SIGDOC Career Advancement Proposal

Don't Leave Data On the Table: Improving the Design of Visual Risk Communication through a Content Analysis of a Crowdsourced Public Health App's Existing User Comments

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Brief Project Description

Over the past couple of decades, scholarship in risk communication research has increasingly focused on understanding how non-expert audiences perceive the visual representation of numeric risk information (see Lipkus & Hollands, 1999; Ancker et al., 2006), which can profoundly influence the decisions they make in order to mitigate health-related risks (Lipkus, 2007). For instance, research on thematic maps has investigated how users perceive risk information about floods (e.g., Hagemeier-Klose & Wagner, 2009), volcanoes (e.g., Haynes, Barclay, & Pidgeon, 2007), and cancer rates (Parrott , Hopfer, Ghetian & Lengerich, 2007). However, less scholarly attention has been directed towards maps as a form of risk communication in general (Dransch, Rotzoll, & Poser, 2010), particularly those that show health-related risks targeted to non-expert audiences.

We propose investigating the ways that Pulse Point--a crowdsourced, mobile, citizen first-responder app--uses Google mapping features and how users perceive those mapping features. More specifically, our goal is to understand the usability of the mapping feature. To do so, we will use content analysis to study the combined 30,000 existing user comments about PulsePoint on the Android and iOS platforms to explore the ways that users use the mapping features and determine if changes might be made to improve the user experience.

PulsePoint was developed to 1) crowdsource the mapping of Automated External Defibrillators (AEDs) through the PulsePoint AED app; 2) connect people experiencing sudden cardiac arrest (SCA), which is often fatal, with nearby responders (frequently off-duty healthcare providers, like paramedics and nurses) through the PulsePoint Responder app; and 3) once adopted by local emergency services, serve these communities. The innovative PulsePoint Respond app recognizes nearby users who respond to SCA can arrive on the scene more quickly than an ambulance.

According to the organization's website, SCA is the third leading cause of death with a less than 10% survival rate without medical intervention. Further, studies investigating volunteer-based networks of lay trained CPR responders found that individuals who experience SCA and receive CPR by bystanders showed increases in survival rates (Hansen, Kragholm, & Pearson, 2015; Ringh et al., 2015). In order to protect privacy, the organization does not collect information about patients. However, the website explains that 183,340 responders are currently registered and a total of 57,597 CPR alerts have been deployed in 3,300 cities. Additionally, the organization's social media presence includes links to news stories where the app was used to save someone's life.

Significance

Crisis and emergency risks---that is, situations where the risk is perceived as highly dangerous and anxiety producing (Sandman, 2014)--is a term often used to describe emergent environmental and/or public health threats like the spread of infectious and communicable diseases. Arguably from a risk communication perspective, responding to a PulsePoint alert constitutes a similar type of response. Further, verbal (Reynolds, Seeger, & CDC, 2014; Sandman, 2004) and visual strategies focusing specifically on maps (Welhausen, 2018) have been proposed for addressing such scenarios in health-related contexts. However, less is known about the ways that the design features of interactive forms of visual risk communication may influence how non-experts perceive and make

decisions. As crowdsourced health-related apps like PulsePoint become increasingly common--i.e., FluNearYou, MoBuzz, Healthmap, and SickWeather allow public audiences to crowdsource information about flu and dengue fever, for instance--better understanding how users navigate this visual information will become more important for information and communication designers.

Additionally, PulsePoint, like many other apps that include navigational functionalities, is linked to Google maps, which relies on assumptions about how users navigate place and space such as privileging certain features like street names and buildings that are arguably more important to users who may be driving rather than walking or cycling, for instance. Indeed, given the time and logistical constraints of responding to someone experiencing SCA--patients can die within minutes thus nearby citizen responders may be more likely to arrive on foot--visual information such as shortcuts between buildings and alleyways as well as pedestrian traffic density might be more important and useful. In this way, our project endeavors to build upon usability research as well as research in visual risk communication with a particular focus on the commonly-used Google maps platform.

The results of this study will be submitted for publication consideration in *Communication Design Quarterly*.

Methodology

Observing citizen first responders use PulsePoint Respond in real time is not feasible because it poses potential privacy concerns for citizens experiencing SCA. Therefore, to investigate the app's mapping usability, we will analyze the app's review comments that users have posted about the functionality of the app's mapping feature for common themes about users' experience. With over 30,000 comments on the iOS and Android platforms combined, we will use Content Analysis (CA) (see Brumberger & Lauer, 2015; Krippendorff, 2004; Thayer, Evans, McBride, Queen, & Spyridakis, 2007) to determine what data--so to speak--has been left on the table. For this project, our primary research question asks: how can the usability and accessibility of the app be improved based on existing user comments?

The biggest challenge to our project is exporting the nearly 30,00 comments from the app to a useable, accessible space for the research team to analyze. Investigators 1 and 2 will meet in person to complete this undertaking with the assistance of a programmer. Once we have exported the comments, we will upload the comments to NVivo, then we will then parse them for categorization. Tentatively, we envision first categorizing user comments by user type: 1) those who have received CPR and/or AED defibrillation for SCA; 2) family members/friends of those who have received CPR and/or AED defibrillation for SCA; and 3) citizen first responders who have performed CPR or administered AED defibrillation to victims of SCA. We anticipate the student research assistants will complete the user categorization, which is the precursor to the CA and coding.

After the student research assistants have categorized by user type, we will then begin to code the data for themes related to Google maps. Tentatively, investigators 1 and 2 will create the coding

scheme with the intention to train the student research assistants. We will train the student research assistants to use the coding scheme and test a sample to ensure intercoder reliability.

Timeline	Research Tasks
Month 1	**Content Analysis project preparation:** Prior to conducting the content analysis and meeting with the student researchers, investigators 1 and 2 will meet in person in Chicago to discuss and export the data set from the app.
Month 2	**Research team meeting:** After the data set has been exported and is useable, the research team will assemble virtually to discuss the research project, including: ● research project overview, timeline, and goals ● work expectations for student research assistants ● research pacing and reporting requirements
Month 3	**Research team meeting:** The research team will meet to discuss content analysis as both a qualitative and quantitative methodology. During this meeting, the research and theoretical framework will be presented to the student research assistants.
Month 4	**Research team meeting:** The research team will meet to discuss the coding scheme. Further, student research assistants will be trained to use the coding scheme.
Months 5-6	**Research team writes and submits manuscript reporting results to *Communication Design Quarterly*.**

Budget

If awarded, the funds would be primarily used for investigator travel in order to meet face-to-face. The aim would be to troubleshoot exporting the 24,000 comments into a useable and accessible format for CA. Additionally, 2 research assistants will be paid for working the research project.

Expense Description	Cost
Research Assistant (1) from Harold Washington College ($20/hr x 10 hours)	$200
Research Assistant (2) from Auburn University ($20/hr x 10 hours)	$200
Travel for Investigator (flight + hotel)	$800
Total	$1200

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