MIDTERM REPORT

GAME OF FITNESS

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Introduction

Physical exercise provides health benefits including muscular strength, improving cardiorespiratory fitness and weight maintenance. These health benefits can reduce and combat diseases. Despite of all these health benefits, around 31%[1] of adults aged 15 and over does not get sufficient physical exercise (WHO). It is also identified that physical inactivity is now the fourth leading risk factor for global mortality.

According to WHO (World Health Organization) there are clear health benefits associated with physical exercise; «there is conclusive scientific evidence, based on a wide range of well-conducted studies, showing that physically active people have higher levels of health related fitness, a lower risk profile for developing a number of disabling medical conditions, and lower rates of various chronic noncommunicable diseases than do people who are inactive.»

There are many different fitness apps available today. These apps have different features. Some are helping people setting up plans, logging and collecting workout data or accounting for calorie consumption/burn. Many also include coaching features to motivate the user. Other apps offer workout music playlists, competition, or reward features.

While there are currently many fitness apps, there are not many fitness game apps available. However, we think fitness games will be more motivating for some people than the regular fitness apps, and we think such apps will be common in the future.

Based on this information, the group will be developing an exercise game app prototype to encourage people to start and maintain physical exercise. It works by combining workout with games as well as giving the possibility of interacting and competing with other players. It will be implemented as a mobile application using the Global Positioning System (GPS) for positioning information which will be used for calculation of other statistics.

Research question

Our research question is to examine how gamification can foster motivation in exercise context. This will be done by examining different aspects of motivation through gamification.

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[1] World Health Organization
http://www.who.int/dietphysicalactivity/factsheet_inactivity/en/

Literature review

In this section we will look at some of the previously done work related to gamification and motivation connected to physical exercise.

The article *"Psychological Perspectives on Motivation through Gamification"* by Michael Sailer et al. is a theoretical article that describes general definition of gamification and analyze about motivational pull of gamification from a psychological perspective. The main purpose of this article is to adopt different perspective of view on the topic of gamification in order to investigate the motivational mechanisms. Further, there are description about typical game elements used in gamification and each game elements is matched with suitable motivational mechanisms.

According to Deterding, S et al. the gamification conceptually can be defined as "the use of game design elements in non game contexts". Since the definition of gamification covers very wide area, the gamification has been used in different contexts and some applications seem to have positive effects regarding motivation and learning. The main components of the gamification are game elements, which describe the specific and characteristic components of games that can be applied in gamification. There have been different approaches to create the lists of game elements. In this article, they provide a list of nine typical game elements that contains points, badges, leaderboards, progress bars, performance graphs, quests, meaningful stories, avatars and profile development. These game elements are discussed and used to investigate different motivational mechanisms from different perspectives.

The article describes six principal perspectives, which can become relevant within gamification, the trait perspective, the behaviourist learning perspective, the cognitive perspective, the perspective of self-determination, the perspective of interest and the perspective of emotion. Each perspective concentrates on different components, which become relevant in different degrees depending on the focus of the perspective. The article analyzes these perspectives and investigates different motivational mechanisms that describe which component gives motivation to different users in different situations, and how.

Since we are going to make a fitness game application, which has a social-competitive aspect, these motivational mechanisms give us useful information about which game elements do we need to give more motivations to different users. As simple examples, the motivational mechanism "Players are likely to be motivated if gamification offers rewards" from behaviourist learning

perspective, and the motivational mechanism "Players are likely to be motivated if they experience the feeling of social relatedness" from perspective of self-determination, tell us respectively the game elements "Points" and the game element "Leaderboards" have potential to give users more motivations.

In Social Motivations To Use Gamification, Juho Hamari and Jonna Koivisto looks at how social factors can be used to predict attitude towards gamification. They refer to social influence as "an individual's perception of how important others regard the target behaviors and whether they expect one to perform that behavior". Where the behaviour is the use of gamification to motivate oneself to exercise. They hypothesise that the more strongly a person believes that others expect and support certain behaviour, the better it feels to conform to those expectations. And when such a behaviour can be met, the social influence will have a positive effect on the attitude toward the service. They tested this thesis with 107 people who were using a training service called "Fitocracy" the exercise: *"activities earn you points. Points lead to level ups. Earn badges for significant achievements. The community will reward your hard work with props"* where the users were given the option to give each other "likes" or comments on good work. Their results confirmed this theory that social influence positively influences a user's attitude directly, with social factors accounting for 56.5% of the variance of attitudes towards using a gamified service. There is a place for discussion concerning if giving a "like" might not improve the service if the user does not feel the need to giving/receiving a like themselves. Understandably this would be able to change with the use of a larger network or people closer to the user being the ones giving the comments or "likes".

As we mentioned above, we are going to make an application that provides a kind of social networking service. Since this kind of application usually deals with personal information of users, we could get useful advices from the article "*Negotiating Privacy Boundaries in Social Applications for Accessibility Mapping*" by Harald Holone and Jo Herstad. This article discusses about privacy issues that arises in process accessibility mapping, by describing existing practice for sharing information about physical accessibility among wheelchair users, and compare that with new practices that using ICT, the mobile, collaborative route planning concept OurWay, which is described in detail in another article of Harald Holone, "Aspects of Personal Navigation with Collaborative User Feedback". In this context, the notion of privacy is not about law, but experienced privacy.

The article introduces three boundaries central to the negotiation of information disclosure, which is proposed by Palen and Dourish. The first boundary is the disclosure boundary, about what information to share and what to keep from others. The second boundary is the identity boundary, which is defined by the role taken on

by the user. Finally, the temporal boundary discusses the effects of persisted information. Through this article, these boundaries are used to discuss about negotiation of privacy in different situations, by presenting anecdotes of different users as examples.

In summary, the article proposes three suggestions or recommendations of negotiation of information disclosure. 1) The negotiation of what information to disclose must be left to the user, and traces of the user's activities must be negotiable by the user at any time. 2) The system must be open to the result of the negotiation. 3) The issues about who owns the service and associated contributed data, and who can change, must be publicly addressed to users prior to joining such a social service.

In the article: On the Move with a Magic Thing: Role Playing in Concept Design of Mobile Services and Devices, they take a look challenges faced by creating new concepts for new mobile services at the design level. The article looks at PD(Participatory design) and develop two participatory techniques. "The two techniques are organized around situations either staged or real where users and designers can envision and enact future scenarios: a role-playing game with toys, and SPES (Situated and Participative Enactment of Scenarios)."

Designing applications for new situations may bring a lot of unseen challenges. A way of working around this is to implement the user directly into the design process itself. In this paper they ended up creating two roleplaying user exercises in a way to deal with this problem.

In the roleplaying game with toys, the designers organized groups with users, to enact out different games with specific rules. Each game were set in a specific environment where the "players" enacted out different situations through role-playing with toys. Dices were used to create some unpredictability with different in-game game setups. Situation cards were used to create different happenings during the gameplay. The designers took minor side roles while also explaining how to play the game. By this technique the designers were able to look at different situations that may occur in scenarios often hard to replicate in the "real world".

During the SPES technique a user is given a simple mock up device and are set to interact with the device during their regular day. A designer shadows ,takes notes and asks the user of the different situations the experience. The mock up helps the designer witness different situations that may occur with the application during a normal day for the user. The situations may be created either by the designer

deliberately or by the user. This technique lets the designer visualise different ideas rather than just storyboarding.

The articles gives us new light on how to conduct different tests and scenarios with user to gain information in creative ways. For our project the use of role playing is not convenient due to the fact that we have limited time and resources. Setting up scenarios with toys and organizing groups for 1-2hours acting is too big for this project. However a some of the techniques used in the SPES testing may be used. We may not be able to follow a user around for 2 days at the time but we can create a mockup of our future applications and see how the user interacts by themselves and by us creating scenarios. By letting the user use a mockup of our application we can analyze what of our design works and what improvements should be done for further improvements.

In article gamification dynamics in app development. Kate abrosimova propose how Integration of technology effects on human behaviour by using some mobile app. The focus of the theory was on the behaviour of people in accordance With their Socially influenced affinities. Through gamification people like to share their achievements and to feel as if they have a mission when using an app. Related to this study gamification dynamics in app development are the intentions of a population in adopting a new advance mobile application. Also within the framework of behavioural control, potential access related difficulties could play a major role. Gamification features are one way to increase engage with mobile app. Reward systems are widely used in games, but there are certain game dynamics that be integrated into the overall mobile app user experience.

Research and method

In this section we will look at how to best continue the development of our application. We are following the classic design lifecycle where we start by determining needs and establishing requirements. We have gathered data by creating an online survey as well as looking over different personas.

Personas

We created a few personas to decide our user group:

Pierre: A married 33-year old gym teacher, from Nice, France. Loves to go cycling in the mountains. He likes to set for himself real long term goals while training. He would love to motivate his wife to join him to go training with him. To have a common goal they could work together towards.

Per: 24 year old student. Per lives in a shared accommodation with 3 of his friends. Per is a very competitive man and loves to compete with his friends in everything. He would like to start exercising more outdoors in form of running but need some form of challenge to do so.

Silje: 35 year old programmer from Trondheim. She is always on the lookout for new ways to exercise but struggles to find motivation to stay on the different programs. She has tried some different training apps before but struggle to find the inner motivation to stick with these.

Hank: 52 year old man from California, USA. Hank works as a car salesman and have been doing that for 20 years. His work doesn't offer him much exercise in his everyday life. He is interested in starting to exercise so he could take more care of his health. He isn't a very practical person when it comes to new technologies so a training app might be more of a challenge than assistance.

Frank: 35 year old man from Bergen, Norway. Frank works as a personal trainer. His day job requires that he stays fit. He has used and uses a lot of different training apps but is on the lookout for a good motivation app for cardio training mostly for his clients. He has no issues himself with motivation, but rather looks for a good way to set goals and store information about his cardio exercises. Also finding a way to set goals for his clients they can follow when the train on their own.

Persona analysis:

Pierre who is trying to motivate his wife to go training with him would like to have features that would allow him to have a common goal with others. And also have features that would allow him to bring include his class on. Pierre would also like the app to be in his native language.

Per would like to have some challenge features into the app. Since Per is a very competitive guy he would like to have some ways to challenge his roommates to reach certain goals first.

Hank who is not well known in the use of smartphone applications would like it to be very user friendly with some introduction tutorial for explaining how to use the it. Since he is knew to doing regularly exercise he would like it to be easy to set partial goals to see some progress towards a greater goal. A possibility of setting up a training schedule with a notification system to remind him of when he should exercise.

Frank is looking for a feature so he can organize his clients training. A way that he can monitor clients progress and set up plans for them. The app needs to be easy to use for the clients so that they can be able to start using it without much hassle.

Silje needs an app that can keep her motivated. By giving her partial goals and achievements for them. Also a social aspect would be nice to keep an extra motivational pull.

Findings

We surveyed 88 people about their training habits and their relation to training applications to give us a better insight to how we should develop our application. The majority of the people who answered the survey (91%) were in the age group 20-35 years.
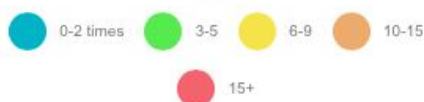
How old are you?

	19 or younger	20-25	26-35	36 or above	Standard Deviation	Responses
All Data	2 (2%)	52 (59%)	28 (32%)	6 (7%)	19.95	88

- 19 or younger
- 20-25
- 26-35
- 36 or above
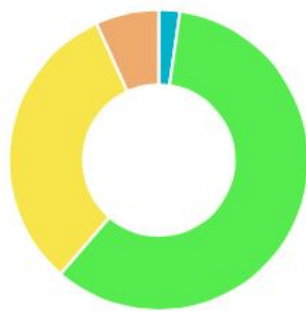
Average how many time do you exercise in a month?

	0-2 times	3-5	6-9	10-15	15+	Standard Deviation	Responses
All Data	16 (19%)	22 (26%)	20 (24%)	16 (19%)	11 (13%)	3.79	85

- 0-2 times
- 3-5
- 6-9
- 10-15
- 15+

WHO describes recommended physical activity of adults (18-64 years old) to be 150 minutes per week, which comes out to an estimate of 8 training session in a month. And 300minutes (16 times in a month) to achieve all health benefits given from training. (this is training with moderate intensity, with high intensity training time needed would be the half). [2] Looking at the results we can see that 45% of the participants does not meet the minimum requirement. And only 11% achieves all of the benefits from training. (for simplicity we look at moderate intensity training as the average training form, this could vary from user to user.)

How often would you ideally want to exercise in a month?

|	0-2 times	3-5	6-9	10-15	15+	Standard Deviation	Responses
All Data	4 (5%)	8 (9%)	16 (18%)	31 (36%)	28 (32%)	10.65	87
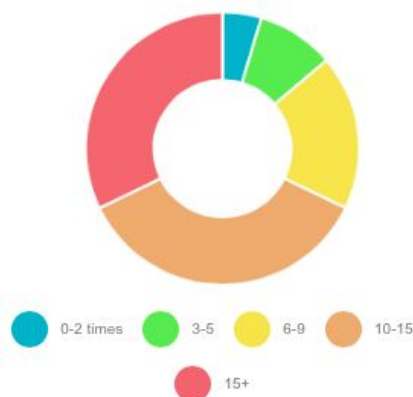
In the next questing we looked at what the user would estimate as their own ideal exercise amount. Comparing this graph with the previous one, we see a shift where almost everyone would want to train more. And the moving average leaning towards WHO's optimal health benefit goal. These two graphs alone gives us a good indication that there is a need for a change when it comes to a person's training habits.

If you exercise regularly, where do you usually train?

↵	Outdoor ●	Indoor ●	Both ●	Standard Deviation	Responses
All Data	13 (17%)	32 (42%)	32 (42%)	8.96	77

● Outdoor　● Indoor　● Both
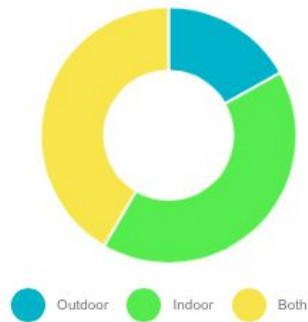
Our application is focused on outdoor exercise with gps tracking. So with this survey we find out how many of active people like to train outside compared to inside. This gives us a decent view on how the distribution of where people like to exercise, showing that our application would reach 59% of the users.

What motivates you to do exercise?

↵	Not motivated at all	Little discouraged	Neutral	Motivated	Highly Motivated	Standard Deviation	Responses	Weighted Average
● Competition	27 (33%)	3 (4%)	24 (29%)	15 (18%)	14 (17%)	8.45	83	2.39 / 4
● Rewards	19 (23%)	4 (5%)	27 (32%)	27 (32%)	7 (8%)	9.72	84	2.81 / 4
● Social	13 (15%)	2 (2%)	21 (25%)	34 (40%)	15 (18%)	10.49	85	3.09 / 4
● Fun	6 (7%)	2 (2%)	15 (18%)	31 (36%)	31 (36%)	12.18	85	3.31 / 4
● See progress	4 (5%)	1 (1%)	9 (11%)	28 (33%)	42 (50%)	15.71	84	3.45 / 4
								3.01 / 4

We wanted to find out what motivated a user into training. Where seeing progress, it being fun and social were the biggest factors.

Have you ever used any mobile application related to training?

↳	● Yes	● No	Standard Deviation	Responses
All Data	55 (64%)	31 (36%)	12	86

● Yes ● No

Do you believe an application could be able to help motivate you when it comes to training?

↳	● Yes	● No	Standard Deviation	Responses
All Data	67 (77%)	20 (23%)	23.5	87

● Yes ● No

The last questions look at the user's relationship to training applications. Where 64% of the people asked had already taken use of some sort of a training application, and 77% believed there could be one able to help motivate them to start training.

Discussion

Usergroup
This application is created solely to help motivate people to start or continue training, and since everyone should be doing so, there are no limitations to the user base. Still our main focus will be built around students. We concluded with this because older people might have other needs when it comes to the understanding of the application, and eventual legal issues concerning younger people and training. It is also a benefit that the user group is easily accessible when it comes to the time pressure of this assignment.

Limitations
We chose to specify our application to outdoor activities for the simplicity of using GPS. Looking at the survey we conducted 42% of the people only train inside, which might be a too big of a loss when it comes to users. You could argue that the application might give a pull to users to start training outside. But the best option might still be to change the application to let the user plot their own training data and calculate distance in calories burned.

Further plans
Our next step will be creating a simple prototype based on the responses we got from the survey and personas looked at in this report. We will do face to face tests with a smaller user group to test the prototype and change it according to the results we get.

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