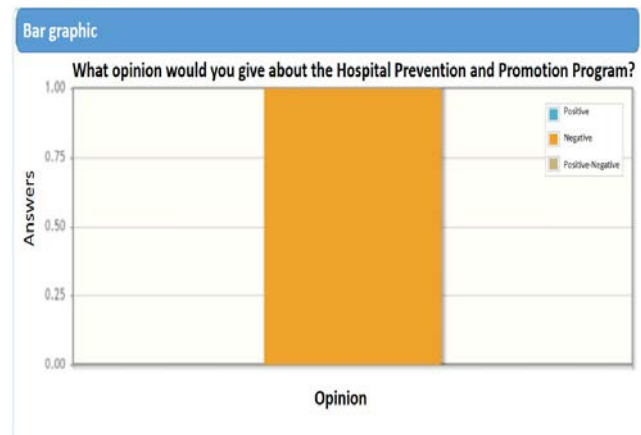
The screenshot shows a web form for collecting opinions. The title is "Opine on the subject". The question is "What opinion would you give about the Hospital Prevention and Promotion Program?". Below the question is a scrollable list of user comments:

- Lorena: very good, I practice oncology every year.
- Gloria: The program is regular, sometimes the appointments are late.
- Gertrudis: The attention is very good, especially for the elderly.
- Luis: In chronic, the attention is excellent and we are always given medications and appointments for control.
- Pedro: Nice, the service is good.
- Luis: In general, We have to wait a lot for attention.
- Rogelio: Luis: Very good, I've been here for two hours waiting for the result of a laboratory.

Below the comments is an "Opinion" input field and a "Send" button.

In this process, each user gave his opinion as shown in Figure 4. From there, each of them made their opinion reaching about 400 users who opined and it was given as a general result, users are not at ease with the Service, as shown in Figure 5. Given this concerns, a report was presented to the hospital management to take the corresponding corrective, and will continue to use the tool for decision-making senior management.

Fig.4. Result



Considerations

Crowdsourcing facilitates the implementation of innovation models and development of actions, which support improvements and the achievement of benefits in innovation processes, this provides more accurate and reliable estimates for a company or organization to base some of their decisions or actions on knowledge and work group of external groups.

Undoubtedly, to understand the current development and situation of traditional medicine in diverse geographic and cultural contexts, the way in which it adapts to its environment, and the type of health care available, it is necessary to locate it in the models context of health care in which is inserted.

It is important to note that the current situation analysis of traditional health systems, seen as subsystems of the total system, serves as a starting point for a more detailed reflection of its dynamics in Colombia. In this way, throughout the development of Crowdsourcing methodology, have allowed to understand the current situation and provides more accurate and reliable estimates of valuable decisions for the future of the health sector, particularly the two beneficiary entities.

It is noteworthy that the implementation and validation of a technological strategy to address and solve problems for the general social security system in health programs in health promotion and disease prevention in high rural and territorial environments Dispersed territories. Case study center of the cauca valle.

Final considerations

We describe the results of Crowdsourcing implementation in the health case study at Ruben Cruz Velez Hospital in the city of Tuluá, Valle – Colombia. Given these concerns, this paper is derived from the project "Control system, inspection, health services surveillance in Colombia for the general system of social security in health throughout ICT services and processes

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