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Gamification towards Sustainable Mobile Application

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Abstract—**Gamification is not a newly emerging concept. Perhaps, it is a new term to some people. Gamification is a powerful new strategy to influence and motivate groups of people. It applies game mechanics to non-game activities to change the user's behavior of an application. It improves the engagement of user by keeping score of points earned through various activities on the application. The recent gamified websites or a related service such as Foursquare is a location-based application that pinpoints where you are and your activities. Users of the Foursquare can "check in" to various locations on their mobile phones and gain incentives like badges or deals. Gamification is utilised as a mean to build up user loyalty, and not so much to gain their long-term engagement. This article discusses how the gamification can help to drive the sustainability after a mobile application has been delivered and is in use. It is important to make mobile application continuously visible and sustainable if the concept of gamification has been used correctly. The more users can gain from the virtual and tangible rewards of using our application, the more we can be rewarded from our users. It also discusses how adding a "game layer" has improved the basic functions in society like educating people to become more responsible and helpful and use badges as virtual reward to users who contribute photos. Interactive mobile application designed to change the way of people report road accident cases with applying a simplicity and convenience principles. For instance, user just needs to snap photo and touch on screen to report a road accident case.**

Keywords-game; interactive mobile application; point-based location technique

I. INTRODUCTION

Mobile application development is growing rapidly. Many mobile applications have been uploaded and downloaded within a day. According to [2], over 15 billion applications have been downloaded from Apple's AppStore. User can download as many mobile applications as they like to. However, high retention of the mobile application is relatively dependent on the user's engagement. In fact, if the users do not like the mobile application which has been downloaded then they will delete it from their mobile phones without any hesitation. In a while, they might find and get a competitor's application that can provide them with same functionalities. Most of the marketplaces has a "try before you buy" tactic which gives user the option of downloading a trial or demo version of an app. However, engaging users in droves on the mobile application that had already existed on the marketplace is a challenging task to the mobile application industry. Individual retention plays an important role to drive advertisements pool or income revenue to sustain the mobile application's life. We make use of gamification to drive the sustainability after a mobile application has been delivered and in used.

In this article, we outline it as follows. Section II – Related Work which reviews the related literature. Section III – Motivation which focuses on approach, technology and tools used to create the mobile application, and the prototype of the application. Section IV – Conclusion which concludes the paper and discussed about further research works.

II. RELATED WORK

The term of "gamification" is not new, and its practice has taken many other uses that you may not realize you already used. Gamification is a method that integrates game mechanics and game dynamics to non-game platform [7] such as products, services, software, marketing and communities to increase engagement, loyalty and fun to achieve the goals. In fact, it applies every aspect of our daily activities. For instance, Tune Talk points which can be used to redeem free AirAsia flights. Another example is the Foursquare. It has popularized awarding badges as an approach of engaging users after completing a specific activity, for instance, "check-in" in the social network context [13]. Does it sound familiar to you? We are pretty sure there are many more examples that had applied gamification pop up in your mind at this moment. In this article, the goal that we would like to achieve is to sustain the life of the mobile application by applying gamification's practice. The game mechanics and game dynamics are two (2) important elements that are closely

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related in gamification. The game mechanics includes points, levels, and challenges whereas the game dynamics includes the reward, status, and achievement. Gamification applies the game dynamics and game mechanics to get users to participate and engage. It can drive participation of users in different kind of activities such as viewing photos, creating content, rating products, voting on content, writing comments, visiting repeatedly and many others [7].

In general, little research has looked at incorporating the concept of gamification into mobile phone application to improve user retention. There are some preliminary indications which show that the gamification helps to improve the long- lasting relationships between the mobile phone users and application. It also impacts the fundamental of business objectives.

The Foursquare is one of the successful examples that have incorporated the concept of gamification into mobile phone application. The Foursquare is a free application and was created in year 2009. It had over 10 million of registered users in April 2011[6], and the number of users has increased dramatically. Foursquare allows registered users to connect with friends and update their location. User will award points and badges for each "checking in" at venues. Perhaps, you may wonder what made Foursquare able to get more people to participate and retain the crowd engaged on its application. Foursquare treats the users with respect and reverence, and a "game layer" has been added on to its application. For instance, Foursquare awards users with virtual and tangible rewards after they have shared their personal information, which is their location with friends via smart phone application or SMS. The Foursquare's users will earn badges and points as their virtual reward, mobile coupons and discount of merchandise as their tangible rewards.

Mobile applications are booming, in the meantime the mobile application publishers are looking for the best strategy to sustain their applications. In [10], Mike Gualtieri said that a great user experience (UX) for mobile application is crucial to retain and gain users. User experience is not just about making the experience user friendly, but it needs to convince users that it is usable, useful and desirable. According to Mike Gualtieri in [11], we should take into account the five (5) dimensions of the mobile context when design the mobile user experience to make a user loves and continues to use our mobile application often as part of their life routines. Five (5) dimensions of the mobile context are location, locomotion, immediacy, intimacy and device. The most useful and valuable user mobile application should feature with simplicity and convenience, for instance, users can complete their tasks in mobile context easily and they feel enjoyable while using it. In addition, a sustainable mobile application should allow users use the application at anywhere and not just limited to a place; allow users use the application while they are performing another task; allow users use it when they need it; allow users to use the application for different purposes; and allow users use the application with capabilities the mobile device has.

Retention of a mobile application depends on the relevance and usefulness of its features. In general, three factors (stickiness, leverage and feedback) influence the retention and frequency of use. Several methods have been used to retain the interest of users on the mobile application. For instance, to continually increase values of mobile application and keep it relevant to users; release another version with new capabilities based on the feedback from users is a must to keep users stick to it. In order to gain and retain users, publishers usually would not rely on users finding their mobile applications in the application store. However, they will promote their mobile applications in different channels such as the mobile web, traditional internet sites or incorporate it with the social network to create an awareness of their mobile applications [12].

III. MOTIVATION

Our mobile application is named as "Accident Bucket", and it has categorized in the utilities and tools category of mobile application. We started to build the idea of "Accident Bucket" because we have noticed that in some situations, especially when accidents happen, people get nervous and mostly are uninformed about what they should do next. Reporting the exact physical address of the road accident can be difficult. Thus, we decided to create an application that could ease the process of reporting. Simplicity and convenience principles have been applied in our application.

What worries us is how we are going to stand out among the other mobile applications and sustain ours user bases, especially when ours is a non-game application. There are various choices in the marketplaces for users to choose, and we tried googling "navigation apps" and at least fifty (50) top free mobile applications popped up on the computer screen immediately. We hope that our application is not just a fanciful one time launch after download, but is the most sustainable application.

Basically, each top free mobile application that we had googled serves the same purpose. For instance, the application provides graphical navigation of the path, and many share the same mapping. Thus, we need to add new concept, which is gamification, to remain competitive with other similar applications. We will discuss how the gamification can help to drive the sustainability in section A – The Approach.

A. The Approach

We are trying to tune our domain application, which is capturing road accident photo immediately and post it on web mobile, to be more fun and engaging. We know that our application is not going to be long-lasting because it is used on-demand whereby it is used when the need arises. Thus, we employ game mechanics to our application framework, which includes points, levels, challenges, virtual spaces and leader-board, to drive the visibility of our application and help to sustain it.

Game mechanics can help to create the traffic growth and it will increase our application visibility. Our business opportunities such as the advertisement will increase with more visibility that we earn. We believe that sustainable software should not just depend on fixed income to overcome operation cost, which is earned from each application sale; however we should seek for other alternatives for example advertising as a revenue channel too.

We want to build virtual community in our application. We award free instant virtual reward points for various actions in the community. For instance, points can be earned by actively involving in the activities in community such as posting road accident photo, directing the traffic in the road accident area (before the accident scene is cleared) or voting the best traffic official. In general, we have three characters to allow the user to choose what they want to be. User can choose to be a reporter, a traffic controller or a citizen in the community. Each of the character plays their own role and will earn free reward points every time they have completed their task. Free instant virtual reward such as points will be given to users to recognize their efforts or contribution to the entire game. It also encourages users to engage in our application. For instance, if a user contributes a road accident report to the web then that user will gain free reward points to indicate that a user has completed a task successfully. Every user of this application has the right to choose their character in this application.

Each activity has the set point value; user can view their progress or achievements in virtual community in the leader-board. We introduce a competitive system of the badges and statuses in the virtual community, in order to retain the crowd engaged in our application. For instance, a traffic official can earn a badge by discovering the best route to take to avoid traffic jams in the road accident area. The badge collection is not restricted to one place and it can be many places. It is to create a common communication channel for people to speak and help with one another to gain badges. The most active and highest quality user for each character in the community can be a mayor in that character.

Usually, people will pay more attention to the activities that involve the points, rewards or status. These simple incentives create an active environment that could be slightly long-lasting than plain applications without adding any game mechanic. Competition and rewards keep people interested and addicted. In our application we offer a virtual space to those people who love to build something great and show off their success to all. We provide user an opportunity to solve urgent problem in the real world which is to identify the congested places that are caused by the posted road accident, and giving the best direction to avoid traffic jams in the accident area. Users will want to take this as an epic mission because they can show their capability to solve a real life problem rather than a virtual problem. A user has to compete with others in the virtual community and announce to the entire community that he or she is going to take charge in the epic mission which is solving the traffic congestion problem. The community is rallied to work together to solve the real life challenge. This extra “game layer” in our application framework has improved the basic function in society like educating people to become more responsible and helpful. Each user in the virtual community influences each another to share the experience of doing something helpful for the betterment of local society.

We selected Windows Phone 7 (WP7) for development because Windows Phone 7 (WP7) is a mobile operating system from Microsoft. In addition, we have worked with Microsoft technologies such as Silverlight and .NET, and the experience will help us to develop a Windows Phone 7 application. How could we help users to solve ‘familiarity with the device’ issue?

As we know the mobile phone screen is often relatively small, so how can we create a simple view that is not crowded with information and present it to users? To facilitate provision of a simple view, each individual function is defined one by one as shown in Fig. 2. This will allow a user to have a quick view of all ‘must’ requirements in the application. Each “must” requirement is equipped with common interface metaphor icon and it is written in simple text to ensure user could understand clearly the purpose of each requirement. For instance, we used “camera” icon and “snap” word to tell user that a particular tap provides them photo shoot function. In so doing, user will find it easy to see what activities can be performed with the application via the interface metaphors [19, 20].

Smart-phones are equipped with a touch-sensitive screen. In our application design, we made use of the capabilities of touch screen such as direct interaction, for instance finger pointing. According to [23], to perform the discrete tasks the target size should be 9.2mm and it would be the ideal size for the one-handed thumb use on touch screen-based hand-held devices to minimize erroneous occurrence and maximize the user preferences. Hence, we designed the size of on-screen buttons which is closer to the target size because we are concerned about user's hand obscuring part of the screen [21]. Users can simply tapped on the desired buttons with the target size of button after using the suggested target size.

We produced our initial interface design with wireframes method. It is an easy and simple way because it allows designer to have simple annotated description of elements that need to be implemented [24] on a piece of paper. We are comfortable to use the wireframes method in communicating requirements between art designer and application developer in developing a mobile application, because we do not need to provide a full specification of user interface. In our point of view, too much information given at the initial interface design will be a heavy burden on communication between the art designer and application developer. Designer sketched the

user-task aspects of the design with a complete workflow before using the basic instruments such as Adobe drawing tools to refine it into better presentation form.

B. *Basic Operations*

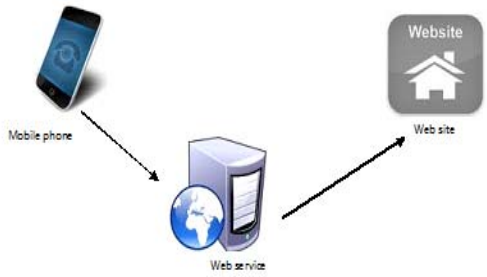

Figure 1: System Architecture

Fig. 1 shows the core workflow in this mobile application. User snaps a road accident photo with the mobile phone, and sends it to the web server. The web server will receive a notification, and the exact physical location will be detected immediate after reading the notification. The web server will redirect the newest case's photo and post it to the web site. Users of this mobile application are free to comment on the photo that has been posted on the web site. This mobile application helps to minimize human mistakes especially when reporting the accident cases. Sometimes, people encounter difficulties in telling the actual physical location accurately due to some circumstances such as that person is not familiar with the locality of the accident place or he/she can be extremely nervous to give a call to get help when an accident has happened. So, in situations like these, our application may be able to help. It is good to take photo when there are no witnesses, and our application can provide the strong evidence if someone claims the accident was your fault after the accident had happened.

C. *The Result*

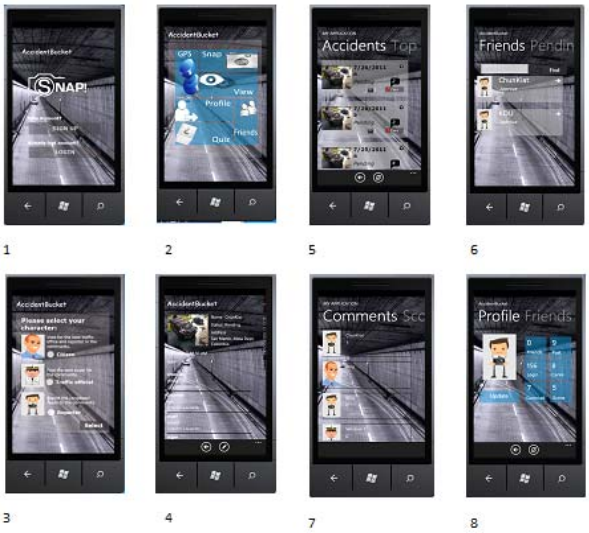

Figure 2: Sample Screen Shots of "Accident Bucket"

Our mobile application provides users with a compelling user experience (UX) that is useful, usable and desirable. Our core intention to create this application is to help people report road accident cases in the simplest and most convenient way. For instance, user just needs to snap photo and touch on screen to report a road accident case. We channel all the reported cases to the web and share the cases among users of this application as shown in the fifth screen shot in Fig. 2. We know that our application is not going to be long-lasting because it is used on-demand whereby user uses it when the need arises. Thus, a "game layer" has been added to our mobile application in order to keep the momentum of using it and to tune it to be more fun and engaging. We capture and display statistics of our application in the eighth screen shot in Fig. 2, for instance - how many times each user login to the application, how many "cares" each user had, how many cases each user contributed and so forth. These statistics make the experience becomes more interesting and create a desire for user to make return visits in order to make new achievements.

We allow users use the application at anywhere and not just limited to a place and allow users use the application while they are performing another task. For instance, while they are driving towards a place nearby a road accident occurred and users can always follow direction from traffic official in our application to skip the congested traffic. In our application context, a road accident case could have more than one traffic official to give traffic direction to the citizen. If a traffic official monitors the traffic congested problems efficiently then as a significant achievement more citizens tag on the traffic official as followers. A user can pick a persona to impersonate and get into character to solve the real world problem in the virtual space, for instance, a person want to become traffic official to help citizen to solve the traffic problems; however, in the real life he or she does not get to play such roles. But, we can help them to realize it in our mobile application. Our uniqueness is to allow the interactions

with people, places and things around users in the physical and virtual spaces. Nonetheless, this feature could not be found in the Foursquare whereby user can become a mayor of a place without having any physical or virtual interactions with others who check in there.

IV. CONCLUSION

This article describes the practice of gamification which can help to sustain longevity of mobile application and also generate revenues to survive the application cost incurred in long-term. We motivate our mobile application users to engage through points, levels, challenges, virtual spaces and leader-board, to drive the visible and sustainable aspects of our application. We believe that users' interest to collect virtual rewards such as points and badges will gradually wane. Thus, we are planning to make some tangible rewards in the real life to encourage more community growth and connect, while also drives up the local businesses growth.

We add a "game layer" to our mobile application in order to create fun and influence. It influences how we act and what is the outcome of our actions. We provide a platform for users to practice insight thought patterns, and encourage them to explore and learn from their past experiences in virtual environment to solve the real life problem.

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