

Developing Health Games requires multidisciplinary expertise

Jaana Kemppainen, MHSc, Teacher, Tanja Korhonen, MSc, Teacher, Teija Ravelin, DHSc, Lecturer

School of Health and Sports, Information Systems, Kajaanin ammattikorkeakoulu Oy, Kajaani, Finland

Tanja Korhonen, MSc, Teacher, School of Information Systems, Kajaanin ammattikorkeakoulu Oy, PL 52, FI-87101 Kajaani, FINLAND. Email: tanja.korhonen@kamk.fi

Abstract

Serious games offer users information disguised with game-like entertaining elements. Due to their elements of surprise and simulation, such games can potentially engage and inspire their target groups more than traditional methods. Health games are serious games that can be divided into cognitive, emotional and rehabilitative health games. Social and healthcare services need to develop new customer-oriented functions empowering its customers. Health games provide a new method and model of maintaining and developing the mental and physical capability of all age groups, for instance as part of self-treatment.

Health game development starts from the need to find a new solution to support treatment. The participation of game design experts, healthcare professionals and end-users is required in planning the game concept. Game implementation requires a team consisting of game design, production, graphics, programming, and sound and testing professionals. Health care experts, who bring their knowledge into the process, support this team's work. Game development proceeds in cycles or sprints during which the health game is tested by customer groups at various stages of development. The tested game is then commercialized for marketing purposes taking into account potential business openings. Overall, good health game development occurs via multidisciplinary cooperation.

Kajaani University of Applied Sciences (KAMK) has developed several health game prototypes as a result of cooperation between Game Studies within Business Information Technology and Nursing and Healthcare education: the Stroke Kinect rehabilitation game for stroke patients, a dance game for the elderly and *Elämäni peli – the Game of My Life* supporting the development of youth life management skills during 2011-2012. KAMK is currently building a virtual exercise and training simulator within the ATHENE project, which first implemented an orienteering simulator. The HETTE project is exploring potential business models for health games within various market areas and advancing the development of the *'Elämäni Peli'* (*The Game of My Life*), under the name of *Elamanipeli – The Game of My Life*.

Keywords: health game, game development, multidisciplinary co-operation, university of applied sciences, The Game of My Life

Health games in health and welfare promotion

Serious games, of which health games are one form, are intended to affect human learning, health and wellbeing in a goal-oriented manner. Health games can be used to support a person's psychological, physical and social wellbeing. They can be played alone or based on interaction between the customer/patient and healthcare representatives. In health games, health and wellbeing elements are disguised behind a veil of entertainment. The games can inspire and engage users with their elements of surprise and feeling of reality. For example, the experience of convalescence and rehabilitation can be made more pleasant by becoming absorbed in the world of a game [1].

One of the most well-known health games internationally is SPARX developed in New Zealand for the treatment of mildly depressed youngsters. SPARX is an interactive 3D fantasy game based on a cognitive-behavioural approach in the treatment of depression. The use of this approach provides the customer with methods of coping and added physical and mental resources. The game teaches alternative thought and operational models, e.g. how to maintain hope and fend off negative thoughts. The impact of the game has been studied and it has proven to be an effective method of treating mild forms of depression within basic healthcare [2].

Other games which are meaningful games that demonstrate how games can be impactful and important in players' lives are for example, "Lucidity", developed in the US (<http://luciditygame.com/>), which is a narrative multimedia game developed for processing trauma caused by sexual abuse. It combines video, a graphical narrative and interactive tasks. RIGYSP "Really Important Game you should play" (<http://www.sophiehouden.com/games/importantgameyoushouldplay/>) speaks on behalf of the unique nature of life in the form of an electronic story book. This visual novel style game consists of background pictures modelling the environment, drawn game characters, background music and a narrative text. The player can make choices affecting the progress of the game.

"Runcible sky" (<http://www.sophiehouden.com/games/runciblesky/#>) is a narrative and minimalist game involving a dying woman remembering her life. This game conveys an image of peacefulness and acceptance of death and the beauty of memories to the player [3]. Such games allow the players to consider turning points in their own lives.

Health game development at Kajaani University of Applied Sciences

The game development process progresses as indicated in Figure 1. Game design is initiated by a need to develop a new solution to support the treatment of a customer/patient. Creating the game concept requires game design expertise and input from healthcare experts and customers. The implementation of the actual game requires a team consisting of a game designer, producer, graphic artist, programmer and expertise in audio planning and game testing. Healthcare experts provide the team with support and the product is tested by customer groups during different phases of development. The tested health game is commercialised so it can be marketed, requiring business expertise and knowledge of the market situation. Health game development thus consists of multidisciplinary cooperation requiring common procedures and concept management of those involved. As a process, the development of a health game is rather more complex than that of games for entertainment purposes. In particular the active participation and input of healthcare experts in game development work is crucial to success.

Kajaani University of Applied Sciences (KAMK) has developed health game prototypes as a result of cooperation between Game Studies within Business Information Technology and Nursing and Healthcare education: a dance game for the elderly, the Stroke Kinect rehabilitation game for stroke patients and *Elämäni peli* – the Game of My Life supporting the development of youth life management skills and the ATHENE a virtual training and rehabilitation environment.

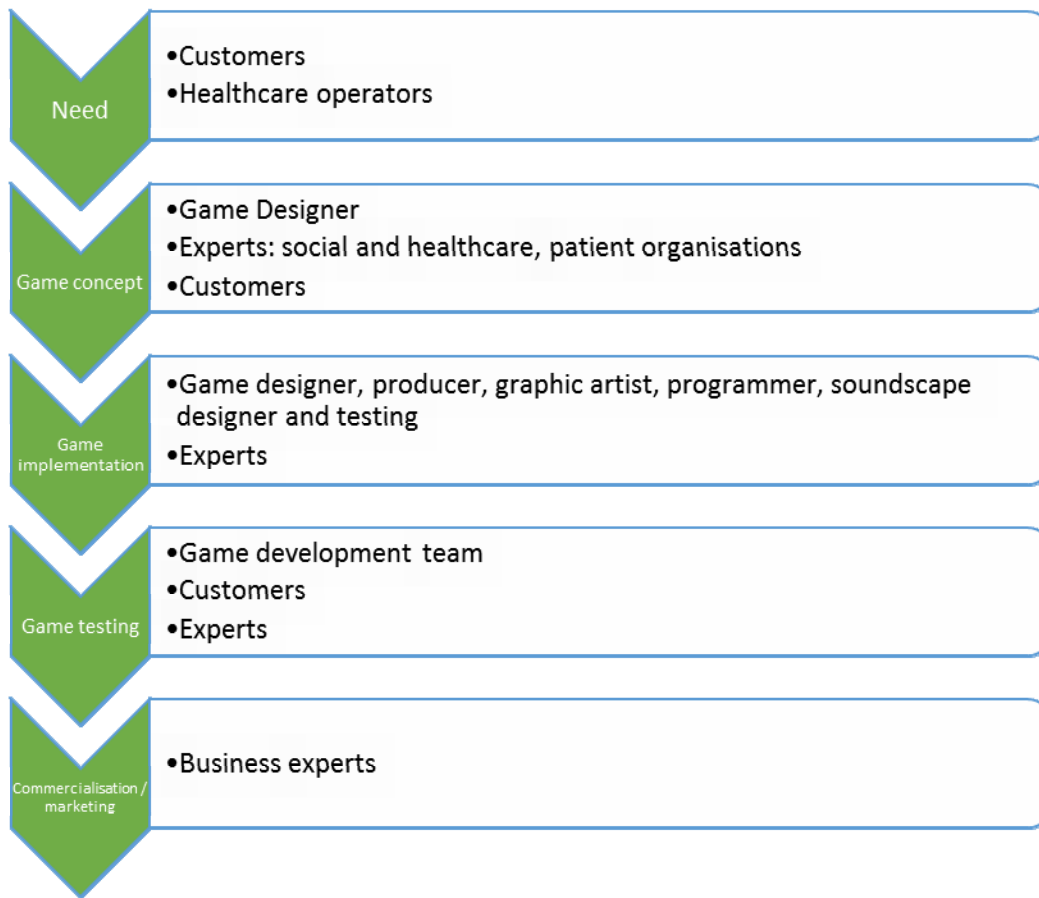


Figure 1. Health game development process.



Figure 2. *Elämäni peli* – the Game of My Life demo version.

In 2009, a dance mat game was developed for the elderly. Game students were responsible for graphic design and programming the game and a sports instruction student produced knowledge concerning the special needs of the elderly for the game design and was

responsible for testing the game, which helps to train balance, coordination, and the ability to react [4,5].

The Stroke Kinect game prototype was developed in summer 2011 for the rehabilitation of stroke patients in close cooperation with those undergoing rehabilitation

and nursing/care staff. The game uses the Kinect game controller enabling gameplay using hands and feet. It offers a new opportunity for increasing the level of difficulty of rehabilitative exercises according to the patient's capability and progress. The exercise and training amounts are dependent on the activeness of the patient. The computer game can motivate and inspire the patient to improve performance when he/she is able to follow personal progress and obtain immediate feedback concerning his/her own movements using the game. A presentation of the game can be viewed at http://www.youtube.com/watch?v=_t9DPq2YEmU

A network game to support the life management of adolescents has been developed at KAMK. The idea for the Game of My Life came from youth psychiatry experts. During the pilot stage of the project in 2012 the main life management problems particularly related to mental health and substance abuse, of young people were surveyed with the aid of a thesis by nursing students and cooperation with working life and a game demo was developed. The main areas of life management emphasised in the game were use of intoxicant substances and money as well as time management [6]. The Game of My Life was constructed in the Visual

Novel style enabling interaction between different parties in the game and a collective participation experience. The visual novel consists of a soundscape, static graphics and first person and interactive decision making events [7]. The theoretical framework chosen for the game was the role map of a young person in the process of becoming independent [8]. The Verkkoterkarit project operating in Helsinki and Brian Lu, a student of psychology at the University of Chicago participated in evaluating the demo version of the game. The feedback obtained will be used to further develop the game.

The ATHENE environment is a new type of virtual and game-like training environment where the player is the movement driver. The environment's games can be controlled via a treadmill, exercise bike or rowing device (automatic speed variation according to the speed of movement of the player), using gestures detected by the Kinect camera's sensors or with the aid of information concerning the player's heart rate. A presentation of the environment is available at <http://athene-exergaming.com/videos>.



Figure 3. *The Game of My Life* new characters.

Future outlook

Development of the rehabilitation and life management games will continue at KAMK. Previous projects have provided a functional development and operational model for health game development which will be used in future work. Commercialisation and finding the right market areas and business model remain a challenge.

During 2014 the Game of My Life version 1.0 will be developed in the Hette project where KAMK’s game students will be responsible for developing the game in cooperation with mental health professionals and students. Mental health representatives will work in cooperation with the script writer and participate in assessing the game. A nursing student specialising in mental health will produce theoretical background knowledge for gameplay development and a second student will be responsible for testing content. Brian Lu has also worked in the game’s advanced development

team. The project will also test the SPARX game mentioned earlier and the results will be reported to Auckland University and used in the development of the Game of My Life [9].

Serious games offer customers of different ages new and inspiring alternatives for the promotion of their health and wellbeing. The intended impacts and needs of the target group must be taken into account in the development of health games. From a business viewpoint, there must be a global need and supply of users in order to develop health games and promote their wider use amongst customer groups on an international scale. It is best to carry out market research and explore suitable business models at the earliest possible stage so that all the requirements can be considered during game development. All things considered, the development of a health game requires multidisciplinary and smooth cooperation.



Figure 4. The Game of My Life 1.0 scenes.

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