iHanda: A Mobile Application for Disaster Preparedness

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Abstract - The application name as iHanda which means “I’am prepared”. This project is a type of mobile application for disaster preparedness that will raise awareness for the Manila inhabitants on what to do during emergencies like earthquake, floods, fire, typhoons and how to prepare the emergency kit. The mobile application has three tabs: iHanda, iAlam, and iListo. The iHanda tab provides information on weather forecast, disaster preparedness infographics, and vulnerability map and disaster emergency hotlines. The iAlam tab is for the users to know the latest announcements of Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). The iListo tab was named as such since it means “Quickly know where to go” and this tab provides map to locate government offices, hospitals, and evacuation centers within Manila. Furthermore, the system notifies the users through SMS messaging whenever there are new announcements posted on the application.

Keywords - Android Mobile Application; Disaster Preparation; Weather Forecast; Maps; SMS Notification; Typhoons; Earthquake

I. INTRODUCTION

Due to the Philippines geographical location, natural disasters are a common incidence. [1] The Philippines is one of the most high-risk countries in the world for experiencing natural disasters. The list of possible natural disasters includes earthquakes, floods, mudslides, typhoons, and volcanic eruptions. [2] The Philippines is considered to be one of the most storm exposed countries on Earth. On average, 18 to 20 tropical storms enter Philippine waters each year, with 8 or 9 of those storms making landfall.

Ref. [3] Based on the World Risk Index 2012, the Philippines is the third among 173 countries most vulnerable to disaster risk and natural hazards; we experience an average of 20 tropical cyclones each year and other climatic and extreme weather aberrations such as the El Niño phenomenon. These disasters strain government funds, with an average of P15 billion in annual direct damages. More adversely, this hampers the government’s poverty reduction efforts.

Ref. [4] Situated on the Ring of Fire, the Philippines has a number of active volcanoes which periodically threaten their immediate vicinities. In the event of major volcanic activity, you should follow the advice of local authorities and monitor warnings issued by the Philippine Institute of Volcanology and Seismology (PHIVOLCS).

While the principles of preparedness are independent of location and scenario, the proponents thought it would be useful to have some information set in a context for the specific needs of Metro Manila inhabitants. The aim of the iHanda app is to fill that gap. We may hear that Manila is not prepared to handle a major disaster but there are many things we can do to minimize the impact to our own families. Preparedness begins at home and preparing Manila means ensuring that enough families take simple steps to look after themselves.

In this project, the proponents aim to develop an android mobile application that will help the Filipinos for disaster preparedness. The target beneficiary of this application are the people of Manila. After all, we need the entire Philippines to be prepared. This is true but we live in Manila and can’t really speak about the needs of other cities. While much of the information here can be applied anywhere, the idea behind the site is to have as much local information as possible. It is a disaster mobile application that will raise awareness on what to do during emergencies like typhoons, floods, fire and earthquakes. It will also provide information on the telephone/mobile numbers to contact in case of emergencies and disasters; and maps for the active faults and trenches in the Philippines. This app is not the one that you’ll use every day. However, it’s a good idea to have it in your mobile phone for when the unexpected disaster happens and so you can meet any emergency situation with confidence.

II. BACKGROUND OF THE STUDY

The proponents primarily chose this topic in order to disseminate information regarding the possible calamities that citizen of Metro Manila may encounter. The project that will be created aims to inform, to prepare and to help the citizens of Metro Manila when calamities strike. No one can really predict when a disaster will hit the region or even the city, for that matter. But with early preparations, not only by the government, but by the public and private sector as well, its effects could be minimized, according to experts.

Ref. [5] According to Philippine Senate, considerable amount of lives, homes, livelihood and services were lost due to natural disasters. They also result in injuries, health
problems, property damage, and social and economic disruption. From 2000 to 2012, natural disasters in the Philippines caused the death of 12,899 people and injury to 138,116 persons. These disasters also affected more than 71 million individuals and rendered almost 375,000 persons homeless.

Ref. [6] One of the key findings of a qualitative study completed recently by the Institute of Philippine Culture (IPC) based at the Ateneo de Manila University stated that many residents in poor communities that were heavily affected by Typhoons Ondoy and 61 Pepeng in 2009 are still struggling to recover due to lack of assets and working capital to restore their livelihood lost to the floods. Using focus group discussions and key informants interviews, the study titled “The Social Impact of Tropical Storm Ondoy and Typhoon” probes into the long-term effects of the twin disasters that hit the country in 2009. The study was supported by a trust fund from the Australian Agency for International Development (AusAID) administered by the World Bank. The study says that since 2009, these communities reported overall reduction in incomes due to loss of assets and working capital.

Ref. [7] Magunda M. K. (PhD) published a study on August 2010 entitled “Study on Disaster Risk Management and Environment for the Karamoja Subregion.” The study focused on: 74 - Assessment of environmental change as a parameter of disaster risk in the Karamoja region - Assessment of environmental causes and the associated consequences - Assessment of the dynamics between disaster, environmental impacts and the needs of the communities in Karamoja Koos van Zyl (2006), meanwhile, discussed in his [8] “A Study on a Disaster Risk Management Plan for the South African Agricultural Sector” the dependent factors of flood hazard such as the depth and velocity of the water, duration of the flood and the load carried such as the sediment, salts, sewage and chemicals. He added that flood events and impacts appear to be increasing on a global scale.

A problem with conceiving of disaster in this way is that it becomes too easy to imagine disaster events as isolated moments or periods lying outside the influence of development planning. It is argued here that disasters are, on the contrary, an outcome of processes of risk accumulation deeply embedded in contemporary and historical development decisions. Disaster risk results from a combination of hazards (potentially damaging events or processes) and people’s vulnerability to those hazards. Both hazards and vulnerability are to varying extents products of development processes. A further common perception is that disasters are usually large-scale events involving a single hazard, such as a flood or an earthquake. As far as scale is concerned, there is not present no agreed threshold at which point a collection of discrete losses or disruptions can reach disaster status. Political spin can either exaggerate or play down the scale of a disaster, with an eye respectively on donor aid or on private sector investment flows. The sole publicly accessible global database on disasters and their impacts, EM-DAT, uses an absolute definition which is statistically convenient but inevitably arbitrary. Scale needs to be seen in relation to the population and economic size of an impacted country for meaningful international comparisons to be made. A disaster with major sub-national impacts may appear relatively unimportant at national or international level. Scale is particularly important for small island developing states (Prevention Web, 2012).

Ref. [9] The Dominican Republic occupies two-thirds of the Island of Hispaniola in the Major Antilles below the Tropic of Cancer in the Caribbean Region. Covering an area of 48,670 square kilometers and including the islands of Saona, Beata, Catalina and other smaller islands, the Island is shared with the Republic of Haiti with a 383 kilometers “porous” border to the west. A tropical country, it has eight extensive rugged mountain ranges that span the country, separated by relatively fertile valleys, sierras and limestone regions. With an average precipitation of around 1,500 mm, the country has large bodies of subterranean water, fourteen principal river basins, over 400 rivers systems and streams that feed the country’s reservoirs, power hydroelectric plants and feed extensive irrigation systems. The Dominican Republic is subject to a number of different hazards including hydro meteorological events such as tropical storms, depressions and hurricanes, floods, landslides and droughts, as well as seismic events including earthquakes and tsunamis, and finally diseases including dengue, malaria and most recently an outbreak of cholera crossing the Haitian border into Dominican territory in late 2010. EM-DAT registers 47 natural events during 1980-2011, of which 21 were caused by storms, followed by 18 floods, five epidemics and one earthquake. Jointly these events have caused the death of 1,486 and affected 2.7 million people, whilst causing close to US$ 2.61 billion in economic damages. Statistics from the 2009 Global Assessment Report on Disaster Risk Reduction indicate that, in terms of severe exposure, 6.3 per cent of the population is located in high-risk earthquake hazard zones subject to significant loss, followed by 5.9 per cent in hurricane zones and 5.4 per cent in drought zones. Additional estimates indicate that up to 80 per cent of the population may be at risk of suffering both directly and indirectly from one or more disasters. Notably, the Dominican Republic has the highest number of deaths per million inhabitants and highest mortality risk to disaster in the Caribbean after Haiti, placing it high on regional rankings for total disaster losses (International Federation of Red Cross and Red Crescent Societies, 2011).

III. RESEARCH METHODOLOGY

The proponents will be using Scrum methodology. [10] Scrum methodology is commonly used for software projects, for it lets the team adapt to changes and problems that the team could encounter during the development. Development happens during a sprint that commonly lasts

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for a week. There are also sprint meetings every day, a short meeting, commonly 5 – 10 minutes, where the team could talk about the project. This software cycle will repeat until the development comes to a conclusion.

[11] The researcher will also be using Black Box as a method for testing the software. It is the most used method for testing software where the functionality is the priority in testing rather than the inside workings of the software.

IV. THE DEVELOPED SYSTEM

- A. Software Design

The system was developed in Android platform for mobile phone application development and uses the current Android SDK Developer Tools, provided in an embedded Eclipse compiler. For the knowledge base, the researchers used the provided Android SQLite, which supports a faster appending and reading of the information from the stored repository. The system also requires to have a stable connection and an enable GPS for accurate reading of user’s location.

The iHanda: A Mobile Application for Disaster Preparedness consists of the following main modules: 1) iHanda, 2) iAlam, and 3) iListo shown in Figure 1.

![Figure 1. iHanda Module.](image1)

![Figure 2. Weather Forecast.](image2)

![Figure 3. Infographics Module.](image3)

The (1) iHanda module is intended to make the users be ready for disasters. It has 4 sub-modules under it: i) Weather Forecast, ii) Disaster Preparedness Infographics, iii) Vulnerability Map and (d) Disaster Emergency Hotlines.

Figure 2 shows the Weather Forecast which is to inform the users to of the weather conditions of the country.

Figure 3 shows the infographics for disaster preparedness which includes the emergency situations like earthquake, flood, typhoon, fire and a guide on how to create an emergency kit. You can still view the infographics even when you’re offline. The infographics used were from safesteps.com.
Figure 4 shows the Vulnerability page. Its purpose is to show the map of the distribution of active faults and trenches in the Philippines.

Figure 5 shows the emergency hotlines that the user can contact in case of emergency or for any disaster related concerns.

The (2) iAlam module is for the users to be in the know of the latest announcements. It has two sub-modules under it: i) Announcement and ii) Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) tweets.

Figure 6 shows the SMS notification feature of the system. Whenever there are new announcements posted, the user will be notified with the announcement posted through an SMS message. So, even though he’s offline, he can still receive and view the new announcement posted on the app.

Figure 7 shows the PAGASA Tweets page. The tweets of PAGASA are posted in this page in real-time updates.

And lastly the (3) iListo module shows the location of the: i) Government offices, ii) Hospitals and iii) Evacuation centers within Manila.

Figure 8 shows the Locate Hospitals page to where the users will be able to locate the hospitals within Manila with the help of the pins.

Figure 9 shows the evacuation centers that where the people can go in case of emergencies.
And the Administrator module can monitor can monitor the number of registered users of the app and the number of the announcements posted. In this page also, the admin can post announcements.

V. RESULTS AND DISCUSSION

Testing plays an important role to the success of the quality of a software. The purpose of the software testing is to discover the defects, improve the quality, reliability and performance of the system and to ensure the software works perfectly based on its functionalities. The proponents used Beta Testing to test the software. In Beta Testing, the software is released to a group of people so that further testing can ensure the product has few faults or bugs. The software was made available to the open public to know the feedback of the users.

The proponents used survey forms to perform the beta testing activity. The researcher used survey questionnaire to evaluate the system. Likert scale was used to address the feedback of the users.

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We used random sampling technique. The respondents of the survey consists of two categories: IT and Non-IT respondents.

There were 20 IT respondents and 20 Non-IT respondents. The respondents should be an inhabitant of Manila, regardless of their age and occupation. The proponents used ISO/IEC 9126 software quality model that categorizes software quality into six characteristics (factors) for the questions on the survey form were it is grouped based on the attributes of the software quality factors: Functionality, Reliability, Usability, Efficiency, Maintainability and Portability.

Table II shows the actual results of the number of IT respondents. The following are revealed in the survey: for the functionality software factor, the mean response is 4.57; for the software factor of reliability with the mean 4.55; for the usability, with the mean of 4.65; for the efficiency, with the mean of 4.37, with the overall mean of 4.54 which means Excellent.

Table III above shows the actual results of the survey for the Non-IT respondents. The following are revealed in the survey: for the functionality software factor, the mean response is 4.44; for the software factor of reliability with the mean 4.41; for the usability, with the mean of 4.60; for the efficiency software factor, with the mean of 4.50; lastly,
for the portability software factor, with the mean of 4.11, with the overall mean of 4.41 which means Very Good.

It is important to formulate survey questions for a software testing based on the software factors which are the functionality, reliability, usability and efficiency. Based on the survey that has been conducted for the IT and non-IT respondents residing in Metro Manila, the iHanda mobile app have a majority of rating scale of 4.47 for all the software factors which includes application’s over-all performance, the app is easy to navigate and how helpful the app is for disaster preparedness.

The general objective of iHanda has been met which is to develop a mobile application for disaster preparedness that will provide helpful information set in a context for the specific needs of Metro Manila inhabitants. To ensure that the objectives of developing the software has been met, there is a need to conduct a beta testing through a survey. Because of the survey, the feedbacks/comments of the respondents helped the proponents to realize the down side of the app and what needs to be improved like the font style and color. Developing an app for social awareness made the proponents realized the importance of the apps like these to inform the general welfare on the things that they need to be aware of like disaster preparedness.

This chapter discussed the summary of the findings of the proponents during the development of Trash Attack. Based on the total ratings, the video game has performed well in all areas of the evaluation. The survey has proven the following points: (1) that the game promoted awareness to the environment while being fun and engaging, (2) that the game has performed efficiently while running, showing little or no frame rate issues and have caused minimal inconvenience to the players and (3) that the game has been successfully ported to mobile devices. Trash Attack, based on the given results of the game evaluation process, has fulfilled the objectives of the study. It has provided an environmental education and has provided awareness to the environment to the players. It was a fun and engaging game. As an addition, the proponents have made the game playable in mobile devices.

Future respondents are advised to be very careful in setting their objectives because it has a major influence in the overall development time and will limit the game’s gameplay or form. If possible, future proponents can focus on the following: (1) develop varied gameplay modes as long as they have enough development time for it and if it has been planned in the early stages of their proposal. (2) Create gameplay mechanics that are deeper and can appeal to hardcore gamers and promote replayability (3) Research deeper as of why waste disposal continues to be a problem in the Philippines.

VI. CONCLUSION, RECOMMENDATION AND FUTURE WORKS

In the future we need to extend the study to make it a cross platform application, which will be available for Android and iOS users. In addition, when a new announcement was posted, the app will notify you in real-time when your device is online. The application’s icon and the announcement will appear in the status bar. Community feedback will be also be helpful to know the other information regarding disaster preparedness. And lastly for wider scope, the app will not only be limited to Manila inhabitants only but to the whole country.

REFERENCES


