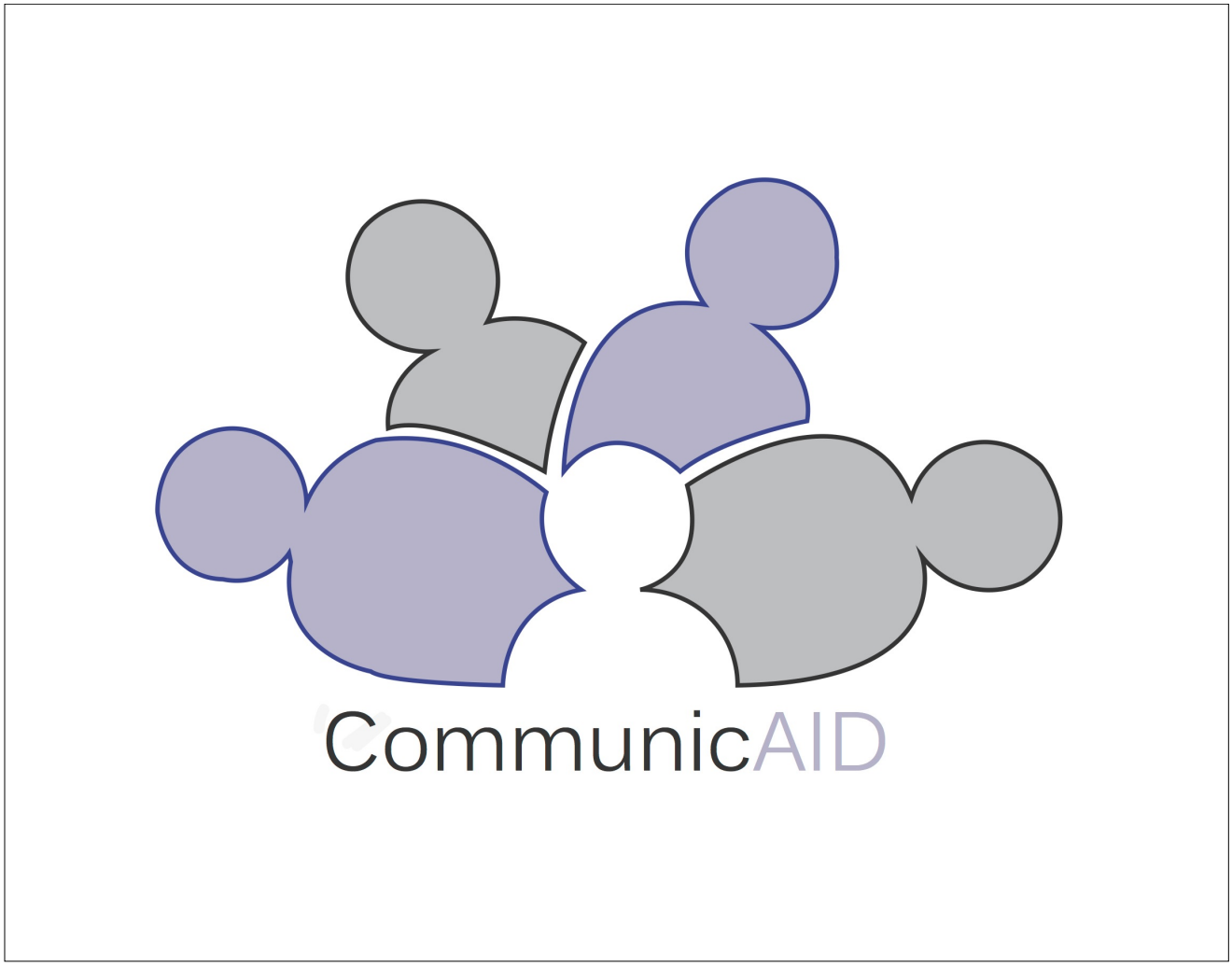

Project Proposal

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ABSTRACT

The current model of communication immediately after natural disasters follows a top-down approach in which national and local governments provide information to the victims. This often does not provide timely information to the victims, who end up coordinating relief amongst themselves. With the rise of social media technology in recent years, locals in disaster situations use Twitter, Facebook, and Instagram to share real-time information about the community and aid availability. We propose to create a new social media mobile application that allows members of a community affected by a disaster to identify their needs, share resources, and share information about the disaster. Using geofencing technology, we will minimize the amount of false information being propagated and allow communities to better meet victims' individual needs, increase volunteers' response efficacy, and provide a more timely disaster response than that provided by the local or national government agencies.

KEYWORDS

First Responders, Immediate Disaster Response, Social Media, Communication, Community Collaboration, Response Efficiency, Meeting Individual Needs

PROBLEM STATEMENT

How Might We

"In the next fifteen to eighteen months, how might we foster collaboration within communities affected by disasters and improve communication among stakeholders in disaster situations?"

Statement Explained

Disaster response currently has numerous problems, the biggest one being communication. Communication inefficiency results in the loss of both lives and resources. Hence, addressing communication is important. However, there are many aspects of communication and targeting all of them at once would not be possible. The four main stakeholders in disaster situations are victims, private businesses, private response organizations and the government. In permutations with each other these can result in sixteen combinations of interactions. Targeting the communication at the government level may seem like the best approach, but studies have shown that aiding the problem at the ground level is more effective.

The problem with communication arises when the people who are communicating do not have a proper platform to communicate. The key to disaster response is trust and shared work ethics between the stakeholders. Currently, problems persist with the interaction platforms associated with communication because of lack of trust

between these different parties. Hence, finding the platform where maximum trust and shared work ethics exists is important to unify the community affected by the disaster. The different kinds of key communication platforms for disaster responses include:

1. **Within the Government**
   This section encompasses communication between different levels of the government with the federal agencies such as FEMA at the top of the hierarchy and first responders at the government level being in direct contact with those affected. Trying to change the communication systems within the government requires bureaucratic power.
2. **Government and Victims**
   The communication between government and victims is done through the first responders, who are government officials who work on the ground with the victim. Efficient communication between the victims and the government is important to make sure that the distribution of resources within the community is efficient and nothing is being wasted.
3. **Private Sector and Government**
   The private sector and the government has been known to collaborate in a number of situations. The private sector has the motivation to look good to the society by contributing and the government needs help with the distribution and finding the proper resources.
4. **Private Sector and Victims**
   This platforms is where there is no involvement of the government and private businesses and response organizations stay in contact with the victimized community in order to help them through providing resources and general aid. However, these private organizations do not have a structure which affects their efficiency.
5. **Within the Victimized Community**
   This is the communication at the ground level where the victims of the disaster communicate among themselves in order to provide support and relief during or immediately after the disaster. This helps the community to empower itself and respond to the disaster before any first responders can reach them.

However, it is not possible to target all the interaction platforms all at once and hence there is a need to focus on one platform and strengthen the communication at that particular platform. Considering the different platforms, it is evident that making any changes for communication within the government would not be possible without bureaucratic support and hence it is not the best option to focus on that side of the problem. In accordance with this, the same problem would arise with the communication platform within the government and private businesses. Dealing with hierarchal structures in both the organizations is challenging and beyond the scope of bringing efficient change through basic solutions. However, there is one platform where focused effort can make a huge difference. The communication between victimized communities is the answer to efficient communication and reduction of wasted resources. The victimized community is closest to the disaster and it's

effects and hence they are the true first responders. Another problem that exists with communication is the destruction of infrastructure that supports disasters. Currently, technology does not exist to tackle that. However, with companies such as Google and Spacex working on satellite internet, tackling the infrastructural damage and constructing physical communication platforms is not the problem to be tackled at hand. Considering this, we decided to focus on small scale disasters such as tornadoes, flash floods, fires, etc where we may be able to make the assumption that the physical communication infrastructures are intact and thus aid the virtual communication platforms.

Therefore, our problem statement basically states that we would like to figure out a solution to aid communication, virtually, between the victimized communities who have been directly affected by the disaster, in order to improve immediate disaster response by empowering the community.

Significance

Why is the problem important?

A. Between 1980 and 2010, 26,889,582 people in the United States were affected by natural disasters. From these disasters, the economic damage totals roughly $544,287,010,000, which is approximately $17,557,645,000 each year. To make matters worse, 12,366 people lost their lives to the 640 natural disasters occurring in this time frame (UNISDR 2010). While some disasters are unavoidable, there needs to be an effort to alleviate the economic and societal devastation caused by disasters.

B. Local and national governments are often overwhelmed when disasters strike, causing their response to be very slow. For example, during Hurricane Katrina, the local government waited 24 hours after the Hurricane struck to request national aid, and it took the government several hours to get to begin distributing aid to the victims (Sobel et. al., 2006). Because of these slow response times, victims are often left to fend for themselves for long periods of time without the food, water, medical care, and other miscellaneous needs they may have.

C. In the absence of government and nonprofit aid, research has shown that victims help each other and communicate verbally, through mobile technology, and using social media. While social media is proving to be an increasingly useful tool in disaster communication, the current platforms like Twitter give way to misinformation, since anyone can post about the disaster practically anonymously (Gupta et. al. 2013). There is currently no social media platform available that enables only people in a specific community to communicate during disasters.

What are the costs to society?

When stakeholders in disaster situations do not communicate effectively, it leads to a misuse of resources and public unrest. Several presenters at the 2015 IDCE spoke about their experiences with communication failures in which members of an affected community did not receive timely information and the negative effects that ensued. For example, Daniel Barnett from the Johns Hopkins School of Public Health conducted a study on hundreds of medical first-responders who worked during Hurricane Sandy. The study found that 41% of

volunteers did not experience “response efficacy,” meaning that they did not feel that their efforts made a difference in the community, and consequently, 30% said that they would never volunteer in another disaster. He made it clear that response efficacy is directly linked to communication, because when volunteers receive clear, timely instructions from their superiors and communicate effectively with the victims, they feel better about their jobs and their roles in the disaster relief. This shows how a lack of communication can lower public morale and augment the suffering caused by disasters. (Barnett 2015). Additionally, Aaron Titus, who worked with VOADs (Volunteer Organizations Active in Disasters) said that he witnessed two thousand volunteers who came to help during Hurricane Sandy literally sitting on the curb doing nothing because no organization wanted to take responsibility for them and tell them what to do. This constitutes a misuse of resources, because these citizens, if given proper instruction, could be on the field helping victims (Titus 2015).

What are the possible causes of the problem?

According to Russell R. Dynes of the University of Delaware Disaster Research Center, there are several misconceptions surrounding victims’ behavior in natural disasters, which leads to a lack of communication between local governments, victims, and citizen volunteers. He found that emergency management agencies operate under the assumption that disasters cause mass social chaos, and that individuals in disaster situations cannot be trusted to make intelligent decisions. Consequently, they adopt a “top-down” communication approach in which citizens trust the national governments to make the correct decisions for them in disaster situations. He found that a more realistic assumption would be to consider individuals affected by disasters as capable of making rational decisions, and agencies must listen to their needs and input in a more flexible form of communication (Dynes 1994). Other studies found similar instances in which emergency management agencies formed a “plurality of phones or walkie-talkies,” controlling the relief effort conversation while keeping the victims in the dark in terms of information (Helsloot et. al 2004). Not all of the blame can be placed on the relief organizations, however, since they are trying to process mass amounts of information about the disaster situation. Francisco Sanchez at the 2015 IDCE said that victims in recent disasters tend to use social media as a sort of 911, assuming that somebody will come help them. In reality, these social media platforms do not have the capacity to connect victims to relief in an efficient way (Sanchez 2015).

How would society be improved if this problem were better addressed?

More effective communication between victims, local and national governments, and other local stakeholders leads to a more efficient allocation of resources, better decision-making abilities, and a boost in public morale. A study analyzing eighty-two disaster situations found a direct correlation between the amount of trust and communication among stakeholders in disaster situations and the effectiveness of the leadership in the disaster. This is partially because a population that communicates with and trusts its authorities’ information will act immediately on the information instead of taking time to verify it. Also, the study found that populations that communicate effectively bounce back from disasters better than those that don’t, supporting the claim that communication post-disasters leads to community resilience (Longstaff 2008). Additionally, Dr. Barnett from the

IDCE found that communication leads to increased response efficacy, so effective communication during disasters can lead volunteers to feel that their work makes a difference in the community, so it can alleviate some of the psychological trauma caused by disasters (Barnett 2015).

Stakeholders

1. **National Government Agencies**
   As soon as a disaster occurs and the governor of the state in which it occurs declares a state of emergency, the president calls upon national disaster response agencies, such as the Federal Emergency Management Agency (FEMA). According to Lt. Shekinah Magee, the Joint Regional Medical Planner for FEMA Region 2, FEMA's role in a disaster situation is to assess the needs of the affected community through situation reports, and then call other federal agencies to the scene depending on the community's needs. The federal government agencies do not communicate directly with the victims and local businesses; they receive information about the locals' needs from the state agencies. Lt. Magee emphasized that while state agencies tend to focus on immediate relief and the "hour-to-hour" needs of the community, the government organizations focus on long-term relief and providing sustainable solutions to the community's problems. She said that since FEMA relies on local agencies for information about the victims in natural disasters, local organizations that communicate effectively with the affected communities allow the government to allocate its resources more efficiently and not have to intervene as much. Therefore, communication between the local governments, local organizations, and victims is essential for the national organizations to be able to focus on long-term relief goals (S. Magee, personal communication, March 27, 2015).
2. **Local Government and Emergency Management Agencies**
   There exists a paradox in communication during natural disasters; while emergency management agencies are overwhelmed with massive amounts of incoming information, victims often do not receive information that is timely and/or adequate (Shklovski et. al., 2008). Local governments receive an overflow of information about the disaster situation through various forms of communication, including verbal communication, mobile technology, and social media. According to a study done on emergency management communication systems, experts identified shortcomings in the following aspects of the information being provided to local governments: integration of information, fast data access, timeliness and updating of information, and the credibility of the information (Meissner et. al. 2002). To illustrate these shortcomings, we cite a conversation we had with Barnaby B. Dow, the External Affairs Manager for the King County Office of Emergency Services Management. He told us that when a disaster strikes in King County, Seattle, some of their staff members parse through the various forms of social media for information about victims, which takes a long time and displays a lack of integration of all of the different information outlets. If the information were all on one platform, it would be much easier to locate relevant information. Additionally, he said that the emergency management agency can never get the information out fast enough, because blogs and real-time reports always "beat [them] to it." This constitutes a lack of

timeliness and updating of information (Dow, B., personal conversation, February 11, 2015). As for credibility of information, Scott Appling, a computational social scientist at the Georgia Tech Research Institute, described to us the need for data analysts to determine which social media information is credible, because applications like Twitter and Instagram allow anyone to post any type of information regardless of its truthfulness. Having lots of inaccurate information can pose a problem to local government agencies trying to assess the needs of a community and coordinate response efforts (Appling. D. S., personal conversation, February 5, 2015).

3. **Victims**

   While local governments often experience an overflow of information, victims do not receive enough information from the governments. A 2007 study on victims of the Southern California Wildfires revealed that many victims did not receive adequate information from the local government, and some did not trust the local government's information: "About a third of our respondents gave harrowing accounts of having little or no time to pack belongings, of receiving wrong directions from law enforcement and driving toward the fire rather than away from it" (Shkolski et. al. 2008). The study also found that in the absence of law enforcement, victims would reach out to each other using Twitter and help each other with the few resources they possessed. In order to have efficient community response, victims and local organizations need to trust each other and provide each other with accurate, timely information.

4. **Private Business**

   A major focus of the 2015 International Disaster Conference and Expo was engaging the private sector, including both local and national businesses, in disaster relief. According to Edward Gabriel, the Principal Deputy Assistant Secretary for Preparedness and Response for the U.S. Department of Health and Human Services, private businesses play a critical role in disaster relief, although it is usually overlooked by local and national government agencies. For example, at Ground Zero, Budweiser passed out canned water to victims in an impromptu relief effort. These businesses often suffer financially during disasters, yet they want to help the community members to boost their image. One of the keys to disaster resiliency is regaining the community's economic stability, which relies heavily on the prosperity of the local businesses (Gabriel 2015). Therefore, these businesses need to be included in the community-wide disaster relief conversation, both to see what they can contribute to the aid and to find out what they need.

Context and Existing Solutions

Research has shown that contrary to popular belief, people do not instinctively panic in disaster situations. In fact, when a disaster strikes, their first instinct is to reach out to their family, friends, and community members to ask for help and offer help (Dynes 1994, Helsloot et. al. 2004). In more recent disasters, victims of disasters have been turning to social media to facilitate this communication. For example, during Hurricane Sandy in 2012, government agencies and citizens actively engaged in conversations on Twitter, exchanging 132,922 disaster-related tweets. This allows communities in disaster situations to share real-time information that local governments may not be able or ready to provide, like which roads are closed and gas stations are open (Chatfield 2014).

However, social media gives rise to miscommunication, since anyone from any part of the world can join the conversation about the disaster, and some people disseminate false information. Also in Hurricane Sandy, researchers identified 10,350 tweets containing fake images, 86% of which were retweets, meaning that people passed along the fake images (Gupta et. al. 2013). This shows how communication using current social media platforms is not ideal, since anyone can post fake information and it will get spread throughout the community, leading to mistrust and miscommunication. Using a presentation by Brandon Greenberg, the CEO of DisasterNet, for the 2014 Global Risk Forum, we identified and analyzed several existing apps and websites that aim to leverage social media technology to enable more effective disaster-time communication (Greenberg 2015):

CATEGORY	SOLUTION	FUNCTION	HOW IT HELPS	WHY IT ISN'T EFFECTIVE
Crowdsourcing and Applications	Disaster Assistance and Assessment Dashboard	It helps businesses and governments to share resources, request assistance through an application.	Provides a strong communication platform for businesses and government to communicate effectively, locally.	It doesn't count the victims and their wishes in the solution and hence there can be potential shortage and wastage of resources.
	Geofeedia	It is a patented social media platform based on cloud networking that allows the user to access and monitor social feeds from a particular location.	It puts all the data on one platform and allows the user to sort through it, thus providing a good resource for understand the social media standpoint during a disaster.	It will only the information when asked of a particular area (very specific) hence it would not aid in immediate response. Also, it does not provide a platform for communication.
	Crisis Cleanup	It is an online tool that lets relief organizations access a database of victims' locations and needs, and "claim" victims that they will help.	It allows the organizations to collaborate and efficiently divide the work. This allows them to target different victims and increase the outreach.	It does not account for the impromptu volunteers within the community during a disaster. This leaves 60% of the volunteers without work.
	DeployPro	It is an application that allows CERT members to submit photos, recordings and reports to incident managers while containing important relief information.	It combines providing quality information and a good network for relief through CERT members by providing them with information and collecting on-site information from them at the same time.	It only considers the CERT members and not the entire community. This does not empower the community as a whole but helps its certain members support the community.

CATEGORY	SOLUTION	FUNCTION	HOW IT HELPS	WHY IT ISN'T EFFECTIVE
	Air BnB	Allows people to rent out rooms in their house for free to people who are evacuating from disaster situations.	Provides an inexpensive, community-driven response before any type of government evacuation program is in place. Victims stay in houses, not shelters.	Only addresses the issue of housing, not other disaster-related issues.
Open Data	LanternLive	It is an open source application that allows users to find local gas stations, find fuel and look up power outage maps, locally while also providing tips during a disaster.	It can help people locate the resources it is providing. This will mostly allow them to empower themselves during a disaster by locating a resource that they need in their local area.	It does not provide any platform for collaboration in the community and only supports aid in individual response. This can reduce the availability of resources for the concerned victim.

There are more platforms out there that have targeted communication but the one mentioned above have been most effective so far.

The Need For a Solution

In the above section numerous problems with existing solutions were highlighted, however the main problem that exists is the lack of recognition of the importance of involving victims in the equation. Most solutions tend to try and reach a wide demographic instead of focusing on a small area and helping increase the efficiency of communication within a smaller geographic location. Also, analyzing the existing solution, we also realized that there are platforms available to provide information and address the technology, separately. However, no application or resource addresses both the aspects of solution to combine them. The focus is mostly on communication between service organizations and the government. However, the need to improve the communication among the members of the victimized community and provide a virtual platform for them to communicate. Usually there is too much or too less information provided in the application or the crowdsourcing data network. These tend to be extremely complex and hard for the users to access. Such apps are not user friendly and hard to access. Apart from this most disaster response tools tend to focus on disaster preparedness instead of immediate disaster response. This provides the information but does not help when a disaster strikes and the victims aren't trained to tackle it. There is a need for a platform that connects the victims and provides them with the right amount of information required. There is a need to focus on the smaller community in a geographically small area rather than focusing on a large area. We also need to empower the community to aid in the direct response right after the disaster strikes.

PROPOSED WORK

Goal

Our exploration into this problem space resulted in the realization that issues with communication were primarily a combination of infrastructural damages and the organization of the emergency management system. While it would be ideal to propose a solution that can minimize the failure of the electrical power grid or increase the resources provided towards disaster response organizations, as a group of college students, these options are simply outside of the impact we can potentially have. Given that most organizations involved in the disaster response system have shown continuously to be unable to provide timely and efficient aid to all victims, the scope of our project focuses specifically on enabling individuals and local businesses to distribute their own available resources. Our goal is to allow these community members, specifically individuals within a local three mile radius of a disaster victim, to be the first responders to the victim and coordinate with governments, private sector, and non-profit organizations (NPOs) in meeting victims' individual needs. The intended impact of this project is an increase in the response efficacy of volunteers, an increase in the efficiency of first-response aid distribution, and the creation of a digital platform enabling inter-community communication between victims, bystanding individuals, volunteers, and the aforementioned local and national government organizations.

Objective

To Provide a Centralized Digital Platform for Communication

BACKGROUND:

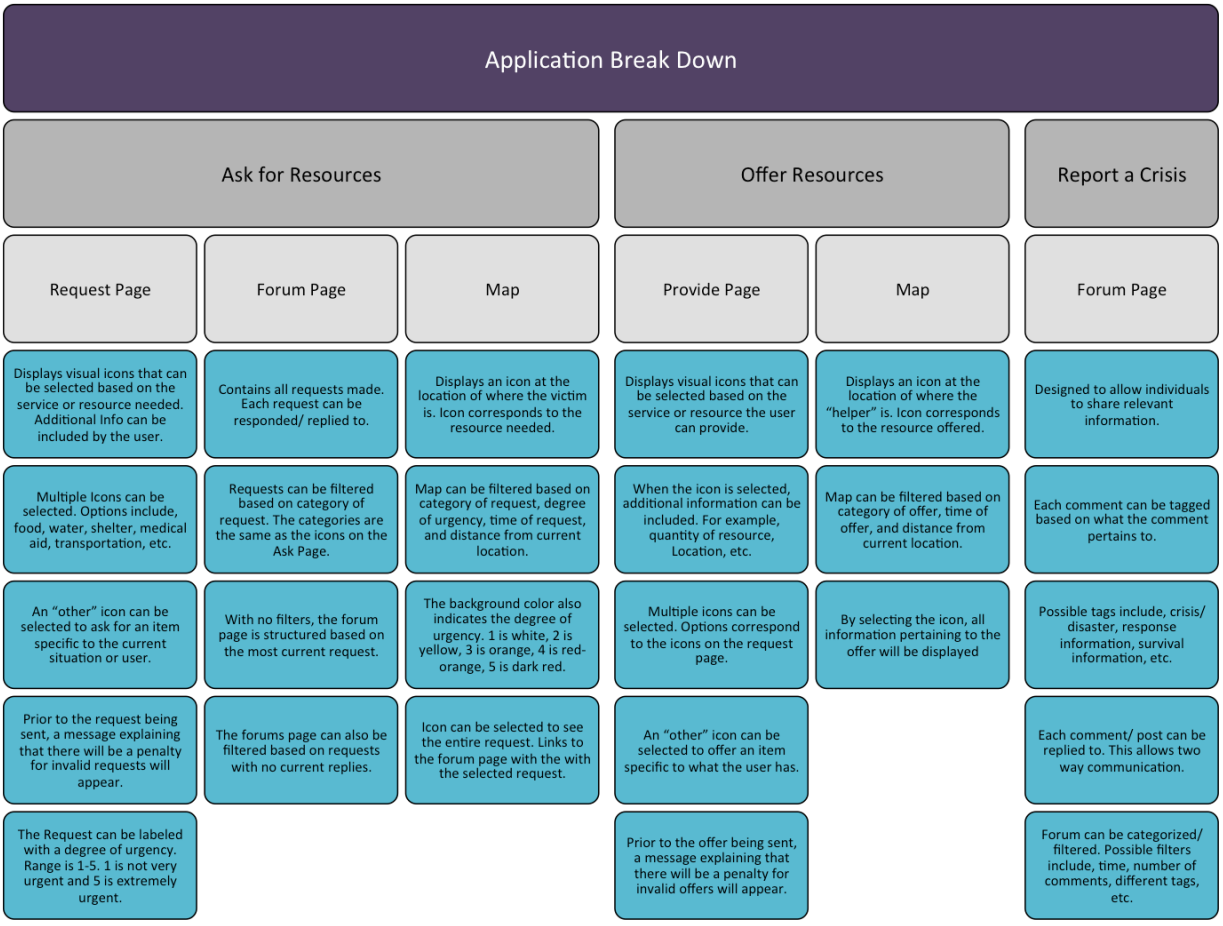
The main objective of the project is to encourage communication amongst stakeholders during disasters so the collective group of victims, the "community," can collaborate with one another to provide immediate aid. According to an article written by Russell R. Dynes on emergency planning, an emergency model that concentrates on ways of developing collective decision making processes amongst the victims is the more successful tactic to emergency relief. The current models in execution predominantly focuses on control and command procedures which pre-empt decision making for the victims. Dynes claims that although overhead direction has positives, victims at the scene have a better collective understanding on the current situation. Additionally, the victims or community affected by the disaster are readily available where emergency response units frequently are not able to respond as quickly. Since the community is the first on scene and has a comprehensive understanding of the disaster scenario, the make the strong candidates for emergency relief.

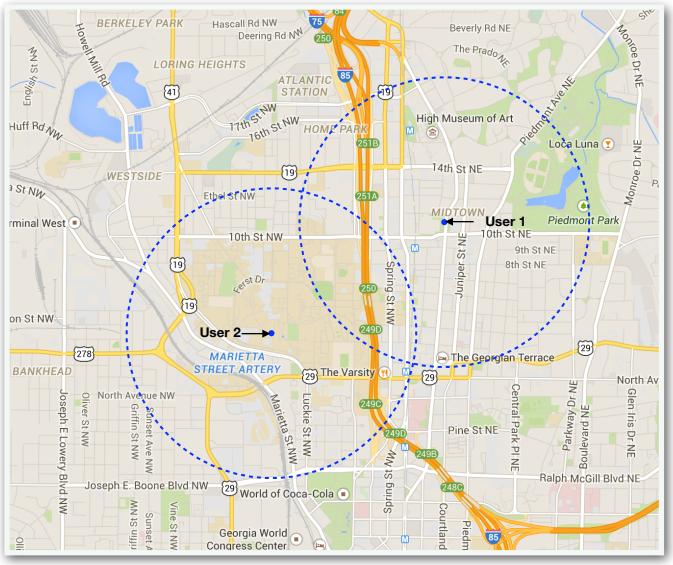
The concept of advocating for victim to victim communication within a community certainly has a few common misconceptions. The first myth is that citizens panic during disasters. If this were overwhelmingly true, then the distress of victims would cause panic and disorder only inhibiting successful inter community aid. I. Helsloot and A. Ruitenberg claim that initial panic in victims is only a brief reaction to the initial shock of the event. Research shows that actual behavior does show an acute reaction of fright, which is followed however by rational and often altruistic acts. The second myth is that citizens are helpless and dependent. Quarantelli states that, "as a

whole, human beings respond well at impact times of disasters. People in such situations actively seek relevant information and attempt to do what they can to deal with the exigencies presented by the emergency. The threat of a disaster just about to happen or its actual impact does not paralyze those affected. Passivity in the face of danger is almost non-existent." Not only does this statement disprove the idea that citizens are rendered helpless and dependent during disasters, it also suggests that humans will actively pursue information which is one of the purposes for the development of a digital platform that allows communication within a community. The final myth is that Looting occurs both during and after a disaster. Quarantelli has stated on the basis of empirical research that looting almost never takes places at those times. In the rare cases it does occur, it is done by lone individuals from outside the community. The community is the target for the proposed application, so the fear of untrustworthy individuals can be disregarded as an extreme factor for why the application would potentially fail.

APPLICATION OVERVIEW:

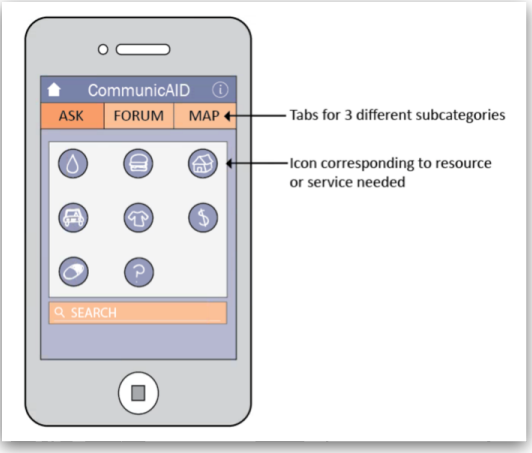
The first step to establishing a single digital platform that advocates for communication within a community is the creation of a mobile application. The application is designed to foster an environment that allows a two way form of communication.





The application is designed to allow the community to aid one another prior to the arrival of first response units. In order to capture this idea of community, each application user can only receive and distribute information within a 2 mile radius of their current location. However, if another person's data range enters the user's range, their information can be seen. The figure below illustrates this concept. The blue dot represents the current location of a user, and the dotted ring or circle encompassing the dot represents the data range for that user. In the image, there are two present application users. Since the data ranges from the two users overlap, User #1 can receive any information User #2 provides and User #2 can receive any information User #1 provides. The limited range in communication was chosen for a couple of reasons. The first reason is that one purpose of the application is to establish a community as well as allow the community to aid itself during various disaster scenarios. If there was no restrictions on the range of communication, then communities would not be established. The second reason is that the application was also designed to organize information, preventing information overload. If victims across the world were given the ability to communicate with one another, the organization of information pertaining to different disaster scenarios would not exist.

The Application is broken into three main sections, and each main section has its own subcomponents with various features. The first section, "Ask for Resources" is specifically designed for the victim. This section is composed of three distinct subcomponents, the Request Page, Victim Forum, and Victim Map. On the Request Page, the victims are able to send requests for resources and/or services they need. The image on the right is a rough example of what the Request Page of the designed application will look like. The icons represent the different resources or services that may be needed by the user. The proposed icons include: water, food, shelter, transportation, clothing, money, medication or any other form of medical aid,and other. The user can select as many of the icons as he/she chooses, and once selected, the user is directed to a page where they can add additional information to their request. Each request will always have the name of the victim as well as the date, time, and location of the request. None of this information will need to be entered by the user, since the app is designed to automatically include this information to save time for the victim and to make the app a little more convenient. The Victim Forum allows victims to communicate back and forth with other users of the application. The forum



was created to allow users who are capable of providing aid to easily learn of the resources and help needed by the surrounding victims. To help the users navigate the forum, filters have been provided. The forum can be filtered based upon, the resource or service requested or the number of comments received. The user may want to filter based on request so he or she can identify which victims need the resource or service they have or can provide. Additionally, the user may wanted to filter based upon the number of comments. This would be useful for identifying which victims have not been responded to yet. If no filters are chosen, then the forum will be structured based on the most current request. The Victim Map is the final subcomponent of the "Ask for Resources" section, and allows users to view where different victims are currently located. On the map an icon will be displayed where the victim is. The icon has two purposes, the first of which is to depict the resource or service the victim requested. The second purpose is that the color of the icon notifies the other users the degree of urgency of the request. The degrees of urgency is outline in the table above titled "Application Break Down." Like the Victim Forum, the Victim Map can be filtered upon certain criteria. The criteria are as followed: resource or service requested, degree of urgency, and location from current position.

The second main section of the application, "Offer Resources," is designed for the users who can provide physical resources and services. The section has two subcomponents, the Provide Page and the Aid Map. The Provide Page functions just like the Request Page used by the victims. The only difference between the two, is that instead of selecting the resources and services needed, the user selects the resources and services he or she can provide. This page was designed to function like the Request Page so the application users would not have to familiarize themselves with a different process. The icons on page are also the same as the icons on the Request Page. The Aid Map in this section of the application functions like the Victim Map designed to illustrate or show the location of the victims. The biggest difference is that Aid Map displays icons where the user is and the icon represents the resources and services the user can provide. The map can be used by the victims to locate users who can provide their needed resources or service. Like the Victim Map, the Aid Map can be filtered. The filters are: resource or service offered, and location from current position.

The final section of the application, "Report a Crisis," is designed for information distribution. This section only contains a Community Forum. Instead of requesting resources and services or providing resources and services, the forum is used to distribute information about various things pertaining to the disaster. Some examples include, occurrence of a disaster, response relief, survival aid, etc. This forum is used for mass communication rather than individual communication which is seen on the Victim Forum.

METHODS:

A. **Simplicity:** After a few members of the group visited a presentation given by the creators of Yik-Yak, the group learned that the most successful to start up an app, is to make the app simple and user friendly. The features of the application were just defined, but all of these features will not appear in the first version of the app. Rather than have all three main sections of the app, the first version will only be comprised of the "Ask for Resources" and "Offer Resources" Sections. This way, the app is very simple to learn to use. Either the user is a victim or a provider. After the application receives positive reviews from the users, the "Report a Crisis" section will be added.

B. **Outreach:** Once the application is available on the market, the group would like to develop a specialized application for response units like the police and fire department. This specialized application will allow the departments to view all information located within their jurisdiction. This will allow the professionals to intervene and provide aid as well. Also, by only allowing information within the departments' jurisdiction, the concept of community will be preserved.

OUTCOMES:

The application will be considered a success if…

1. There is an increase in volunteer response efficacy

   - WHY: Daniel Barnett from the Johns Hopkins School of Public Health conducted a study on hundreds of medical first-responders who worked during Hurricane Sandy. The study found that 41% of volunteers did not experience "response efficacy," meaning that they did not feel that their efforts made a difference in the community, and consequently, 30% said that they would never volunteer in another disaster. He made it clear that response efficacy is directly linked to communication, because when volunteers receive clear, timely instructions from their superiors and communicate effectively with the victims, they feel better about their jobs and their roles in the disaster relief. This shows how a lack of communication can lower public morale and augment the suffering caused by disasters.

   - HOW: Our app proposes to increase response efficacy of volunteers through the "request resources" and "offer resources" features. When members of a community that was affected by a disaster see that someone in the vicinity of them needs a certain resource or service, they will be able to communicate directly with the victim and provide them with what they need. This will allow community volunteers to process clear, specific instructions and meet requests in a timely manner. This way, the volunteers will see the direct impact that their help has on the community member or members they are helping, and they will feel that they have made a difference in their community and therefore experience response efficacy.

   - RESULT: As a result of the direct communication between victims and volunteers, as well as the fact that community members are helping each other as opposed to a government agency providing less specific instructions about aid distribution, we hope that 80% of our citizen volunteers will experience response efficacy. This will raise the morale of the community members in disaster situations, and make the volunteers more likely to help more people and possibly volunteer again in other disaster situations.

   - POTENTIAL PROBLEMS: We understand that disaster situations cause widespread suffering and anxiety, so not all victims may openly express their gratitude for volunteers coming to help them. This may cause volunteers to feel discouraged and stop helping people, and consequently not feel response efficacy.

2. There is a decrease in wait times and the victim's needs are better met

   - WHY: Local, state, and federal governments, local businesses, private corporations, and non-profit organizations all have a stake in the well-being of the inhabitants of a region. Their resources become all the

more crucial when a natural disaster disrupts the functioning of infrastructure, the economy, and health of these residents. However, it has been observed that these organizations struggle in properly distributing out aid due to a number of factors: the flow of large yet incomplete information through their databases, the ability to mobilize their available resources, and the proper relocation and allocation of the selected resources. This three-step process is typically how the majority of organizations operate in emergency management. While this method typically works for smaller scale disasters, such as a fire in a single building in a city, a natural disaster encompasses a large number of variables, which can include fires, loss of property, personal health, and stray animals. A natural disaster simulation conducted in a breakout session by Ecosify at the 2015 International Disaster Conference and Exposition (Fulton 2015) revealed through analytics that 47% of all available resources from governments, businesses, and nonprofits failed to even be deployed. This data reveals concerns not only with aid distribution but with the ability to properly deliver the correct aid to victims. A new method is needed to improve the efficiency and timing of first-response aid that will cover the many diverse needs of a population in a short amount of time. The design of the online digital platform not only enables individuals on the ground to distribute their own aid, but allows this information to be open to anyone connected to the platform. For example, the anonymous social media application Yik Yak has an option on its menu called "Peek." Here, anyone connected can see the posts of another location anywhere within the United States, primarily posts on college campuses due to its popularity to that segment of the population. Our design of the digital platform will also attempt to draw upon this concept, to allow out-of-region organizations to collect constantly updated, geolocated data on the exact needs of people within a certain time frame.

- HOW:
  - Create a social media platform, with the option to connect to other established social media sites such as Facebook and Twitter, that will enable individuals to post concerns and needs to those within a local three mile radius. Different types of aid will fall under different categories, along with the level of urgency, estimated response time, or level of feasibility.
  - Gather frequently used keywords for type of aid, such as food, water, or a type of disease, and place these under a trending category of the platform (or a feature of an application), ranked by number of times a keyword is used. This is similar to the hashtag feature of Twitter.
  - Design a feature of the platform that will allow individuals to reach out to outside organizations if the specific type of aid they are looking for is not available in their local community. An individual will log into this aspect of the platform and search for an organization that can provide a specific type of aid he/she is looking for. A list of suggested organizations will appear, and the individual can notify the organization of what is needed, how much, and the location.
- RESULT:
  - As a result of the creation of the digital platform, individuals and organizations connect online to voice concerns/needs. The digital platform will only succeed if it is fully utilized by active online users. Success

will be gauged by whether 75% of all active online users engage with the platform when a disaster strikes a metropolitan area and its surrounding region.

- Organizations analyze trends in the platform to gather data on the specific resources and locations needed depending on frequency of keywords and ability of local communities to distribute its own aid. Again, active participation is required for this aspect of the platform to succeed. Success will be gauged by two specific figures: a 75% participation rate of organizations with a history of being involved in at least three disasters, and the deployment of 90% of available resources within a week of a disaster
- The focus of this outcome is specifically on decreasing wait times for aid and increasing its economic efficiency (goods and services in demand by victims are met by suppliers). Success will be gauged by meeting the full needs of 90% of individuals who request supplies within five days of the request being sent.

- POTENTIAL PROBLEMS:
  - **Long-term use:** Since the digital platform will require active participation among residents in a metropolitan region, one of the issues that can arise is whether the notion of receiving aid is enough of an incentive for people to use the application. We conducted an experiment testing whether people would even want to reach out to others in need, and results indicated that 80% of subjects would be either a candidate or a strong candidate for victim-to-victim communication. However, even with this figure, since social media platforms tend to fluctuate in use due to popularity, would it be consistently used a decade from now? The emergence of a vast number of social media applications means that what we could develop in a year may already be outdated with the current thinking of the market. Being one of the first social media platforms, Facebook and Twitter have remained one of the most highly used sites within the United States by constantly updating and adding new features to engage users. For our project, we will not only have to take into account the design of the platform but also the upkeep required for it to be successful during the next disaster.
  - **Verification:** One of the primary issues with allowing individual users to freely post their needs and concerns is the possible situation that what someone posts on the platform is completely false. This factor will determine the ultimate success or failure of the project because local communities, volunteers, and organizations will rely on reliable and truthful data being posted to the platform. Such an issue is currently addressed by 911 operators when they deal with false emergency calls. For example, a caller is automatically prompted into a series of specific questions that allow for specific information on the caller to be collected. False information from the caller can often be revealed by asking questions on the number of doors in a room and other details involved in the claimed site of the emergency (Sampson). The online platform will similarly be designed to discourage users from posting false information. First, terms and conditions for the applications must be accepted by users. Second, other users on the application on the ground near a site can verify this information by confirming or denying information based on location. Verification based on community resilience will deter the user from misusing the purpose of the platform and thus allowing organizations to decrease wait times and maximize efficiency.

ANTICIPATED PROBLEMS:

The largest or most expected issue with the development of the application is not its functionality, but rather advocating for usage. The goal is to have the group's created application function as a part or subcategory of a currently existing application. For example, a subcategory of Google is Google Crisis. If the group could incorporate the app into a social media app like Facebook, twitter, or even yik-yak, it would be preferred. This would not only encourage the application to be used, but it will also increase the familiarity of the app. Studies conducted by Jochim Hansen and Michaela Wanke suggest that even when stimuli are presented supraliminally and when recognition did not fail, unconscious familiarity had an influence on liking. The more the users of the application are familiar with the app, their interest and support for the app will increase. This phenomena will cause the app to become more popular amongst the users.

Another expected problem or road block is the coding knowledge required to create a sophisticated application. The groups current coding knowledge is not very broad, but experts in King County have offered help with creating the application. Not only have they offered to provide their own expertise, but they have also asked to be the first beta users of the application once it has been created.

The final problem that needs to be monitored is the potential for users to make false claims on the app. Since the application is available to everyone, and is encouraged to be downloaded by everyone, some of the users may be immature. The solution to this potential problem would be to have a terms and conditions document that would have to be accepted prior to downloading the application. The consequences for misuse of the application would be clearly specified. The other part to the solution would be to have a pop up message warning the user about making invalid requests or claims appear prior to making a post, offer, or request. In order to proceed, the user would have to hit accept.

RESEARCH TEAM

Students

STUDENT TITLE	DESIRED ATTRIBUTE	ROLE	NECESSITY
Research Engineer 1. Lara Orlandic 2. Srishti Gupta	1. Has an aptitude and desire to do research. 2. Understands how proposals and documentation work. 3. Is open to meet with experts and partners to discuss the direction of the project.	1. Focusing on researching and understanding the problem space and solution effectiveness at the depth of the field. 2. Drafting majority of proposals and staying in touch with external research experts.	Our project requires a lot of research and understanding the structure of communities and human response and hence at least two team members focusing exclusively on research are required.

STUDENT TITLE	DESIRED ATTRIBUTE	ROLE	NECESSITY
Project Logistics Expert 1. Willard Snyder	1. Organized nature and ability to keep track of progress. 2. Accountability and approachable personality. 3. Understands the formats of documentation and working of the system.	1. Keep a track of the team's progress along with their own. 2. Meet with partners to discuss the further direction and document the meetings. 3. Contact outside sources in case we need help and support.	With a number of developments over the past few months, there has been a huge need for one of the team members to keep track of the work to be done and hold each other accountable and do the important documentation required periodically.
Team Logistics Expert 1. Matthew Wyatt	1. Organized 2. Understands logistics of travel, meeting and communication 3. Good communication skills	1. Managing the team's project budget and equipment requirements. 2. Contacting partners and outside sources about significant developments that need attention.	Considering that our project will require significant amount of travel to Hackathons and partner collaboration, we need one person to take up the responsibility of managing the logistics of equipments and resources.
Concept and Graphics Expert 1. Ryan Miller	1. Strong aptitude for graphic design with proficiency in Illustrator and Photoshop. 2. Introduced to basics of concept design. 3. Organized	1. Design the posters for the team. 2. Conceptualize experimentation and aid in ideation using visuals. 3. Documentation with Research Engineers	Considering most of our presentations require a strong visual affinity to get information across, a team member is needed to focus on conceptual and visual aspect of the project.
Technical Expert 1. Lotanna Okoli	1. Well versed with technological advances and equipment setup. 2. CE/CS major 3. Understands the current technological algorithms	1. Setup equipment when required. 2. Work on developing a working algorithm for application success. 3. Explain the tech aspects to the team, when required.	Since our solution is technology driven and we will need to set up equipment such as app developing softwares and servers along with aid in development of the application.
App Developer 1. Possible Team Member	1. Proficient in App-Development on android, UNIX and apple platforms 2. Strong communication skills	1. Developing the app along with partners/ hired programmers. 2. Incorporating ideas of all team members in the application.	In accordance with our solution approach we may look for another team member who fits in our team dynamics and is proficient in app development.

Advisor

Dr. D. Scott Appling from Georgia Tech Research Institute has been continuously helping us find research resources and platforms for the further development and understanding of the project. As a part of The Behavioral Modeling and Computational Social Systems Team, his research is extremely close to our problem space and

hence he will be an ideal research advisor for our team. Currently, we are studying a few research provided by him to understand the possibilities of working with the social media platforms.

Definite Partners

King County Seattle Emergency Responders have approximately a million residents in the county, to whom they provide disaster relief. They have agreed to help us narrow down our problem space further and make our solution more effective by providing resources, data and technological support. Along with this, they will be having a simulation event in the year of 2016 and have agreed to be our beta users during the event if we are able to accomplish the task of developing the application by that time. They will provide us with feedback on our application throughout the development process.

Potential Partners

Considering the nature of our solution and the need to test the solution in different situations and locations, we are also looking to partner with local government response agencies in New York City and North Carolina through our contact in FEMA, Lt. Shenakiah L. Magee.

In order to understand how application development and marketing works, we have acquired contacts in Visualink and Yik Yak. Visualink is a company which is focused on open source disaster response and can provide us with technical support as they are doing similar work as us, except in regards with small organizations instead of people. Yik Yak would be a good source as our app utilizes the idea of geofencing. Apart from that, their advice on marketing will definitely help us grow.

BUDGET

Category	Item	Quantity	Unit Price	Cost
Supplies	Office Supplies	1	$ 50.00	$ 50.00
	Android App Developing Software	3	$ 0.00	$ 0.00
	iOS App Developing Software	2	$ 198.00	$ 396.00
	UNIX App Developing Software	3	$ 0.00	$ 0.00
Equipment	Servers	2	$ 3,000.00	$ 6,000.00
Services	Programing Support	1	$ 1,000.00	$ 1,000.00
	Professional Business Support	2	$ 250.00	$ 500.00
Travel	Seattle (King County)	2733	$ 0.05	$ 1,366.50
	MIT Hackathon (Possibility)	1075	$ 0.05	$ 537.50

Category	Item	Quantity	Unit Price	Cost
	VT Hackathon (Possibility)	408	$ 0.05	$ 204.00
	IDCE 2016 Conference/Hackathon	473	$ 0.05	$ 236.50
Total				**$ 10,290.50**

TIME LINE

Phase/Month	Sp 15	S 15	F 15	Sp 16	S 16	F 16	Sp 17	S 17	F 17	Later
Proposal Submitted - Partners										
App Conceptualization										
App Interface Development										
App Server Setup										
Website and App Setup										
Concept App Released										
Local Beta Testing										
App Concept Review Period I										
Hackathon Participation										
Official App Releasing										
Seattle Beta Testing					A	B				
App Concept Review Period II						A	B			
Addition of App Features										
Marketing										
Beta Testing										
Continue Project										

Legend		
Sp = Spring	15 = 2015	A = Option A
S = Summer	16 = 2016	B = Option B
F = Fall	17 = 2017	

EXPECTED OUTCOMES

By the end of this project, we hope to provide a digital platform for communication in the form of a smartphone app. This app would help increase our volunteer response efficacy and decrease wait times in disaster situation to better meet victims' individual needs. By year 2 we hope to have conceptualized the app, developed the interface, set-up the servers, released a concept app and participated in hackathons to promote the app to social media companies. After year two, we hope to release the beta version and test it, perhaps in our partner community in Seattle. From the feedback obtained, we will add or remove some features, market the app, continue beta testing and, generally, continue the project.

Most of our support would come from the organization in Seattle willing to help us conceptualize the app and design, and possibly beta test it during their disaster simulation. We also look forward to working with Visualink, Yik Yak, Google or any other social media platform into which our app can be incorporated. It would be easier for users to utilize the features on an app they're already used to and trust, so deploying the app would be better.

FUTURE DIRECTIONS

As far as the direction of our project is concerned, our future directions mostly include participating in Hackathons and getting feedback for our app. Another reason to participate in Hackathons is to potentially find a way to partner with big social media platforms such as twitter or Facebook in order to get our app out there. This will not only help us in marketing but also give our users an incentive to use the application when needed without it being exclusive. Apart from this, we are looking into testing our application at numerous platforms to better it throughout the development process. In future, this application could aid disaster response in a large way. Currently, Google and Spacex are working on satellite internet. This could help our solution to be applied even to large scale disasters such as larger hurricanes because the infrastructure for communication will be available and all people would need would be a platform. In accordance with this, the application could be widely used to communicate during any kind of disaster.

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