Exploring Gamification and Related Models In Enhancing Disaster Mitigation and Preparedness

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Abstract: Disasters have made a big impact by destroying different infrastructure and lives of people. It is evident that there is a lack of knowledge and strategy on implementing disaster management that could alleviate its devastating effects. Furthermore, is the lack of application on being prepared in an upcoming disaster. There is a new strategy that can help increase knowledge and application when it comes to disasters, which is the concept of gamification, which is the implementation of game elements such as quests, leaderboards, trophies and ribbons that would be implemented in a non-game platform.

This paper introduces the integration of gamification within the disaster mitigation and preparedness process under the disaster management life cycle. The main goal of the study is to equip the community with necessary knowledge on disaster mitigation and preparedness concepts that would help them prepare for an upcoming disaster. Adding the concept of gamification could further increase the motivation and interest of people to do disaster mitigation and preparedness activities within the community. It could also reduce the impact of a disaster within the community that can save lives and lessen casualties that may occur. In addition, the people would also have a real life application on implementing different disaster mitigation and preparedness activities so that they could gain learning and mastery at the same time. Lastly, gamification is a new innovation in technology that can enhance a specific field such as disaster mitigation and preparedness that could help people practice different disaster mitigation and preparedness activities in a fun and exciting way and at the same time, have application and learning within the community.

Keywords: Gamification;, Disaster Mitigation and Preparedness

1. INTRODUCTION

The number of documented natural disasters in the Philippines surged 50 percent last year, making it the world's most disaster-hit country in 2011, according to the Citizens' Disaster Response Center (CDRC). In a report, the non-government CDRC said natural disasters last year cost the Philippines P26 billion, displacing a record

15.3 million people - a huge jump from the 6.75 million people in 2010 (Ubalde, C., 2012).

The Philippines has two organizations that are handling disaster management and these are the National Disaster Coordinating Council (NDCC) and Office of Civil Defense (OCD). Furthermore, these organizations would like to implement the READY project to further implement disaster risk management in the Philippines. Moreover, the NDCC implemented a

HCT-II-014

project by 2007, which is called the National Strategic Plan to Integrate Community based Disaster Risk Management (CBDRM) and this project aims to promote disaster management in even small communities in the Philippines. Moreover, there is a cluster implementation for the different NGO's in the Philippines that would be coherent and effective in an occurrence of a disaster. Lastly, the READY project would be implemented in different parts of the Philippines to further increase awareness for disaster management (ADPC, 2008).

In line with the READY project that the NDCC would like to implement a project within small communities that would cater in increasing knowledge of different community members, the group would like to utilize a project that would help small communities prepare for an upcoming disaster and the different members of the community would already have sufficient knowledge on how to prevent the impact of these disasters through implementing the concept of gamification within the field of disaster management in the context of disaster mitigation and preparedness in the disaster management life cycle. People would become motivated to do disaster mitigation and preparedness activities not just by simply learning different concepts but also applying the different insights that the different members have gained within the community.

The target domains of the group's proposed project would be several communities, which are Pasong Tamo and Anabu. These communities are barangays which are greatly affected by disasters such as flood and earthquakes. Furthermore, the group asked the cooperation of the National Disaster Risk Reduction and Management Council to host the Gamification System within their website that would be implemented in the target barangay because the council is the center for disseminating disaster information to these communities.

2. METHODOLOGY

2.1 Agile Methodology

Agile development is a methodology that focuses on providing different opportunities that could help assess the direction of a project. Furthermore, this type of methodology focuses on being 'incremental' and 'iterative' (CollabNet, 2008). This type of methodology is flexible especially in creating the thesis project of the team because it is iterative and incremental meaning that this type of methodology is open for change once a specific project is implemented. Furthermore, the interaction of the different steps could be seen once this methodology is implemented that encourages rapid and flexible response to change.
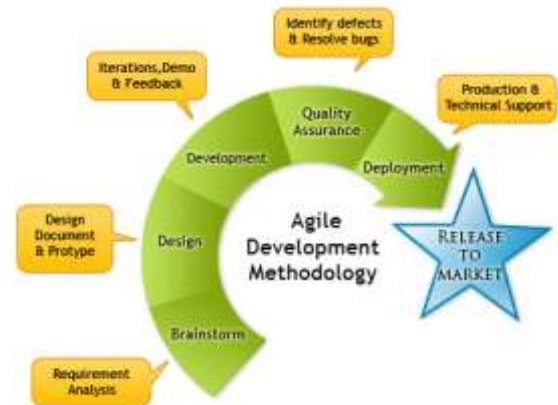

Figure 2.0 Agile Development Methodology

2.1.1. Brainstorm

The phase of brainstorming focuses on planning specific goals and objectives for the project to be implemented. Furthermore, the different inputs that would be needed are the information required to develop the project and the requirements that are needed. Moreover, the main content of the system would be discussed. Lastly, during this

phase the work division for the document and system is discussed and its corresponding deadline so that the project would be finished on time.

2.1.2 Design

The designing phase focuses on the design of the project that would be implemented. Furthermore, the different inputs that would be needed for this phase are the requirements and data that would be implemented for the project. Moreover, the group would also design the different graphics needed to be implemented within the game. In addition, the system documentation would be designed in this phase. Lastly, the prototype of the system would be produced during this stage.

2.1.3 Development

In this phase of development the system prototype would be further developed. Furthermore, this phase would focus on revision of different features of the system. Moreover, there would be a demonstration for the system to gather feedback. In addition, the different graphical components would be implemented in the system to be more dynamic. Lastly, is the distribution of the User Acceptance Test that would help in rating the performance of the system.

2.1.4 Quality Assurance

The phase of quality assurance focuses on testing and debugging the system if it already passed the standards. Furthermore, system revisions would be implemented in this stage to improve system performance.

2.2 Duboi's Model in Gamification

Gamification is a new concept that is defined as using different game elements through the application of guidelines in game development. Furthermore, the main goal of gamification is to provide motivation for its users so that it would be interactive for them. Moreover, the concept should implement an emergent property that would further motivate the different users in the game. Lastly, gamification has different models for users that would help improve interaction within a game (Dubois, D.J., 2012). Motivation is the main goal of gamification that implements different game elements within a specific field for different users. Furthermore, it is able to enhance interaction for people. Lastly, this model focuses on using competition, collaboration and the environment as the means to further maximize gamification.
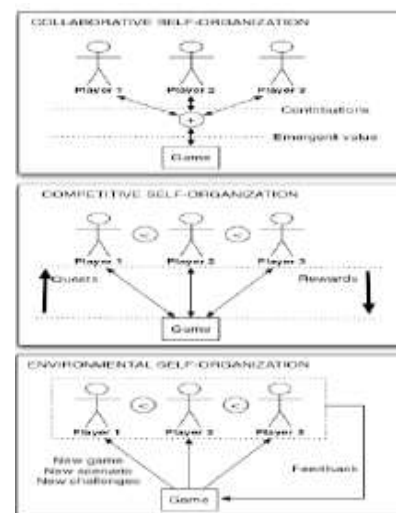

Figure 2.1 Duboi's Model in Gamification

2.3 Daniel Pink's Drive Model

Abraham Maslow describes that human behaviour is driven through satisfying both physical and psychological needs. Furthermore, Maslow is able to

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refer to self-actualization that focuses on being-needs and meta-needs that focuses on motivational factors. Moreover, Daniel Pink author of a book entitled Drive: The Surprising Truth about What Motivates Us explains that the lower levels of in the Maslow's hierarchy in the society are less satisfied and people within the community is motivated even further through the use intrinsic motivators in the hierarchy, which Pink identified as autonomy, mastery and purpose. Lastly, Daniel Pink matches the esteem and belonging level in Maslow's Hierarchy and integrated with the different intrinsic factors that would further increase motivation that can be applied with gamification (Wu, M., 2011).

Lower Levels of Maslow's Hierarchy of Needs does not satisfy the needs of people it requires the psychological needs to further enhance satisfaction. This is where the model of Daniel Pink would come in that focuses on the level of esteem and belonging that would further enhance motivation for users in gamification. Furthermore, the intrinsic factors of purpose, mastery and autonomy that would help support motivation for gamification for different users that would be involved.

Figure 2.2 Dan Pink's Model in Gamification

3. RESULT AND DISCUSSION

The proposed system focuses on the disaster mitigation and preparedness processes within the community. Moreover, implementing the concept of gamification within the proposed system would help people in the community to be motivated to participate in disaster related activities that would in turn reduce the casualty of disasters occurring in the environment. In addition, people within the community have lack of interest and motivation in disaster mitigation and preparedness with the implemented system, people could gain motivation and interest to do disaster mitigation and preparedness activities within the community.

In addition the system has several modules which would help in integrating game concepts into the mitigation and preparedness process in the disaster risk reduction management lifecycle. These modules are the following, manage rewards and accounts, manage quest points and leader boards, track progress, manage assessment, collaboration and coordination, and generate report. The elements of gamificaion, which the group would like to integrate into the system involves the models created by Dubois, Wu and Pink, furthermore the specific concepts which would be used are the following, collaborative, competitive, and environmental self-organization. Also, there would be monitoring in place specifically in the track progress module, for in this module the administrators could track the progress of each event and activity, and the generate report also shows the individual assessment and the barangay assessment.

Lastly, the concept of gamification that is implemented within the system would help the people in the community to create a collaborative environment that is motivated in participating in disaster related activities and this in turn would help users create a disaster mitigation concept that can help users learn techniques and models on how
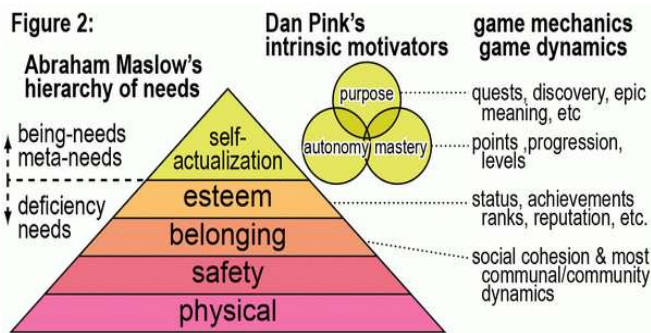
to avert the different disasters that could occur in the community.

4. User Acceptance Test

The group conducted a User Acceptance Test on July 11, 2013 from 2 o' clock to 4 o' clock in the afternoon and it is conducted in the barangay hall of Anabu. Likewise, the group also conducted a user acceptance test on July 12, 2013 from 2 o'clock to 4 o' clock in the afternoon and it is conducted at the barangay hall of Pasong Tamo.

There were 15 people that took the user acceptance in Anabu and 16 for Pasong Tamo. Furthermore, the goal of the group is to have 20 respondents to evaluate the system and has failed to meet this objective but 15 and 16 were good numbers to evaluate the system.

The result and overall score of Barangay Anabu is good with an average of 82.52% out of 100%. Based on the UAT result, the aesthetics and user experience of the system has an above average score, which is good because it means the system has a good interface and also users would have a good experience from it. Furthermore, is the security, which also has a score of above average, meaning that the system is able to maximize security. Moreover, is the different system modules that were implemented in the system such as gamification, assessment, monitoring and tracking, information dissemination, community registration, collaboration and performance management that also had good scores for the UAT. This means that the different modules integrated within the system are useful for the different members in the community. Lastly, as an overall the rating of the system for Barangay Anabu is above average. Furthermore, all of the components of the system are the strongest points in having this rating.

The result and overall score of Barangay Pasong Tamo is good with an average of 80.86% out of 100%. Based on the UAT result, the aesthetics and user experience of the system has an above average score, which is good because it means the system has a good interface and also users would have a good experience from it. Furthermore, is the security, which also has a score of above average, meaning that the system is able to maximize security. Moreover, is the different system modules that were implemented in the system such as gamification, assessment, monitoring and tracking, information dissemination, community registration, collaboration and performance management that also had good scores for the UAT. This means that the different modules integrated within the system are useful for the different members in the community. Lastly, as an overall the rating of the system for Barangay Pasong Tamo is above average. Furthermore, all of the components of the system are the strongest points in having this rating

5.Conclusion

New innovations in technology have played an important role in the lives of people. Furthermore, these different innovations have made an impact to different industries. One of these innovations is gamification that uses game elements that can be applied in any industry. Disaster Management is one of the industries that have made an impact in the society. Furthermore, this field is able to save countless lives of people through implementing different strategies that could help avert disasters. This is under the Disaster Mitigation and Preparedness stage of the disaster management life cycle that seeks to provide people with adequate knowledge with different disaster mitigation and preparedness concepts that can help prepare in an upcoming disaster. At present, people do not pay attention to the importance of Disaster Mitigation and Preparedness concepts. This is going to change through implementing the concept of gamification

that would further enhance the motivation of people to do disaster mitigation and preparedness activities.

The implementation of the software integrated with gamification would be effective in the community because people would become motivated in participating in different disaster mitigation and preparedness activities. Furthermore, the implementation of the system within the community would also help people prepare in an upcoming disaster that would in turn prevent casualties from happening. gamification is a new innovation in technology today that makes an impact in different fields like Disaster Mitigation and Preparedness and it is a very good topic to venture because it can affect the character and motivation of different people, which is important.

6. ACKNOWLEDGMENT

We would like to thank our adviser, Ms. Ma. Victoria G. Pineda for the support and guidance that she has given us for this project and pushing us to submit our thesis paper to the DLSU S & T Congress. Also, our group for continuously striving hard to make this project successful.

We would also like to thank both the communities of Barangay Anabu and Barangay Pasong Tamo for providing a venue for the project to be implemented within their respective communities.

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