Circles: Enhancing Effective Interactions by Quantitative and Qualitative Visualization in User-Centered Design

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Abstract. In this paper we analyze how effective the interactions between Mexican individuals that share a relationship, like family or friends, can be measured with a proposed social network tool. This tool is called *Circles* and its main function is to apply visualization methods to show graphically parameters like quality and quantity of time, where quality becomes more important due to the relation within interests or hobbies sharing. The process was based on User-Centered Design methods in order to find the main user's needs, build prototypes according to final users, test the prototypes and get knowledge about the tool's relevance in improving life quality.

Keywords: Media-based social interaction · Social media · Online involvement · User-Centered design · Social circles · Information visualization · Usability

1 Introduction

Lifestyle in big, urban cities is chaotic, but not only lifestyle, also the ways we develop our daily activities; traffic jams, crowds, long journeys between places, are some of the main problems for urban people which also suffer from tight schedules and poor organization of their daily routines.

While living fast, people do not have an efficient tool to know how they invest their time and how they organize their activities. They also ignore how much time they invest in their relationships, within different social circles, or if those relationships are really significant in their lives according to the quality of time, hobbies, interests and life plans in common.

One of the solutions for time measurement in order to strength relationships are social networks. We can use Valerio Arnaboldis and Marco Conti's definition of social network as an "*ensemble of ties denoting the existence of a social connection between two individuals*" [1]. This definition describes, in a good way, the social process of bonding and the importance of having a connection or a link where individuals interact and exchange information about interests, hobbies and lifestyles with their different social circles. However, until now, one of the biggest problems lays on information saturation, that leads to wrong and imprecise guidance to achieve effective relationships with family, friends and co-workers. Some researches show that some users, which are exposed to

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larger amounts of time using social networks, can suffer depression and isolation because of the misleading perception of information joined to an excessive saturation of data. Also, they believe that social networks improve relationships based on the amount of contact over the quality of it [3].

In Sect. 2, we analyze the state of art in social networks and Internet usage. As we present some mobile apps that were designed as tools for improving relationships among social circles and activities organization.

The Section is concern to the contextual study. This section explains the process and methodology followed for developing our prototypes and evaluating them with final users as we demonstrate usability and relevance.

In the Sect. 4, we present a description of our prototype's functions and how the app works. Finally, conclusions are given as future work.

2 Background and Related Work

According to AMIPCI (Mexican Internet Association, 2015) nine of every ten Mexicans web surfers are frequent social networks users. This is the main reason why they use Internet, and we can translate this behavior in an importance of reaching social interactions. 85 % of regular Internet users adopt social networks to keep in touch with family and friends and to inform about what happens around the world [2].

The main device for social networks access is the laptop, however, the sum of mobile devices such as tablets and smart phones, lead the access to social networks. People aged between 18 and 44 years old, are the ones that use social networks in their daily basis; this segment represents 87 % of total Internet users. Here, we can highlight a special group between 25 and 34 years old that represent 45 % of total Internet users [3].

In Mexico, some of the most used social networks are: Facebook, Twitter and Instagram. Although, there are others that are gaining ground between Mexican users, like: Snapchat, Vine, Periscope, Tinder and Foursquare. We will focus on the last one in this paper.

Some of the essential reasons for using social networks in Mexico are mainly associated with relationships maintenance and news consumption. Young adults, between 18 and 34 years old, who develop full-time professional activities, have a lack of time to grow effective relationships. In this way, social networks become a crucial key to maintain, develop or strengthen links between individuals. Until now, social networks research has analyzed these phenomena in diverse ways and from different backgrounds: sociology, psychology, marketing, administration, economy and computer sciences.

In literature, we find many works that analyze Facebook and Twitter and their impact in relationships [4–6]. In spite of being social networks used to keep in touch with friends and family, these apps have other main purposes that lay on information exchanging more than activities and interests' organization. Most of these studies were interested in finding common structures to measure human interactions between them by using Graphic Users Interfaces (GUI). Another field of study involves similar interests' communities and their possibilities to strengthen social networks as tools for communal living [7, 8].

As we described above in this section, some social networks that used to be less popular are gaining ground (Snapchat, Vine, Periscope, Tinder and Foursquare), which essentially allow multimedia exchange about interests and personal preferences. These include dating, suggesting places, and each one of these apps has particular and diverse main objectives, but they have something in common: lifestyle sharing among social circles.

We'll focus in analyzing Foursquare and it is crowd-sourcing scheme. This social network is based on geo-localization and user-experience evaluation of places. Since it's developing, in 2009, it has grown its database thanks to the community collaboration, where anyone can grade places to let the world know how great -or how bad- is a mall or a restaurant. Also, users can leave tips for the community, where they share their wisdom of the experience they had and they can add new places to the database. Gamification is another of the reasons that made this app popular among users: the possibility to get the best rank in the leader board where users compete with their contacts. Also achieving masteries, a progressive system that acknowledges users as "masters" in certain category, like some region or food style. Suggestions of places pop out when the user is near to a popular place or if it matches with his/her list of interests. Places that are liked can be saved in a wish list in order to be visited later. Foursquare is great for sharing places, but its main objective is not to enhance interactions between individuals that have an important relationship. It is possible to see graphically how many times the user has been in a place, but not how many times he or she has been with someone, and more important, how many times he or she spent with someone. Even more, it is not possible to measure quality of time based on the user's interests.

Arnaboldis *et al.*, analyze the processes in online social relationships, where they found a gradual decay between most users' relationships as time passes due to a high percentage of weak ties [3].

In the next section, we present our contextual study in order to find user's needs and propose a prototype according to them.

3 Contextual Study

Methodologically, we used a contextual study, which is a User-Centered Design (UCD) method, to discover urban inhabitant needs by using direct observation and interviews in the environment of the users.

We chose UCD method because even though we were the ones that pointed out what the problem was, and we could propose a list of features the app "should" have, it is important to consider final users. In this way, they were those whom showed us how functional these features were, based on their experience and not in our assumptions.

We observed people from different group ages, economic income and academic backgrounds in 3 regions of Mexico: Mexico City, Toluca (Estado de México) and Acapulco (Guerrero). They showed us the importance they give to relationships development; their need to visualize how they invest time, not only while doing activities, also with their loved ones. Finally, their need to get information in an easy way. In order

to gather relevant information about people's social habits, we designed an interview composed by eleven questions. We chose two principles of design: (1) time and (2) change; every question had a specific objective according to the principles above mentioned. Table 1 shows each question and its objective. With the findings obtained during the observation phase, a brainstorm was generated to detect the best ideas in order to solve user's needs and to choose a couple of them for focusing on our possible solutions (Fig. 1).

Table 1. User's social habits interview

No.	Question	Objective
1	How many social circles do you think you have?	Change
2	How often do you contact your dearest ones?	Time
3	Which situations make difficult, for you, to contact your dearest ones?	Change
4	How do you contact important people you care for?	Change
5	Which kind of activities do you consider relevant to spend quality time with people you care?	Time
6	How many hobbies do you think you know from your dearest ones?	Change
7	Do you think there's a way to measure how much time you spend with important people for you?	Time
8	If a tool existed to keep record about the time you spend with your important people, would you use it?	Time
9	Which things in your life could be improved if you have more quality time with your dearest ones?	Change
10	Have you lost any important relationship due to a lack of time or contact?	Change
11	Why haven't you used an existent tool, like an agenda or an app, to organize your time so you could keep in touch with important people for you?	Time

Fig. 1. Through contextual study we could analyze the way users interact with people they care using social networks and messaging apps.

3.1 Contextual Study

Strategy becomes scope when you translate user needs and product objectives into specific requirements for what content and functionality the product will offer to users [9]. Table 2 shows 15 needs detected or deduced from the answers we got in the Contextual Study phase.

Table 2. User's needs

User's Needs	Organization	Accessing information in a simple way
	Time administration	Redefining social media's concept and it's value for communal living, beyond idleness
	Relationships bonding	To find new uses for existing tools
	Improvement of life quality	To visualize and control time
	Reaffirming self-assurance	To identify different social circles people are involved into
	Priority hierarchy	To use hobbies and likes for effective interactions building
	Communication efficiency	To diversify activities and hobbies
	To open to new horizons for social inclusion	

3.2 Rapid Prototyping

We made two storyboards, two paper and two digital prototypes that were given to ten end users to get usability feedback about the proposal.

To develop both storyboards we have been inspired in products, places and programs that were relevant for us, such as Swarm [10] and Foursquare [11] apps, because of their user's interaction based on places of interest and tips given by the community (Fig. 2).

Fig. 2. Storyboards were an important step in building a bridge between user's needs and our tool.

Interviewed users had different academic backgrounds, level of tech experience and they used diverse mobile operating systems (Android, iOS and Windows Phone). Their ages ranged between 21 and 45 years old.

With the feedback we got for each paper prototype, we made graphic and usability changes to make our digital prototypes; most of the changes involved suggestions to improve interaction and usage of existent apps to take advantage of the information gathered there to enrich our apps.

In Figs. 3 and 4 we can see some screens of the paper prototypes. The first one shows the step to import contacts from a list of existent apps to ours to get that linking feature that was important for interviewed users. Figure 4 shows the qualitative and quantitative charts screen that results from evaluations made to a certain contact for each encounter.

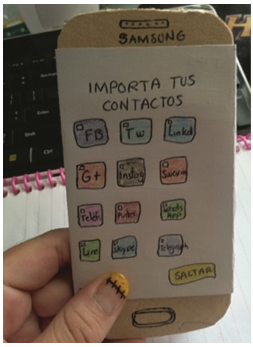

Fig. 3. Paper prototypes were tested to get features feedback from final users.

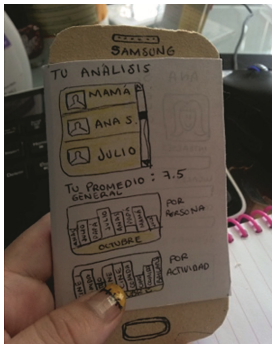

Fig. 4. Paper prototypes were tested to get features feedback from final users.

Users need to link their existing social network apps to make quicker and easier their profile filling process. The users also pointed the importance of visualization patterns of time administration as a preview step before planning activities to improve effective interactions among them.

In Fig. 5 we can see the contacts screen of one digital prototype that organizes people in social groups for detecting easily all the circles the user is involved into and how many members share that group in common.

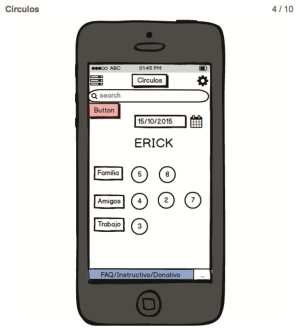

Fig. 5. Digital prototype based on social circles.

3.3 Usability Testing

We had two really significant findings while testing prototypes: the first one, was that users identify healthy relationships based in the quality and not in the quantity of time spent. The second one was about interests and hobbies as symbols of having quality time.

Most of the mid-level-tech-experienced users interacted in a very natural way with both prototypes, pointing some doubts about icons design and sharing options (for example, if it was possible to hide the location or if contact grading -for qualitative experiences visualization- had private access).

4 Creating a Tool for Enhancing Effective Interactions: *Circles*

Our proposal is to develop a digital tool to visualize how people invest time between their social circles and to use significant information, such as interests and hobbies to suggest activities that could strengthen effective relationships. Our hypothesis is: if people had a social network capable of showing graphically how time is invested between their activities and social groups, they could be able to measure quantitatively and qualitatively their encounters to enhance effective interactions between individuals.

This tool is called *Circles*, which we conceive as a social network for community, activities and time visualization. Its main goal is to provide tools for constructing effective relationships by using significant information exchange about specific communities, such as family, friends, co-workers, or any group that share a particular interest (Fig. 6).

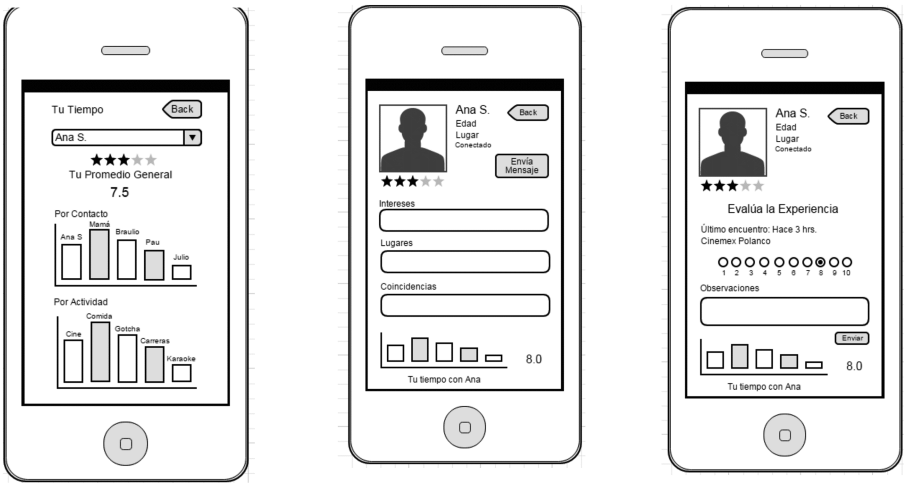

Fig. 6. Digital prototype based on evaluating social encounters to show qualitative and quantitative visualization between contacts with a relationship.

The prototype uses existing social networks and messaging apps (Facebook, Twitter, LinkedIn, Instagram, Google+, Swarm, Foursquare, Skype, Spotify and WhatsApp) to link information that enriches our user database and to create more helpful interest's profiles, routines and social circles. With all this information, users can organize their most relevant contacts or social circles to register activities done with them, also to produce more accurate activities suggestions (based in coincidences between users and geo-localization) in real time or to make future plans. After each meeting, *Circles* allows users to grade the experience as it registers all the meetings by makings graphics, so the user can visualize the quality of these experiences. Users are able to analyze this information and decide if they need to make new habits or if it is healthy for them to keep some relationships. To make introspection about how they keep in touch with people and how they affect their lives.

A strengthen of social circles is the result of arranging information about likes, hobbies, appointments and contacts (friends, family, etc.) according to the principles we chose at the beginning of the project, both, time and organization; also, information design's principle: to organize an amount of information in different ways to visualize and analyze new patterns and relations [12].

5 Conclusion

We conclude that time and organization are two linked factors that usually are hard to measure because of their intangibility. However, they can be represented in a graphic way to make easier to know, by using visualization, our activities and the amount of time we spend daily in each one. In this way, activities can be organized effectively and this can be also applied in the developing of social relationships where quality is more important than quantity. This could be translated in the raise of productivity and self-esteem as a lowering of stress levels.

Sharing hobbies and interests is an important key to improve effective interactions in relationships. The suggestions feature based on contact coincidences was widely appreciated with interviewed users, allowing them to have a deeper knowledge of the ones they care about and to discover new places and activities to enjoy together.

User-Centered Design was an effective method to know final users in a holistic way: their habits, their needs, their desires and how they interact with technology to do everyday tasks. We believe this is an essential step in app and websites development.

In future work we intend to improve the social media linking and to add a quiz tool to gather more particular information in an entertaining and fun way. This could provide us more valuable and consistent data to create more significant and accurate profiles and suggestions for final users in *Circles*.

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