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HOPE - A serious game to engage chronic disease patients in medical research

Report in the course Innovation Game 2019

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Introduction

Data is one of the most valuable resources in this decade. Scientific research and innovation is dependent on the quantity and quality of the data available for researchers. In order to develop solutions for patients suffering from chronic diseases to help them cope with their diseases and make their life easier, researchers need a lot of data from patients. However, it can be daunting to engage patients in a large scale research studies that require filling in surveys on a monthly basis. Therefore, we decided to make this task easier by spreading awareness among patients and engaging them through gamification. Gamification is the use of game methods to solve real life problems.

Our goal is to design an intuitive serious game that engages patients with chronic diseases to voluntarily participate in medical research. The purpose of this game is not mere enjoyment. It is a serious game that aims to make patients feel empowered and realized the importance of their contribution to the medical research. Therefore encouraging them to participate in studies on chronic diseases by donating their data to researchers.

The Challenge

To help patients with chronic diseases manage daily healing and to improve the quality of life, the organization NOUS PATIENTS (We, the Patients) has started the online platform ComPaRe for spreading evidence-based knowledge. On ComPaRe, the organization also collaborates with the medical research that is focused on chronic diseases, their symptoms, and their treatment.

The organisation behind the platform is a consortium of hospitals in the Paris region, with further support from a plethora of health companies and patients organisations. The main focus of the platform in its current form is to be a space where patients can answer monthly questionnaires about their life with chronic diseases, serving researchers with data that could be useful for research.

However, the rate of the current registration and participation of patients with chronic diseases constantly remains low. In order to tackle this challenge, we have been missioned to raise the awareness about the ComPaRe platform and the important role that is played by patients' participation in advancing medical research and searching for treatments of chronic diseases.

Therefore, for the sake of patients' well-being and to reveal the congruent relationship between patients and researchers, we decided to design a serious game that is more specifically classified as an advergame. The game aims to encourage patients with chronic diseases to voluntarily engage in the online survey platform in a fun manner. Through playing this serious game, the patients with chronic diseases are able to perceive positive emotions, including the sense of success, proud etc.. According to the research, the rejoiced patients are prone to participate in research groups through sharing their personal information.

Presentation of the Game

The game will act as a researcher ambassador and introduce a new perspective to provide data. In order to realize that, the game will engage patients with chronic diseases by teaching the patients the mapping relations between needed risk factors that cause diseases as well as preventing diseases and different chronic diseases.

Hardware Design of the Game

The major population of patients who suffer from chronic diseases is old. Therefore, offline equipment allows the elderly to get access to this game quickly. The game is designed to be played on a cube that consists of four large antivirus touch screens. The cubes are installed in certain venues. For example, in a hospital lobby as shown in Figure **1**.

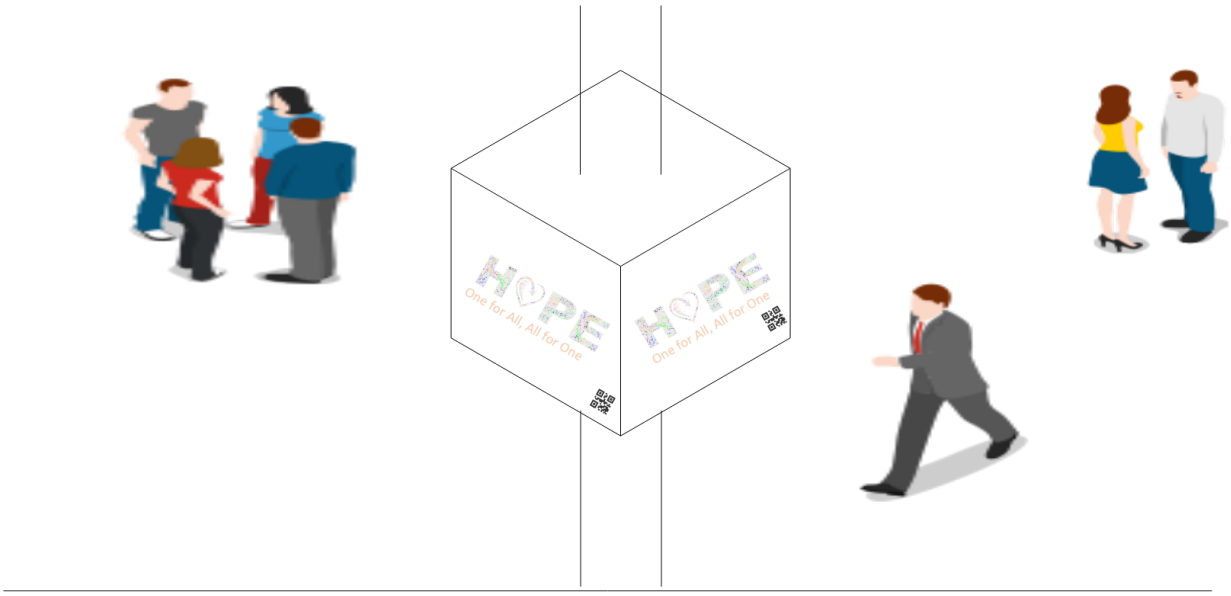

Figure 1 Hospital Lobby

Software Design of the Game

Every screen of the cube plays a welcoming animation and QR code when the game is in its idle state. Figure 2 shows the ending of the animation.

Figure 2 Welcoming Screen

The animation includes the name and logo of this game and the OR code, as shown in the illustration above. This animation also imitates the dynamics of this game that players should categorize a variety of icons into different diseases by means of dragging. With this animation, potential players are supposed to be attracted to approach the cube.

When potential players use their fingers to touch one screen, the game is triggered. Sequentially, the start screen of the game is displayed as in Figure 3.

Figure 3 Start Screen

Each basket in the corners represents different chronic diseases. Icons inside the middle container represent needed risk factors causing diseases as well as preventing diseases. Players will learn mapping relations between needed risk factors and different chronic diseases by dragging right icons to the corresponding baskets.

MDAO of the Game

The game content will be articulated further using the Mechanics, Dynamics, Aesthetics, and Outcomes (MDAO) framework. According to Kapp, K. M. (2012), the MDAO framework is largely used by game designers to make compelling games and would therefore be suitable to apply in this context.

Mechanics

The fundamental mechanics of this game are simple and straightforward. Players merely need to connect a variety of icons that are located in the center of the screen, to the four different corners that represent different chronic diseases. The icons represent risk factors causing diseases as well as preventing diseases. Through dragging, players are able to assign the association between a couple of risk factors and different chronic diseases based on their knowledge.

In addition there is a count-up timer by which players are aware of the time they consume. This game also applies the time players consume as a scale to review players' performance.

The internal system of the game should control the number of risk factors, so that the game players should correctly connect 40 risk factors into corresponding diseases in order to accomplish this game. When the players accomplishes this game, the system would congratulate the players for their contribution.

Levels

The game consists of four levels. The first three levels play a role as the instruction for playing the game, through which players are able to understand the mechanics of the game without extra explanation.

1. Level 1

   There is a basket only in one corner and a number of icons appearing on the center of the screen. All the other baskets are locked and greyed out. The basket has the name of a chronic disease on it.

   The first corner is located in the upper-left part of the screen. Meanwhile, there is an arrow from the center to that corner incessantly blinking. The blinking indicator serves to guide players to use their hands to move an icon. When players successfully move an icon into the corner, the game will provide feedback based on whether or not the factor is associated with the chronic disease of that basket. If there is an association between the factor that is selected by the player and the chronic disease, the corner will start glowing and a star appear as a badge. Otherwise, the icon will automatically return to the center of the screen and an error sound will be played. If the player wins the first badge, the instructional arrow will disappear. When the player gains three badges, he or she is allowed to proceed to the next level - level 2.

Figure 4 Level 1 of the Game

2. Level 2:

The layout of level 2 is similar to that of level 1, with the addition of the second basket being unlocked and appearing in the upper-right corner of the screen. In level 2, there is no longer any instructional arrow, so players need to address the association between a variety of risk factors and different diseases by themselves. When players correctly drag an icon into the second corner, there will be another badge appearing in the second corner. The players are not allowed to move on to the next level until they gather three stars in the upper-right corner.

Figure 5 Level 2 of the Game

3. Level 3:

   The layout of the third level is similar to the earlier ones. It looks like level 2, but now a third basket is unlocked and appears in the bottom-right corner. In level 3, there is no instructional arrow either, so players need to address the association between a variety of risk factors and different diseases by themselves. When players correctly drag an icon into the second corner, there is another badge appearing in the third corner. The players are not allowed to move on to the next level until they gather three stars in the bottom-right corner.

4. Level 4:

   There are four baskets representing different diseases located in four different corners of the screen. Without extra guidance, players need to address the association between a variety of risk factors and different diseases by themselves. When players correctly drag an icon into the different corner, there is another badge appearing in the corresponding corner. The player has to keep playing this game until they assign the remaining risk factors into the correct corners.

5. Accomplishment
   After all four baskets are filled in with associated icons, the player's mission is accomplished. The player will be congratulated and the contribution will be acknowledged. In addition, if the player likes, the player can print out a hero badge that contains a QR code to scan for registering to the ComPaRe platform.

Dynamics

The player interacts with the screen by dragging the icons to different baskets. If in a multiplayer mode, the player will team up with another player and communicate while playing the game.

Aesthetics

The player's curiosity and competitiveness will be triggered constantly by the mapping relations between the icons and the baskets.

When the player completes the game, the player has had a fun time and will feel rewarded when being congratulated for the accomplishment.

Outcome

The player has a fun time while playing the game. Consequently, the player will (hopefully) sign up to ComPare.

The Business Model

To develop the business model of this game, a paper canvas has been used to visualize our thoughts, as shown in Figure 6. Table 1 shows the summary of the business model progress prior to the pitch for the panel.

Figure 6 Progressing Business Model Canvas

Table 1 Business Model Canvas

<table>
<tr>
<td rowspan="2">Key Partners

Hospital

Consortium

COMPARE group

Cube

Manufacturer</td>
<td>Key Activities

Design

Management team</td>
<td rowspan="2">Value Propositions

Perspective to provide data</td>
<td>Customer Relationships

Constant feedback

Research Ambassador</td>
<td rowspan="2">Customer Segments

Direct Customer

Patients with chronic disease

Paying Customer

Researchers</td>
</tr>
<tr>
<td>Key Resources

Designers

Subject Matter Experts</td>
<td>Channels

Cube

Intuitive Game</td>
</tr>
<tr>
<td colspan="3">Cost Structure

Strategy

HR

Production</td>
<td colspan="2">Revenue Stream

Customization

Sign-ups</td>
</tr>
</table>

Logo and Slogan

The aesthetics of this game are designed for providing a context where players can perceive certain kinds of positive emotions, such as euphoria or satisfaction, while they are playing this game. Furthermore, with the positive sentiment, players, who are patients suffering from chronic diseases, are expected to be relieved from anxiety, stress, or other negative emotions to a certain extent. It is undeniable that hope commonly plays a vital role in the creation and development of positive emotions. So, we have selected hope as the name of our game.

According to Kapferer (2012), a brand is supposed to represent the brand's core value. When we design the Logo, we have gained inspiration from the Logo of Unilever. According to Unilever's official website (2019), the character, 'U,' which consists of 25 icons, is referred to as Unilever. The 25 symbols, such as ice cream, a bird, and fireworks, are associated with sustainable living commonplace. Given these 25 positive icons, Unilever has conveyed that Unilever is prone to create sustainable living commonplace.

In the light of Unilever's Logo, we have applied a variety of chronic diseases to composite HOPE. Our game brand, HOPE, is also committed by the game's core value. The core value is to encourage patients suffering from chronic diseases to engage in the research platform voluntarily. In contrast to Unilever's Logo, our game logo consists of six common chronic diseases, including AIDS, Alzheimer, Blindness, Epilepsy, Fibromyalgia, and Hepatitis that significantly impact patients' well-being. The game logo is intended to represent a united group of patients who suffer from different chronic diseases and to convey a message --- A group of patients can incubate a hope. In other words, one patient is desperate; one group of patients is hopeful.

With the game's Logo, the game's slogan also stresses the importance of engagement of patients suffering from chronic diseases. The motto is "One for all, All for one." This slogan pinpoints that patients need to support each other through a particular contribution if they want to improve their well-being in the end.

Both Logo and slogan of this game are prone to deliver information that patients should actively contribute, and they would end up with gaining particular benefit as a reward.

Both Logo and slogan are consistent with the game's mission; patients suffering from chronic diseases are encouraged in order to engage in the platform voluntarily.

Discussion

The challenge 7 --- engagement in a patient-research community for patients with chronic diseases encompasses three different sub-challenges:

- Patients' engagement
- Patients' motivation for filling out the questionnaire
- Patients' loyalty on the platform

Due to time limitation, our team chose to tackle the sub-challenge of increasing patients' engagement.

It is observed that two aspects of sub-challenge are the key to solving the problem. One is awareness and the other is the understanding of the important role played by patience's participation in medical research advancement. To address the two key aspects, the solution to the sub-challenge is set in a context that is off the online patient-research community and prior to patients' participation in community. For example, the cube that is the hardware of the game is designed to be installed in a hospital lobby.

The main purpose of this solution is to advertise the online community and valuable contributions that can be made to the medical research by patients. The secondary purpose is to shed light onto other sub-challenges by means of appealing more and more registrations on the community. Moreover, in the light of our game, HOPE, it becomes possible that the other sub-challenges would be addressed by means of gamification in the future.

It is undeniable that personal data becomes more and more valuable over time. Based on estimated ARPU (average revenue per user) in digital advertisement attained $59 per person in 2017 in comparison with $6.25 per person in 2012 (Lineshout, 2015; European Union Agency for Cybersecurity, 2018). The value of personal data gets awareness, such as GDPR in EU (General data protection regulation). In contrast to tangible payback, our game applies emotional reward. In other words, patients with chronic diseases would perceive a positive emotional attachment rather than any real promise when they are playing the game. The positive emotional attachment would encourage patients to engage in the platform. Through conducting empirical studies, Angel and Frederiksen (2015) point out that the positive attitude could handle patient participation challenges. Meanwhile, Dyrstad (2010) applies face-to-face interviews and reveals that some patients with high expectations of themselves are prone to participate

in medical research. It is clear that playing our game enables patients to prompt the expectation and hope of themselves. Nevertheless, we do not have quantitative data to support yet, so that applying a pilot survey, as well as marketing research, is necessary for the following study.

Nevertheless, as the cube can be installed in a public area where crowds pass by, it can attract all sorts of people other than patients with chronic diseases to play the game. Therefore, in the future, improvements should be made to the design in order to prevent children who usually do not have chronic diseases from playing the game. Also, improvements should indicate to game participators that the registration is for chronic diseases only, before they access the online community to save them from unnecessary efforts.

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