Exergaming – gaming for health

A bridge between real world and virtual communities

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Abstract—**The urban lifestyle is hectic and information rich. A busy work pace and digital entertainment take time away from real world physical exercise, while lifestyle diseases increase globally. An aging population and diminishing resources for public healthcare cause pressure to move healthcare resources from treatment to prevention of illnesses. Exergaming, which is a term combining "exercise" and "gaming", has a lot of potential to provide various new service business opportunities for the Entertainment and Recreation as well as the Healthcare sectors. We started with scenario work, consumer studies and exergame roadmapping and interviews with potential actors and created two prototype concepts, "Fitness Adventure" and "Figuremeter" in our project. At the beginning of our project, Exergaming was not a very well-known concept by the masses. The emerging success stories of Nintendo Wii and everyman GPS devices have shown that combining existing technologies in a novel way has already opened the Exergame-related market and consumers are willing to use such services.**

Keywords; exergame; fitness adventure; figuremeter; ict for healthcare; virtual communities; location based services; location based gaming; user created content

I. INTRODUCTION

ICT plays an increasingly important role in providing relevant health-related information in an interesting way to specified target groups. Diverse playful ways to measure total wellness and provide information could increase the motivation to do sport also for those not interested in current sport. Based on expert interviews we found out key needs in the future to support preventive work for maintaining one's total wellness in the long run. The key aspects are flexible and playful/visual, tailored for the respondents and anytime-and-anywhere-type casual exercise experience. The trend is not only happening in Finland. There is an increasing demand for wellness products and playful ways to provide information internationally.

The urban lifestyle is hectic information rich and mobile. The lifestyle is changing and formulating new needs and new segmented solutions will become more important. Focus in healthcare is moving from treatment to prevention of illnesses. One hundred years ago, the major health concerns were the infectious diseases. Today the leading causes of death are cardiovascular diseases and cancer. Unhealthy lifestyle caused health problems lowers the quality of life of many, even if they don't cause death. These include e.g. obesity and diabetes.

VTT Service Beyond theme project, Exergame (Sept. 2006–June 2008) focused on escalating ICT trends: 1) serious games (beneficial entertainment), 2) social media (users as content creators), and 3) mobility. Our hypothesis was that exergames – games targeted to promote wellbeing and motivate people to do casual exercise – will become a promising business within the next five years. When VTT's Exergame project started, there were not much talk about exergames but soon Nintendo Wii brought up topics related to virtual exercise and the discussion around exergaming started to grow steadily. Another rapidly growing trend of personal navigation systems has also gained popularity. Personal navigation systems have become common both in cars as well as in mobile phones, which has opened the markets for novel location based services.

We started with consumer studies, exergame roadmapping and interviews with potential actors. After several workshops and brainstorming sessions, we created two prototypes, Figuremeter and Fitness Adventure, to tackle these problems and encourage people to utilize new concepts for improving wellbeing [1][2].

This paper first describes the creation process of two Exergame related services, and then moves on to discuss the business area and utilization possibilities of Exergaming services.

II. RESEARCH METHODS

The main objective of the Exergame project was to find innovative ways to give positive feedback and playful motivation for people to exercise and grow interest towards their wellbeing. The project focused on preventive healthcare and playful ways for the main focus groups, which are 1) youth, and 2) occupational sport (working people).

We did not want to take a pure technology-driven approach, so we started from future scenarios and concept development. Several innovation workshops were organized to collect and refine initial scenarios and concepts. An adapted open innovation process was utilized in the project and it is depicted in Figure 1. [3]

In parallel with the workshops, a technology roadmap and a future scenario overview for Exergame technologies was collected and created to help the next stage concept development. [4]

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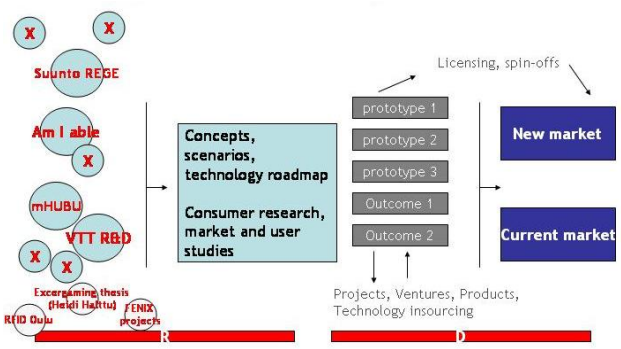

Figure 1: Open innovation process utilized in the project.

In the beginning of concept development phase, a consumer study of 1,489 respondents was organized to get early feedback to support concept development. [5] The aim of the study was to examine what factors affect willingness to exercise with new technologically supported playful ways, exergames. We were interested in obtaining whether willingness to participate in Exergaming is more closely related to motivations to exercise than to motivations to play computer games. In addition, we studied the relationship between individual computer playing and physical activity. The study covered various age groups , in which ages were varying between 13 years up to 75 years.

Later, during the development ideas were combined and narrowed to two prototype concepts: Fitness Adventure and Figuremeter, which were the outcome of the process. These prototypes are described briefly in following chapters.

After concept prototype development, a user evaluation for Fitness Adventure was organized. The aim of the evaluation was to collect user feedback of the impact that the Fitness Adventure (FA) application could have on the users' exercise habits as well as the benefits and costs that the application could have.

III. FITNESS ADVENTURE PROTOTYPE

The Fitness Adventure prototype depicted in Figure 2 is an application platform supporting physical outdoor exercise. It utilises location information and a mobile phone acts as a terminal device for the game.

The aim of the prototype is to combine a mobile game and fitness exercise and thus create new opportunities for the mobile phone to enhance the efficiency of lifestyle improvement and management. The concept is supposed to offer a proactive, locationaware solution that would motivate people to move from place to place with the help of GPS location technology. The person uses the service with his/her own mobile phone. The application allures the person to go out for a walk or a run. It is meant to entertain the user with an interesting fictional story, spiced up with additional information on different sites along the route that the person walks or runs. The concept takes advantage of architecturally interesting buildings, tourist attractions, sights and nature trails around the selected area.

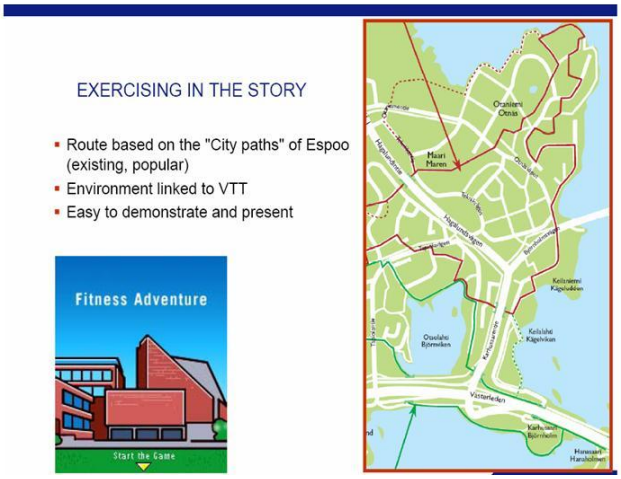

Figure 2: Fitness Adventure

Fitness Adventure runs in Series 60 mobile phones and the game itself is a Java application. The game utilises a Bluetooth GPS positioning device. GPS coordinates are transferred to the game software with the GPS reader software. The system recognises the user with GPS location technology as the user enters the spot. [6]

Fitness Adventure application supports also various tags, which can be used to spice the story in the adventure. These tags include RFID tags and visual tags [7]. RFID tags require a mobile phone with a RFID reader which are currently quite rare. Visual tags can be read with a normal camera of a mobile phone, which makes them usable with most of the mobile phone models.

After finishing the Fitness Adventure prototype an additional platform for user content creation was developed to enhance the functionalities of the FA application. This platform is called the Simple Mobile Application Code (SMAC). SMAC provides a platform to create new content and games on-the-spot. No special programming skills are needed for creating the content or minigames. Platform utilizes location information, photos, sound, text and time via mobile phone. Snapshot of SMAC is depicted in Figure 3.

Figure 3: Simple Mobile Application Code (SMAC).

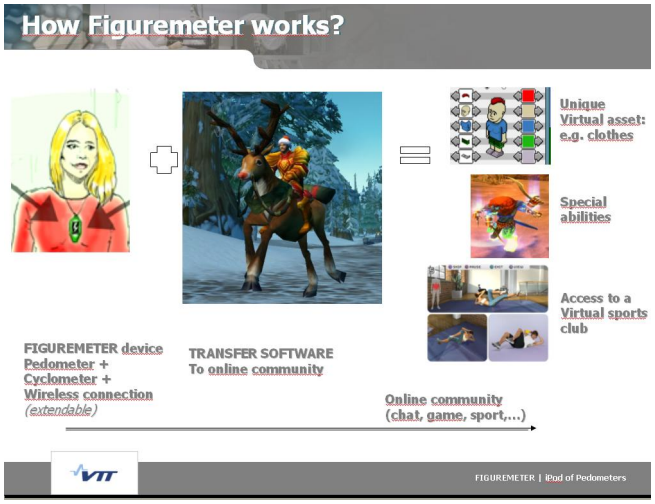

Figure 4: Figuremeter concept

IV. FIGUREMETER PROTOTYPE CONCEPT

The Figuremeter concept prototype depicted in Figure 4 combiness casual exercise and online communities. Figuremeter consists of a mobile device that measures the physical activity of a user, and software that transfers measured data to a computer and an online community or a game. The aim of Figuremeter is to motivate people to exercise by giving advantages and special abilities in online games and communities according to their real life exercising. Figuremeter device is a combination of a pedometer and cyclometer with wired or wireless connectivity.

V. EXERGAME BUSINESS ENVIRONMENT

The online gaming market is a growing area with a lot of business potential. The growth of active subscribers for massive multiuser online games (MMOG) is growing rapidly as it can be seen in Figure 5 [8]. Novel ideas are needed to keep players active and committed to the game for long times. Online Game Market Forecasted that subscription revenue from online games was $2 billion in 2005 and it was expected to grow to $6.8 billion by 2011. But already in 2007 the PC online game revenue alone passed $7 billion, not ncluding retail sales. [9] Furthermore, subscription revenue is only one part of the online game business equation. Advertising and digital distribution revenue are also expected to grow significantly.

Location-based social media is another growing sector. Personal navigation equipment have turned up in everyday devices such as mobile phones and other personal navigator equipment. Existing user GPS devices offer a wide business environment for novel location-based services.

Sport and fitness companies have provided services for long time. Many gyms have adopted modern technological solutions to support exercising and monitoring performance. Success of these companies have shown that people are concerned about their health and willing to pay services which can help them keep fit.

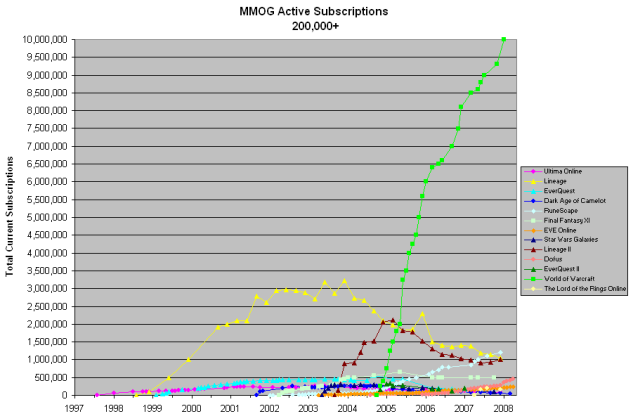

Figure 5: Massive Multiuser Online Games ((MMOG) >200.000 active subscribers [8].

VI. EXERGAME SERVICE PROVIDERS

The exergaming business area is still an emerging field, but it has already moved from being a field of research to a real business. A huge amount of companies working in the game business already exist, as do other companies working in the exercise business. These existing companies can enhance their service and product offerings by widening their services to the exergame area. For example, game companies have been accused of making games which are too addictive and which immobilise young people. Games can be made even more tempting by combining the real lives of players with the virtual worlds using exergaming concepts. At the same time, when exergaming seduces youth to casual exercise, game companies can raise their social acceptance level. For pure exercise companies, exergaming concepts can make physical exercise more tempting also for current "non-exercisers", which would increase the customer volume of these companies.

Most computer and video games are currently shackling the player to a console or a computer. The success of massive multiuser online games (MMOGs) and virtual communities have shown that virtual worlds can, in the worst case scenario, take up all of a person's leisure time. Even adding exergame components to these games might not be sufficient to ensure adequate exercise for the "non-exercisers". There is a need for novel game concepts and new game companies which take the exergaming and mobility as their initial starting points when they are defining their game offerings.

Exergaming can also be used in the tourism and experience business to give additional value and new features that are location and user-context aware (e.g. language and preferences) for the customers of these fields.

Last but not least, an aging population and the diminishing resources of public healthcare cause pressure to move resources from treatment to prevention. This opens new opportunities for new exergame related companies, ones which offer services both to the public health care sector and directly to the end users.

VII. CONCLUSIONS

Digital life has brought many benefits to humans, but, more negatively, it has also immobilised many people, causing health problems because of unhealthy lifestyles. Gaming and entertainment easily seduce people to neglect physical activities. It is predicted that the worldwide revenue of the video game and interactive entertainment industry will reach $57 billion in 2009 [9]. New service concepts combining real life and virtual communities can be used to tempt people to casual exercise to improve wellbeing. This can also increase the social acceptance of the entertainment industry.

In the beginning of our project, exergame concept was not very wellknown by the masses. The situation has changed outstandingly since that. Recent product releases by game console manufactures and exersice companies have shown that the exergame market is open and consumers are willing to adopt these new concepts in to use.

VIII. ACKNOWLEDGEMENT

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