Tampere University of Technology
Department of Pervasive Computing
TIE-40106 Psychology of Pervasive Computing 2018

Biohacking & quantified self/05

Death Clock

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Definitions, abbreviations and acronyms

UI	User interface
Ubiquitous Computing	Computation being embedded in the physical environment and being accessible anytime, anywhere

1 Technology area and psychology

1.1 Introduction

Biohacking and quantified self means optimizing physiology, biology and psychology to improve health and wellness. Biohacking is relatively new area of science and self-improvement which has first emerged from wellness enthusiasts monitoring and optimizing everything related to their health and mind using supplements, exercise, various technologies like wearable devices that monitor values like heart rate, and even using nootropics. It has evolved from this small group of enthusiasts to more commonly used practise for regular people in just few short years. Today biohacking doesn't necessarily mean the use of nootropics or special dietary supplements, but simply monitoring vitals and trying to improve oneself with the information given.

Biohacking and quantified self can't be categorized to one field of study. It's combination of psychology, biology, physiology, engineering and even robotics. The field is relatively new and developing rapidly so mentioning any central theories or frameworks would be difficult.

User need for this area of technology are mostly related to wellbeing and health. Wellbeing has been increasing trend in the past years and many companies have taken up the challenge to develop devices that combine biohacking features with regular wrist watches or smart watches with plan to provide regular customers easy way to track their activity and vitals to improve life quality naturally in this booming trend of self improvement today's world is all about.

1.1.1 Options for technology areas.

Among all of the given technology areas,we have chosen Biohacking & quantified self for our group assignment. We have seen all the areas but Biohacking & quantified self excited us more. Biohacking & quantified self allows people to do things with clever and new ways. For example,it allows people to check their own health condition with the help of devices. Quantified self can be used to track both personal and professional life by tracking people daily life eg. during the work day what are they doing, where they spent their most of the time, how much they are sleeping in a day, eating habit, physical activity etc. Gamification is a new application in quantified self. After tracking whole days activities if people see that they have to improve themselves with that particular area which requires improvement then they will get motivated to improve that thing. Biohacking & quantified self is the best way to solve this problem. With considering people health and other activities we have chosen this area of technology. Basically, We want to motivate people to aware about their health or personal life by observing their daily activities by themselves and take preventive steps depending on the situation. We stick with our selection in both phases of the assignment.

1.2 Example applications

Biohacking and quantified self is an idea to improve people's health and wellbeing by the means of epidermal electronics, biosensors and even artificial intelligence. This idea is co-opted by the quantified-self movement in which daily physical and biochemical activities are tracked to build a database of information for the purpose of tracking, maintaining and improving once health and wellbeing [7].

Currently, biohacking as a commercial idea is limited to smartphone applications in which you input the data and the application does the necessary calculations and evaluations to inform the user about their specific area of interest. This area of interest is quite wide and diverse and can be things such as exercise and motivation, to sleep and general wellbeing. There are a lot of these applications and here are examples of a few of them.

Moodnodes is an application that captures your mood and is meant to improve your thinking habits. The application tracks your mood over time and is meant to help you improve your mood over time [8].

RescueTime is a program that tracks your activities on your smartphone or computer and ranks each activity based on their productivity. The application is meant to inform the user about their productivity and motivate them to improve [9].

Track my stack is an application meant to help the user improve their health by building a stack as a method of reaching your health goals and managing symptoms. The stack in this case meaning a care plan or regimen comprising of treatments, therapies, activities and medicine [10].

Despite many of these interesting ideas and applications, biohacking and quantified self is still in its infancy and most of the applications rely on the user given data general knowledge of substances. In the future commercial applications may be available that could monitor the users health and well-being by the means of accurate sensors that may measure hormonal levels or even brain activity.

1.3 The role of psychology in this area

The primary goal of any biohacking technology is to provide the user with data they can use to make informed choices concerning their health. Another goal would be to present that information in a way that is easy to understand and motivating. A good biohacking device would empower and motivate the user to change their behaviour and habits towards a healthier lifestyle. No device can (or should) force people to change their behaviour but for those who want to, it should provide assistance in decision-making and motivate them to act on those decisions.

One study (Crossman, 2016) found out that most student participants were able to change their behaviour for the better through a behaviour change plan (BCP). Out of 134 students who set fitness or nutrition goals 59% achieved them using a BCP and 33% achieved them partially. This is something that could be integrated to a biohacking device/app. BCPs often take into account principles from the Transtheoretical model (TTM) of change which has five stages: precontemplation (not recognising the need for or having an interest in change), contemplation (thinking about change), preparation (planning for change), action (adopting new habits) and maintenance (ongoing new, healthier behaviour). Often times people don't move through these stages linearly, sometimes they relapse and go back to a previous stage due to lack of motivation or self-efficacy. A biohacking device could help in all five stages.

During precontemplation it could make the user recognise the need for change by giving accurate data about the users health and raise interest to change by letting the user know how certain types of changes might improve their well-being. During contemplation and preparation it could motivate the user to start planning, ask questions about how they would like to change and give tools for making SMART (specific, measurable, attainable, relevant and time-framed) goals to work towards. Here it is important to consider each of these qualities the goal should have. A good goal would be specific (specify an activity rather than an outcome) and measurable so the user knows exactly what to do and where they are in the progress of reaching that goal. It also needs to be attainable and relevant to the behaviour change the user is trying to make so the user knows they can reach it and why they should work towards it. The goal should also be realistically time-framed so that it can be reached on time but can't be put off indefinitely. These goals should be set by the user themselves but the device/app should guide the user in making them so that they are SMART and therefore more helpful in making whatever behaviour change the user wants to make.

During action stage the device should keep track of the users progress and reward them for the steps they take to reach their goals. Rewards could be points in the app and users could have groups with leaderboards (maybe a global leaderboard too) to add some healthy competition as another motivator. If the device/app can't provide enough meaningful rewards for the user it could also encourage the user to set some rewards for themselves, preferably

ones that aren't too detrimental to the users progress. If the user is falling behind in the progress, the device/app should let them know gently but it should not nag about every small thing they do. These messages should also be worded in terms of the goals the users set themselves so the user is less likely to get frustrated about the apps demands (e.g. "It's halfway through the week and you have 3/3 30 minute jogs remaining to reach your weekly goal. If you can't make it, go for 2 to get 50% of the points"). Also important is to be reasonable with the user when they relapse or just can't reach a particular goal. Setbacks are a part of life and most likely the user doesn't need a program berating them about their choices when they're probably already frustrated about losing progress towards their own goal. It might seem unfair. Rather the device/app should encourage them to keep going and remind them that living healthy is supposed to be a lifetime commitment and instead of where they might be at the moment it's more about the process and what they are doing to get where they want to be. In the maintenance stage the device/app can be pretty quiet, however if it notices regression it should make the user aware of it and ask if they'd like to do something about it.

2 Concept & Evaluation

For our application of biohacking and quantified self, we chose to go with something out of the ordinary, memorable and perhaps a bit striking at a first glance. The name of our project is Death Clock and reason for such a provocative nomenclature is that it stands out and appeals to people with a macabre sense of humor.

Despite the grim name, the main idea of the application is to motivate people to live more healthily and to improve their life and wellbeing. The idea is also meant to in a way, introduce a sense of gamification to life itself. Too many applications rely on positive reinforcement of healthy living and give people pat on the back for doing well on anything, however perhaps there is a different way of motivating people and also for our application to stand out of the crowd.
Everyone understands that certain life choices are not good for their health, however if an actual definitive number is given to them on how this will affect their life in the long term, it would give people a more objective sense of the consequences and give them a new perspective on the matter.
Because the application gives the user an objective and measurable readout, the application can introduce a sense of gamification to health and wellbeing, because people can not only improve their own life, but compare their results to other people and this could motivate groups of people to compete and at the same time further better themselves.

2.1 Concept description

The Death Clock idea in many ways is a interactive and dynamic life expectancy calculator which uses certain given metrics and variables to calculate the life expectancy of the user at any given time.The main idea and the core concept is not all that novel and there are many iterations of it from simple tests or applications where you will fill in given variables about yourself such as your age, gender income and so on and the calculator determines your projected life expectancy by the means of determining the various probabilities. This process is very generic and reliant solely on probability of any given metric, for instance women on average live longer than men and people who do not smoke are less susceptible to diseases and live longer.

Certain aspects of the idea is often discussed as a general measure of health and wellbeing with doctors and psychiatrist and in this case the variables are not as generic or solely based on probability, but in these cases the subjects health is measured by a professional and advice is given to improve your life. And although the idea is not to give the subject a certain life expectancy, the general idea is to prolong it and this is often achieved by advising against unhealthy life choices and promoting healthy ones.

The main difference between the existing methods, applications and practices is that the Death Clock is both interactive and dynamic, meaning that the device will monitor the user constantly and re-evaluate the users life at a given moment. At this time there is no application or practice that can achieve this because the Death Clock monitors the user constantly and adapts to the users life choices and general mood at a any given moment and give an updated measurement.

This constant knowledge of a given action and the subsequent effect on the users ultimate life expectancy and long term survivability is what sets the Death Clock aside from conventional methods of determining the length of the subjects life and it marries both subjective information from the user through measurement and given information and generic probability of any given choices on the long term effects of any given action.

This can not really be achieved at this point in time due to lack of sufficient monitoring equipment and overall difficulty to measure certain things such as how stress and anxiety affect a person in a measurable way.
The Death Clock may also give valuable knowledge about the user for doctors because the device in addition to other things, monitors the users hormonal levels, blood pressure, cholesterol and vitals. This information can be very useful because many of these variables fluctuate throughout the day and constantly monitoring them will give a more reliable measurement.

The user is able to make various choices to determine the interval of both positive and negative feedback separately and exactly how accurate information they want. Death clock

is able to estimate life expectancy very accurately, but we've created various checks before actually displaying this information to end user to avoid any chance of accidentally revealing exact or too accurate life expectancy to user. By default, Death Clock only gives general guidelines on how positive and negative choices of the user have affected their life expectancy instead of displaying actual estimated years or even more accurate information.

By default, positive information is given real-time to give instant feeling of accomplishment even for relatively minor improvements to overall health. In addition gathered information is presented to user both daily and weekly. Negative feedback is by default enabled to only give suggestions that would improve health and quality of life overall. Negative feedback is by default only given weekly and minor reductions to health like occasional use of alcohol is not, by default, displayed to user at all.

This will create both instant and long-term motivation to make healthy life choices. These options are by default made to compliment the end user for positive choices to naturally create motivation instead of making constant reminders to avoid every single cupcake or drop of alcohol that would generally cause frustration and negative moodlets.

However, more determined biohacker on road to ultimate self-improvement can, after multiple verifications, remove any reduction of information set by default and receive instant and accurate feedback about their actions and accurate changes to life expectancy. These options are not accessible by minors at all.

2.2 Interview methodology

Each of our group members conducted one interview. We have taken four interviews in total. To get more analytical data we have also taken an online survey, more than 20 people have participated in our survey. Participants were both male and female. Our interviewees and survey participants aged is started from 22 to 40 and all of them have different occupations(e.g technical professional, student, unemployed, businessman etc.). Mainly, they are from Asia(south/east), Europe, and America. We took interviews in different places e.g. at home, TUT campus, and relatives home. Each interview took around 30 to 40 minutes. Mainly, for interview questions, we have asked open-ended questions so that interviewees can describe themselves without any boundaries. We have also conducted a survey to get stronger results by comparing both data collection method. For the survey, we have used "Google Forms" and asked participants some specific question e.g. people's knowledge about biohacking, and the relationship of biohacking with psychology while using digital media, Which will help us to design our concept. Both data collecting methods are individual and there is no correlation between them. We have introduced our concept ('Death Clock') to the interviewees before asking them the interview questions.

We have asked some questions which has been given below:

1) Please describe yourself e.g., Name, Age, Occupation, Gender, Cultural background
2) Could you please describe about your eating habits and activities during a day ?
3) Have you heard about bio-hacking or self monitoring ? If so, can you please tell us something about biohacking that you know of ? (you can use some commonly known, already excising device for this)
4) How biohacking or self monitoring have changed your life? Does it helped you to become a healthy person?
5) In your opinion, what kind of psychological impact or best psychological aspects you can relate/expect from biohacking?
6) What do you think about the name "Death Clock" ? Does it make you interested in it or simply scare you away from it?
7) How much information would you like to monitor for your activities ?
8)In what way, would you want to receive the information of life expectancy and how precisely ?
9) How fast the information about negative/positive life-choices should be given ? For example immediate feedback or present gathered information from longer period of time? How about positive life-choices?
10) Is there any possibilities that negative feedback from the product will impact your psychological aspects?
11) For disabled or sick people, how biohacking can be an inspiration to lead a healthy life ? How they can use such product which will monitor their everyday lifestyle ?
12) For disabled or sick, what kind of psychological aspects such as wellbeing/motivation, emotion etc. do you think will change or improve by biohacking ?
13) Finally, on a scale of 1-5, how will you scale the idea of “death clock”?(scale 1 is poor and 5 is Excellent)

While we took the interviews we have followed some rules such as:

- ➢ Created an interview script so that we can collect the same areas of information from each interviewee.
- ➢ Made observations throughout the interview such as while they were talking what was there body language and surroundings of the participant.
- ➢ We have let them talk and asked open-ended questions
- ➢ We took notes in our laptops and before taking notes in laptop we took their permissions so that they don’t feel any physical barrier and can talk freely while seeing us typing in laptop
- ➢ At the end we thanked them and wished to hear from them in future if they have any further questions about these topic.

Recruitment process:
For the interview, we have asked random people to participate in the interviews and after taking their consent we recruited them as a participant. For the online survey, we used social media so that we can get diversity and many participants in the fastest way.

Data analysis:
The interview contains 13 questions. First two question is asked to know about interviewees basic information e.g.name, age, occupation, gender etc and about their activities and food habits during a week/day respectively. We asked this questions because we wanted to analyze what type of people could be our target group for the product and is there any relation between participants basic information with the product.
The question no 3,4,5 asked to analyze user's knowledge about biohacking and psychological relation with biohacking as our target is also find out the role of psychology in this area.
Question 6-10 and 13 are asked to analyze data about our product "Death Clock" e.g. what should we keep in mind while designing the product. The question no 10 is asked to analyze the psychological impacts of negative feedback.
Again, question 11 and 12 are asked to analyze that through biohacking and "Death Clock" is there are any possibilities that disabled people would be able to change/improve any psychological aspects(we didn't ask this questions to disabled people, we got this answers from normal people).

Needs and expectations:
From both interview and survey (fig:1) results we can see that more than 50% user's know about biohacking. As they know about biohacking so they have some needs and expectations from it.

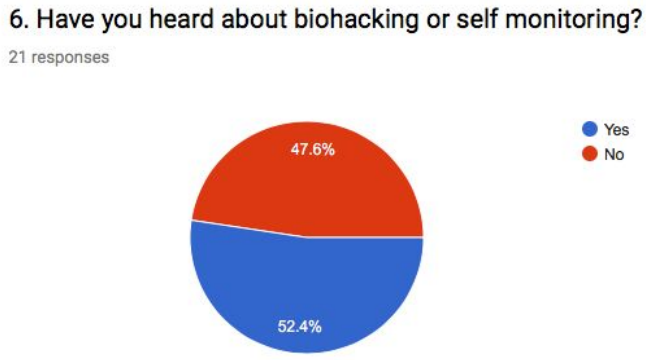

Figure 1: Participant's(male and female) earlier knowledge about biohacking

According to 2 interviewees, they expect that biohacking will motivate their motivational aspect and other 1 expected that "It can be relieving or agonizing depending on the person". Again they don't expect that biohacking will improve their health.

Evaluation:
As the main feature of ‘Death Clock’ is both interactive and dynamic so the device will monitor the user constantly and re-evaluate the user's life at a given moment. To evaluate it we have asked several questions such as do they want immediate feedback for both negative and positive life choices or not. To evaluate our concept of the product name we also asked about the name as the name is a little bit different from other existing products.

Feedback:
Biohacking hasn’t changed interviewees life according to 3 of them. But they can relate mostly biohacking with motivation. 3 out of 4 interviewees showed interest towards the name “Death Clock” whereas in the survey below 50% people showed interest and 9.1% directly will use this kind of device which has a unique name ('Death Clock').
Interviewees gave different answers while asked them about how much information do they need to monitor health and which way they want to get the information.

People’s thinking:
While we asked that “how biohacking or self-monitoring have changed your life? Does it helped you to become a healthy person?” according to 3 interviewees they think that biohacking can’t help them to become a healthy person. An interviewee replied, “Nope, I don’t do it what it tells me to do”. Whereas, another interview replied to the same question and said “Yes. Activity tracker (footstep counter) is used by many people as a tool to measure physical activity”. So, as the other participant said they can improve this situation through activity tracker so it might be a way to improve this situation.
On the other hand, according to the survey result, only 31.8% said that biohacking helped them to become a healthy person. 9.1% disagreed (fig: 2).

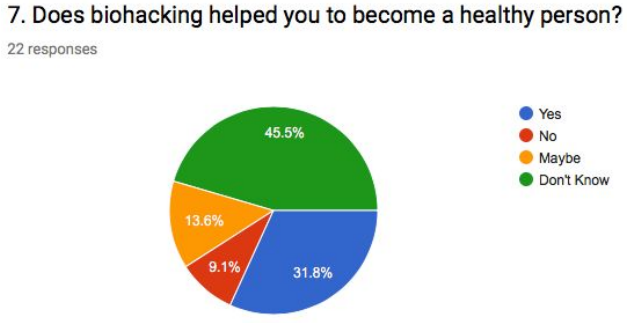

Figure 2: Relation of biohacking with health(male and female)

Acceptancy:
In the survey 42.9% showed interest in the name “Death Clock” and 9.5% said that they will use the device and according to 3 interviewees the naming is interesting. People understand the concept as we give some initial ideas that how it will work. From the interview, we see that overall they have rated the idea of “Death Clock” on average 3.6 out of 5. At this point, we can’t decide that it is a good/bad idea because we need more data to analyze it.

2.3 Interview results

Our main focus was to find out-
1) Psychological aspects people can relate with biohacking
2) People want instant feedback from the device or not, psychological impact of negative/positive feedback and, what will motivate people to use health monitoring device specifically ‘Death Clock’.
3) We wanted to find out the target group
4) We also wanted to find out the psychological impact of biohacking and death clock for disabled people
4) What is the impact of our unique product name ‘Death Clock’

Our findings is based on occupation, gender and age. We wanted to evaluate specific group members opinions as it is not possible to take opinions to all kind of people.

Interview results:
There were 3 male and 1 female interviewee. Among all of them, 3 participants are employed and one is Student. Our target group was both male and female and their age is between 22 to 36.
While we asked about biohacking, two male participants said they have knowledge about biohacking and 1 female and male don’t know about it. So, 50% knows about it. About the instant feedback question, the female participant and 1 male participant said that both positive/negative feedback can give after a long period of time instead of instant feedback whereas another male said negative feedback could be provided instant. Again, participant no 4 said he would like to get instant feedback. According to all of them, positive/negative feedback can affect their psychological aspects in a positive way. They can relate motivation with biohacking. Our participant’s (2 out of 4) think that for disabled people biohacking would be helpful for their health. Additionally, our participant’s think positive feedback from the biohacking tool would help disabled people to improve their health.

So, biohacking is seen as a positive tool to motivate health conscious among our participant’s. They tend to agree that positive feedback from biohacking would help both normal and disabled person. In regard to the feedback time most agreed that we need to provide instant and long-term feedback. Additionally, most of them find the name ‘Death Clock’ interesting. Overall, they have scaled the idea of ‘Death Clock’ at 3.5 out of 5. So,our target group can be both man and female with different occupations who aged between 22 to 40 or more than that.

Survey results:
More than 20 people participated in our survey through social media. Our participants were both male and female. They are mostly Technical professional/employed and student.Participants aged between 24-50.
Male participants were mostly technical professional and student. 70% of them have heard about biohacking (fig: 3).

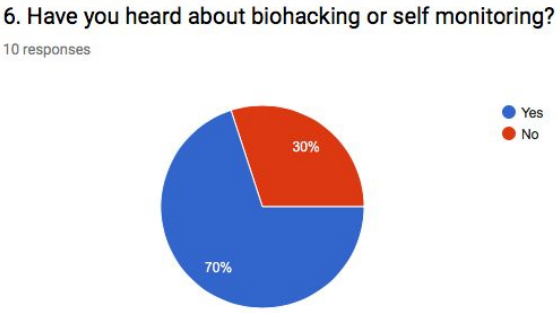

Figure 3 : Males response on biohacking knowledge

60% technical professional people said that biohacking helped them to be a healthy person. Though most of the student doesn't know biohacking helped them or not they can relate biohacking with motivation and wellbeing. Most technical professional also feel the same relation with psychology. Both occupation's people said that they haven't any knowledge about disabled people's situation with biohacking and psychology. According to most of them they could motivate people about biohacking. Again, 50% expressed that they would like instant feedback and 20% said may be they also can like such devices (fig: 4).

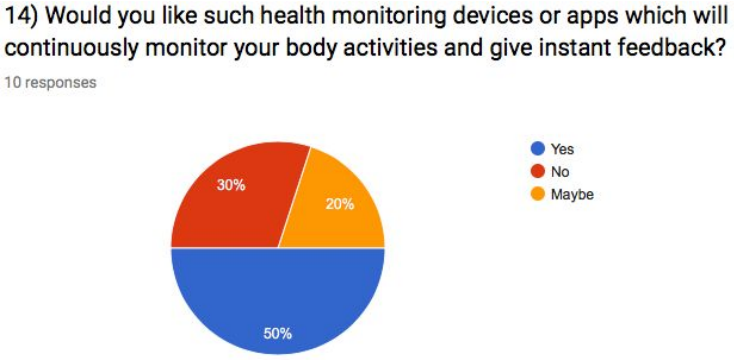

Figure 4: Males response on instant feedback

More than 90% said they would be positively affected if the device provides positive instant feedback. About negative feedback they have mixed opinion. Again, most of them said that they would like to have some kind of reward system in the product to motivate themselves to buy/use such kind of health monitoring device. 60% of them showed interest in 'Death Clock' and it's naming.

Female, participants were mostly student. 50%of them have heard about biohacking. Again, most of them don't know about many questions which was asked such as biohacking helped them or not to become a healthy person, the relation of psychology with biohacking, instant feedback and, disabled people's relation with biohacking and psychology. But, more than 65% would like to have a reward system to motivate using such health monitoring device.70% people didn't like the name 'Death Clock'.

So, according to male participant's they can relate biohacking with motivation and wellbeing, where most females don't know about it. Biohacking is seen as a positive tool to motivate health consciousness among male participants especially technical professional's. Male participants tend to agree on instant feedback. Though some of them showed interest in long-term feedback. All male participants will positively affected for instant positive feedback. About negative feedback male participants are 50% positively and 50% negatively affected. According to all the participants they haven't any idea about disabled people relation with our topic. Only male participants liked the name 'Death Clock'. As most of the female participants said they felt scary or irritated with the name. However, both male and female said that they could be motivated to buy/use such kind of device if there are any rewarded system is available (fig: 5). So, at this stage, our target group can be man with different occupations specially employed who aged between 22 to 50 or more than that. The idea needs to improve to get all type of user.

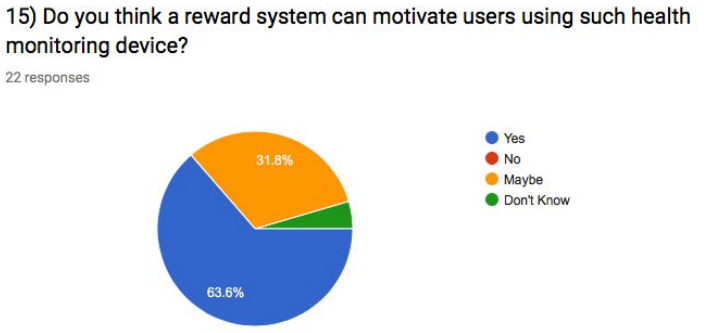

Figure 5 : Reward system to motivate people (results from both male and female)

Final result :
Finally, with this small amount of result(interview and survey), we have succeeded to find the relation of psychology with biohacking and ‘Death Clock’ t. From the results, it can be seen that biohacking isn’t a common thing to people. People who have knowledge about biohacking can relate themselves mostly with motivation and emotion. We tried to find psychological relation with biohacking not only for normal people but also for disabled people but for lack of data we didn’t find any solution for them(disabled). At this stage, the idea of ‘Death Clock’ couldn’t impress most of the people. However, in the future, the idea can be interesting to more people if we include more features in it. We could think of changing the name ‘Death Clock’ in the future. Though, we can’t give a final conclusion that who will be our final targeted group based on this result. Because small data is not reliable in any case of studies.
Graphs or chart helped us a lot as we have done calculating the data very easily with the help of this. We got the idea of changing the name 'Death Clock' from the graph as well so this way it helped us to change our design.

3 Collaboration report

Each of the group members attended meetings after exercises and have been in constant communication through the web.In addition two meetings were organized to get the project started and to further discuss details of the project.Most of the project was conducted by delegating sections of the project work to each group member and a collaborative effort was established to complete each section not just as individuals but as a team.

Personal description of each members contribution:

Shayan Shajarian
Initiated the project on google docs and facilitated the web-based collaboration process. Attended all but one of the exercises, meetings and post exercise meetings. Remained active on the teams communication network. Wrote section 1.2, 2 and worked on section 2.1, provided interview results and wrote the header in the collaboration report. Overall work hours difficult to estimate due to the prolonged time the project has gone on and lack of contemporary notations. Overall the process was a collaborative team effort and everyone did their part.

Farida Yeasmin
We all took the initiative to start our project. In Phase 1 we have decided that we will divide our work. So, each of us makes slides equally for the classroom presentation through dividing work. In phase 1 I have written 1.1.1. Meetings were initially arranged by me and all of us participated there. I also gave some ideas in phase 1. In phase 2 I have written 2.2 and 2.3 the whole interview process. Tuomo and Mika came up with the initial questions and I did my part improving the questions and adding to them. Each of us conducted 1 interview and they gave me the interviewees answers in the WhatsApp and then I have collected the answers and written in the appendix. The appendix is written by me. To manage the interview section it took around two weeks or more than that as I have also created some questions for the online survey to make the results stronger. The survey is done by me. I have sent my online survey to participants and collect those data through online. After doing that I have calculated the data and wrote in the paper. Worked on grammar corrections. One more thing I had to go through that how exactly we can identify whom to choose for our targeted group who will use such kind of product. Throughout the interview process, it was so stressful because of the participants of the survey and interviews and also for the data collection process. As there were so many information needed to keep in mind while finally need to come to a conclusion.

In my opinion, there isn't any single person who did not complete their task on time. All of us have done our work equally. After we done with our part all members rechecked the other's part and if there were something missing or didn't match with another part we informed our team members to correct the part and gave some ideas too. Though we misunderstood something in phase 1 but in phase 2, individual members corrected all the points of that particular part. We also find out one common thing that as biohacking or related thing is still not very common, sometimes it felt hard to find the related articles. Again we think that our idea of 'Death clock' is unique so it took so many times to only understand that what we will finally do. And we had to face difficulties while explaining more in details about 'Death Clock' to the interviewee as when they heard that it will give them instant feedback they started asking how exactly or did you already make any futuristic device and many more other questions.

Tuomo Hartikainen
I attended all exercises and team meetings, wrote part 1.3 of this report, conducted one interview and wrote the answers down in appendix A. I also participated in our team's communication and gave ideas and suggestions for our concept. I was also happy with our teamwork. Everyone did their share in time and I feel like we were all happy with how we shared the workload. Communication worked well too.

Mika Liukkonen
I was able to attend all exercises & team meetings except one exercise was missed due to prolonged illness. Overall the initial idea process & team work was equally shared. Everyone in the group followed play rules & did their share of the work. Nobody excessively missed anything so I'm happy about the work of our group. Communication through WhatsApp worked properly and nobody was unresponsive for extended periods of time.Personally I've done my best to improve grammar & provide feedback, ideas & improvements from various chapters through the project whenever I had any ideas worth giving & others would agree to these. Personally I've worked in chapter 1.1 in the first part of the group work and provided assistance to psychological side of the project to my best effort along with others. In 2nd phase I worked along with Shayan in part 2.1. I wrote initial questions with Tuomo, which Farida improved to better reflect the tone of our interview & I conducted one of these interviews. During both phases I took a look into psychological side in the project along with others by reading recent studies in this field and applying this to our work.

All the work, including reading psychological studies and discussions with various friends and acquaintances was done both daily and weekly during the whole course. I never took notes of the time spent and never thought it was important as the workload was overall fairly high in this course. Because of this I can't give any fair or realistic estimation of the hours spent in this project by me.

Citation

[1]Sjöklint, M. (2014). The measurable me: The influence of self-quantification on the online user's decision-making process. Paper presented at the 131-137. doi:10.1145/2641248.2642737

[2]Whitson, J. R. (2013). Gaming the quantified self. Surveillance & Society, 11(1), 163-176. Retrieved from http://helios.uta.fi/docview/1428931132?accountid=14242

[3]Ruckenstein, M., & Pantzar, M. (2017). Beyond the quantified self: Thematic exploration of a dataistic paradigm. New Media & Society, 19(3), 401-418. doi:10.1177/1461444815609081

[4]Qin, J., Cao, S., & Wang, X. (2016). User experience design for green IT products through wearable computing and quantified self. Paper presented at the , 9747 507-515. doi:10.1007/978-3-319-40355-7_48

[5]Crossman, J. M. (2016). Planning, practising and prioritising wellness through an integrative behaviour change plan. *Health Education Journal, 75*(7), 823-832. doi:10.1177/0017896916629171

[6]Format preview Yetisen, A.K. 2018, "Biohacking", Trends in Biotechnology, vol. 36, no. 8, pp. 744-747.

[7] Format preview Yetisen, A.K. 2018, "Biohacking", Trends in Biotechnology, vol. 36, no. 8, pp. 744-747.

[8] https://itunes.apple.com/us/app/moodnotes-thought-journal/id1019230398?ls=1&mt=8

[9] https://www.rescuetime.com/
[10] https://trackmystack.com

Appendix A

Interview questions and participants answers are given in one table:

Interview Question	Reason behind asking this question	Participant no 1- Time and Place:	Participant no 2- Time and Place:	Participant no 3- Time and Place:	Participant no 4- Time and Place:
1) Please describe yourself e.g., Name, Age, Occupation, Gender, Cultural background	To know about the participant	Shohel, 36, Male, South East Asian, Engineer	/27/f/finnish/programmer	22/M/student/	35, M, Musician
2)What Kind of food you eat in a day(e.g. healthy/nonhealthy/junk food/other) How many exercise you do per week?	To know about their activities and food habits during a week/day	3 meals a day, low curb food. 3 hours/week	2) Eggs & random food, “I’m not good at deciding what I eat. A lot of water. I walk to bus and hunt pokemon ”	Irregularly about 2 sandwiches and 2 warm meals in a day, no exercise	Porridge for breakfast with coffee, go to work. Have some lunch during the day and some more coffee and dinner with wine. Typical activities: Walking, occasionally running and going to the gym.

3) Have you heard about bio-hacking or self monitoring ? If so, can you please tell us something about biohacking that you know of ? (you can use some commonly known, already excising device for this)	To know , if they know about the topic or not	Yes. Activity tracker (foot step counter) is used by many people as a tool to measure physical activity	3) Nope. (At this part I explained it to her..)	yes,Some apps could detect cancer, diabetes etc.	no
4) How biohacking or self monitoring have changed your life? Does it helped you to become a healthy person?	Impact of biohacking	“Yes, by tracking number of hours physically active in a day, I can modify my routine”	4) Nope “ I don’t do it what it tells me to do”	Not in any way.	no
5) In your opinion, what kind of psychological impact or best	To know about the relation between biohacking and	motivation	5) Motivation	It can be relieving or agonizing depending on the person.	Have not heard about it

psychological aspects you can relate /expect from biohacking?	psychology				
6) What do you think about the name "Death Clock" ? Does it make you interested in it or simply scare you away from it?	To know about the idea of “Death clock”	Sounds interesting	6) “It’s quite interesting name, makes me wonder what it is.”	It makes me feel very anxious, kinda like Black Mirror.	Sounds humorous
7) How much information would you like to monitor for your activities ?	To know about user’s need	“My time management in different activities, my food consumption, my metal health”	7)” I don’t want it to monitor everything. Just basic stuff like heart rate & other vitals + steps”	Things affecting my mood	Not really at all
8)In what way, would you want to receive the information of	About how user’s will get the information	Constant feedback e.g., daily as a graphical view in a mobile app.	8) “I DON’T WANT TO! Jk, not precisely. Just some general	Not really in any way, but at least +-5 years	I am not really interested in the hard data.

life expectancy and how precisely ?			guideline, not exact years or anything stupid af like that”		
9) How fast the information about negative/positive life-choices should be given ? For example immediate feedback or present gathered information from longer period of time? How about positive life-choices?	About feedback system	Negative feedback can be instant, positive ones after a period (e.g., after day)	9) Longer periods of time for both negative and positive	Summary after a year, once every year for both negative and positive	For the device it would be interesting to know the results immediately
10) Is there any possibilities that negative feedback from the product will impact your psychological aspects?	Impacts of feedback	It will impact me . I will try to do the right thing for my health	10) “Probably yes”	Most definitely	The device would give a way of quantifying life choices so it might motivate me.

11) For disabled or sick people, how biohacking can be an inspiration to lead a healthy life ? How they can use such product which will monitor their everyday lifestyle ?	Biohacking for disabled people	“It should also motivate them as like normal people.”	11) “I suppose they would be motivated more than generally healthy people”	Don’t know	I am not sure
12) For disabled or sick, what kind of psychological aspects such as wellbeing/motivation, emotion etc. do you think will change or improve by biohacking ?	Relation between disable people and psychology	“I think, disabled people need to be handled from their customized perspective. E.g., if some one is suffering from cancer, the product can customize itself to give feedback how the person can reduce impact of cancer.”	12) “Motivation for sure will improve, they will probably be happier to their life when they see positive changes”	Feedback could help, but most disabled people I know are already motivated	If you are disabled or sick, I doubt that this would give any assistance because they can’t help their own condition.

13) Finally, on a scale of 1-5, how will you scale the idea of “death clock”?(scale 1 is poor and 5 is Excellent)	To know about raating	5	13) 4	2	3.5