Evidence Socialization in a Community based Dengue Prevention initiative

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Abstract
Dengue prevention efforts that involve the community in collecting and socializing evidence about *Aedes Aegypti* breeding sites have been proven effective to reduce the risks for dengue and other arboviruses. Key for their success is to make sure evidence (i.e., information about breeding sites and infestation levels in the community) is properly socialized with volunteers and the community at large. Here, we analyze one case of weekly messaging notifications as the means to achieve this goal.

Author Keywords
ICT, Dengue, Aedes Aegypti

Introduction
Well designed community participation strategies have been proven effective in reducing the risks of dengue and other arboviruses, by facilitating the elimination of breeding sites for its vector, the *Aedes Aegypti* [6]. One of the key challenges of these programs is to ensure awareness on the evidence (i.e., information about breeding sites and infestation levels in the community) to influence collective action. This paper discusses our experiments, using weekly messaging notifications as the means to socialize evidence with volunteers of a community mobilization entomological surveillance program in Asunción, Paraguay. The TopaDengue project engaged local volunteers of a

GraviTreks *[2]:* Quick scanning and instant report of adult mosquitoes surroundings. ***Spectra:*** georeferenced information of breeding sites [1]. ***Mosquito Habitat Mapper:*** ***[?]*** part of *Nasa Globe Observer*, it facilitates sampling and counting of mosquito larvae (as DengueChat, but without the social component).

Table 1: Dengue prevention or control ICTs.

community in a citizen science participatory program to monitor the presence and evolution of the *Aedes Aegypti* in the community (i.e., community-based entomological surveillance), using the DengueChat platform to collect and visualize data.

Related Work

Interactive systems for better engagement between citizens, communities and governments, also known as Civic Technologies (CivicTech) [1] have oriented our work. Platforms like Ushahidi, SeeClickFix, FixMyStreet, and Urban Decor are closed examples to the type of participatory mapping tha takes place in TopaDengue. More closely connected to our goals of using messaging and notifications, we build upon previous work from our team that has explored how these might encourage participation [3].

In the context of Dengue prevention, some of the most salient examples of interactive systems to both collect evidence on breeding sites and socialize it in some form are listed in table 1. Most of these systems are geared toward the report of mosquito breeding sites or areas where dengue cases exist to the pertaining authorities. However, these systems do not focus on promoting community action and collaboration.

Context: The TopaDengue Project

The community mobilization as a prevention strategy adopted for the TopaDengue project takes inspiration from the methodology applied in *Green Way* [7] and it has been contextualized with a social volunteering program specifically designed for a vulnerable community in Asunción *Bañado Sur*, Paraguay. We worked with volunteers who are residents of this community, training them to host once a weekly house-by-house visits in search of potential breeding sites. They were asked to document the process with support of tablets and paper forms, to upload and visualize the data in *DengueChat (DC)*.

[1] https://civictech.guide/

Methodology and Proposed Solution

The methodological aspects of our research and our engineering process can be framed as a Design Research [8] project.

Preliminary Exploration

We participated in the fieldwork with the volunteers [5], collecting qualitative notes about their experience with both fieldwork and the use of DC within this initiative. One of the design challenges that was identified, and over which the design and development efforts focused was that of evidence socialization, which is presented in table 2.

Socialization via messaging strategy

We designed three types weekly messages for volunteers: (1) Information: about the project's progress. (2) Education: ways of preventing and eliminating mosquito breeders. (3) Motivation: for participation of volunteers in the TopaDengue project activities. We experienced a Wizard of Oz (WOZ) prototype that consisted of a calendar to coordinate the delivery days of each message: (1) Information: about the project's progress. (2) Education: ways of preventing and eliminating mosquito breeders. (3) Motivation: for volunteers to participate of TopaDengue project activities. The WOZ methodology simulated the auto-send functionality for messages, but in reality, the researchers manually sent them to the volunteers. Figure 1.

Results

Before launching the WOZ study, and in order to assess feasibility, we collected information about the

- *Problem:* Not knowing the impact of the work done by the volunteers (that is, the evolution of the *Aedes Aegypti mosquito* infestation levels in the community, represented through the concept of *'casas verdes'*, are houses that for two months do not have active breeding grounds). This limits the possibilities of action of the volunteers, and can result in them losing the motivation to continue with their voluntary contribution, which in turn limits the number of *'casas verdes'* that the project can achieve. - *Design Challenge:* How could we increase the amount of *'green houses'* in the community through risk socialization strategies in the community?.

Table 2: Evidence Socialization Challenge

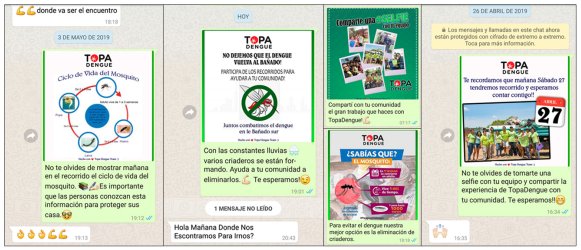

Figure 1: Messages sent by WhatsApp.

communication channels used by volunteers and facilitators. A first survey was carried out in which 31 volunteers participated. Based on all these exploratory results, WhatsApp Business was chosen as our broadcast channel. A total of 48 messages were sent to 32 volunteers, from 2019-03-09 to 2019-08-02. To measure the impact of the messages sent via WhatsApp Business, a survey was delivered to 31 volunteers in total, in multiple times throughout the period of this case study. The most important results from these surveys are listed below:

- 71% of volunteers said that the messages were useful, with 35% (11) choosing educational messages, 35% (11) choosing active messages, and 32% (10) choosing informative messages.
- When asked whether they shared the message outside of the group of volunteers, 50% (19) did so using WhatsApp, and 15% (6) through Facebook. Also, 29% (11) talked about the project with someone upon receiving these messages.
- On a closer examination, using a grounded theory approach [4], we codified the responses to the open-ended question of how exactly the messages helped volunteers looking to decipher which of the message types were useful. We found that both informative (11) and educational (11) purposes were common, whereas active messages were not registered, contradicting the previous result.
- On a closer examination, we futher codified the responses we got in the open-ended question to deepen our understanding of how exactly the messages helped volunteers. After manually classifying these anwers, we found that both informative (11) and educational (11) purposes were the most common reasons why the messages were helpful. A minority of users reported that the messages helped in motivating them to participate (3).
- Most of the volunteers (66.7%) were better informed about the project in face-to-face meetings at the beginning and end of the fieldwork days, WhatsApp messages and social networks appear as a second option.

Considering the total number of visits to houses done by volunteers throughout the *TopaDengue* project, 45.2% were performed from April to July 2018. In the same period of time for 2019, this percentage raised to 54.8%. Interestingly, there were less volunteers available in the later period, and even despite this, more visits were performed.

Conclusions and Future Work

Starting from an open-ended exploration, within the fieldwork activities of the *TopaDengue* project, we got valuable lessons. The messages strategy was welcomed by participants, a generally considered useful in their activities with the project. Interestingly, while volunteers reported that educational and active messages were the most useful for them, the analysis revealed that the usefulness of informational messages was on par with the educational

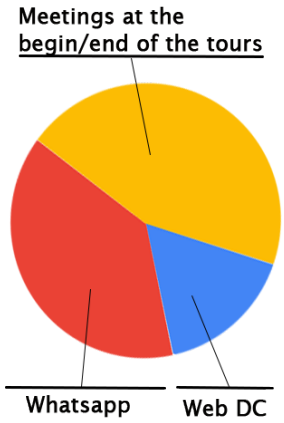

Figure 2: Information Media.

design, while the active messages were not registered. This is interesting because it validates in part one of our hypothesis (and the core value of the DC model): the most important role for ICTs is to ensure that the information (or evidence) is socialized, because this is what will mobilize the community to action. However, in order to fully validate this hypothesis, and particularly, the role of the notifications strategy in making it happen, a controlled experiment will be needed. Both results invite to further design explorations of both the content of messages that are sent to participants, and the strategy to deliver them.

Moreover, we asked users to select the best mechanism for them to be informed about the project. Figure 2 shows an interesting result which partially validates the results from the messages study. However, it opens up a new space of exploration: information sharing and socialization at the beginning or at the end of the field activities. The group meetings at the beginning and at the end of their activities are recognized as key moments of socialization. Finding ways in which ICTs can support this space, represents an opportunity for design and engineering. ICTs have a role in resolving these challenges, and the path we laid out in this paper is one in which a continuous feedback loop between research, design, development and community action is in place throughout the prevention initiative.

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