

Modern voluntary Health-Care-System

The influence of gamification on the willingness to live healthy

188.407: Management von Software Projekten

Group: 12

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1 Synopsis

The ultimate goal of the Modern Voluntary Health-Care System is to create and publish a new form of an e-health system that encourages users to live healthy. This platform is based on a bonus malus system to give users an easy understandable overview on how healthy they live and how they compare to others.

The project is split in both a scientific and an engineering part. The scientific part aims at searching for technical methods to encourage people to live healthier and generating knowledge of the influence of gamification on the willingness of people to live healthy. From a scientific perspective it is interesting to see how well-known methods like gamification and competition can be used to motivate people to live and stay healthy.

For this purpose we try to evaluate and answer some questions, such as:

- How can people, by technical means, be subconsciously forced to change their ways and daily routines?
- Is there a way to achieve practical improvements in peoples health by providing a playful approach to do so?
- Are those improvements comparable to e.g. consulting professionals such as nutritionists, health trainers or even doctors?
- Does competition motivate people to stay healthy?

The knowledge generated from these tests and questions can be used as a scientific backbone on the journey to a more healthy and fit society. From a psychological perspective it's important to generate data on how gamification of all-day tasks like eating, walking and avoiding health traps can improve the attitude and willingness of people to live healthy. Combined with a modern workflow and easy tracking of health-related data by offering a mobile interface our study aims at generating new knowledge in the field of gamification through technology. Moreover the study should reveal useful information on the usability and user interface of such a system. A clunky interface and no support for automatic tracking of information ultimately means a failure of the whole system. It is vital to generate useful and accurate data of each participant because the system stays and fails with the usefulness of the collected data. We can't force the user to manually enter each and every task he does throughout the day, we need to automate this process as much as possible and we need to integrate with other tracking systems to get access to even more data. The interface of the modern health-care system should stay out of the way of the user, it should intelligently track the information needed to generate good statistics of the habits of the participant.

Case studies including user tests in the section of human computer interaction shall lead to a basis for developing a completely innovative and ground-breaking health-care system, which brings benefits to several different parties.

The engineering part is split into different phases. This leads to the creation of a usable, rudimentary but integrated prototype after a short time. Nevertheless, the vision is a long-term development. For each phase it is necessary to find different partners in economy, politics, health-care and science. The partners mainly use our platform for advertisement and customer relationships, which brings benefits to them as well.

Possible Partners are:

- Phase 1:
 - Supermarkets
 - Fitness Centers
 - Restaurants
 - Doctors
- Phase 2 - "Integrating with existing services":
 - Sport-Community with Tracking (e.g. Runtastic, RunKeeper, Nike Plus, ...)
 - Other health-related tracking services (e.g. Pedometer, Weighttracking, ...)
 - Health-related gaming platforms (e.g. Geocaching, ...)
- Phase 3 - "A new form of health-care system":
 - Insurances
 - WHO

When a user buys something in a partner shop the product gets registered at our platform. The system stores the information in an anonymised form and calculates statistics based on a transparent score-schema. The user can then exchange his earned points for gifts like coupons for healthy shopping at a partner's store. Moreover the platform generates a monthly, opt-in ranking of people living in a specific area, people who register them as a group of friends or all registered people as a whole. It therefore aims at answering questions like "which user lives most healthy?", "which user eats most healthy?", "which user walks the farthest distance in a day?" and similar. Partners are able to interact with the user with the use of the platform so they can selectively advertise new products of interest for the user.

The goals of the platform:

- **Improving overall health of the user:** People are getting more sensible for health-care. So they get forced to live in a healthier way. The healthcare-system is very expensive. So the whole government will have a benefit from this platform and more healthier people.
- **Financial benefits for the user:** Users will be given discounts and coupon codes when buying healthy products at partner stores.
- **Advertisement for the partners:** For the partners the platform offers a chance to advertise their promotions. Furthermore they have the chance to give coupons to the users. With this coupon they can interact with the customer. One possible effect is a gain in customer loyalty.



Figure 1: Obese in the EU

2 Introduction and problem description

More and more people are getting obese. They live unhealthy and do less sport. Many health-reports in Europe and America describe the problem and show how fast the people are getting fat. Particular bad are the children, which also gets unhealthy. And these children are going to become serious problems when they are grown up.

Studies (rki) show, that about 23 Percent of the people in Germany are obese nowadays. These people don't only look bad. They can get serious health-problems like hypertension, diabetes and other cardiovascular problems.

In the Forbes List for the fattest nation, Austria is on place 52 with a fat rate of 57.1%.¹. The Image on this site show the percentage of obese people in the European Union for male and female.

Unfortunately this trend starts early. The parents live unhealthy and show their children this unhealthy way of life. The children are overweight in young ages. And this can raise the impact on the life of the child when it is grown up.

You can't teach an old dog new tricks. So the children are grown up without any real chance to live in a healthier way. But this slogan is not true at all. It is never too late for change something. But it gets more difficult.

¹forbeslist:http://www.forbes.com/2007/02/07/worlds-fattest-countries-forbeslife-cx_ls_0208worldfat_3.html

In near future this will cause a lot of financial claim in our health-care-system. More and more people have to get treated in a hospital because of health problems caused by being obese over the years.

The only way we can reduce this costs in future, is to live nowadays healthier. And for this the software system should help. If people can get an bonus for living healthier, they will get motivated to do so. They will use the system in their live and reduce the risks to get one of the illnesses caused by obese.

Every single person has a benefit when he uses the system. So he can live longer and healthier. We can say:

Mens sana in corpore sano

This Latin slogan means: In a healthier body is a healthier soul. People will feel happier, if they live healthier.

Unfortunately it is not easy to motivate people to look on their own bodies. Many people are lazy and lay on the couch instead of going out for a walk. They buy junk food instead of fruits. Because they know how junk food tastes better. With this software system, the people should learn and accept a healthier way of living. They get a little benefit, when they buy an healthier fruit instead of junk food.

These small benefits are combined in a challenge with all the other users of the system. So the motivation gets to a competition with a lot of other people living in a particular similar situation.

Over all the health-care-system will lower the costs and so they can combine this system with their insurance-system. So people would have to use it for getting a cheaper insurance. So somebody who wants to live healthier can have a cheaper insurance.

This project is accompanied by a scientific study. This study have to monitor the evolution of the health of the people while the use the system. This study show how efficient the system works. The iterative development of the system uses the data from the study for improving the output and to get healthier people.

So everyone has a benefit with this system. The people are living healthier, happier and longer.

3 Project goals and deliverables

- *Length: 1-2 pages*
- What is the goal of the project?
- Research questions
 - What are the hypotheses that are to be investigated?
 - Main hypothesis & sub hypotheses
- Which results should be achieved with the project?
 - What will be known afterwards that is not known now?
 - What will be created that does not exist now?
- Non-goals (What will not be part of the project? What will not be done?)

4 Scientific relevance and innovative aspects

- *Length: 1-2 pages*
- Why is the project scientifically interesting?
- Did others point out that this is an open question?
- What are the innovative aspects that make it interesting?
- How could the project break new ground scientifically?
- To what extent are the objectives ambitious and beyond the state of the art (e.g. novel concepts and approaches or development across disciplines)?

5 State of the art / current knowledge

Today there are several approaches to motivate people to live healthier, but most of them are just focusing on doing your regular workout and track your success or just help to have more fun doing physical activities.

Analyzing these current systems you can find two strategies, on one hand the gamification of healthcare (see 5.1) and on the other hand a combination of healthcare and social engineering with special platforms.

5.1 Gamification of Healthcare

Nowadays there are several products that are using a gamification approach to motivate the user-base to do sport-activities. This technique is used in the gaming industry to sell sport and fitness games and was also part of creating new remotes and interaction possibilities to evolve the whole gaming industry.

5.1.1 Nintendo Wii

One of the first well-known of these systems was introduced by the Japanese company called Nintendo in the year 2005 and named Nintendo Wii. This product is a typical games console, but offered a new kind of remote called “Wii Remote”. The shape of this remote is also highly inspired by the form of an TV remote and uses 4 infrared sensors on top of this remote which makes it possible to point on several objects presented on the TV-screen with a precision comparable to a common mouse used for personal computers.

The included accelerometer is the most important part of this remote which recognizes motions and rotations of the remote and lets users play their games in a very funny and highly interactive way.

Another additional input device for the Nintendo Wii is called “Wii Balance Board” (see 2), which users have to place on the floor in front of the games console. The users have to stand right on top of this board and are able to control the game by switching their weight from one side to the other side. For user feedback they also included speakers and vibration sensors into the Wii Remote.

All these devices are connected via Bluetooth with the Console and are heavily used by sport and fitness games. Some rehabilitation centers are using these consoles to gamify the process and making workouts more interesting. These rehabilitation centers were also observed and analyzed in medical studies showing, that patients have more fun doing their daily workout and training and also getting back to a normal physical condition more quickly.

5.1.2 Xbox 360 and Kinect

Microsoft also introduced an additional remote for their Xbox 360 in the year 2010 called “Kinect”. Kinect is working with a different approach than Wii Remote. It’s like a camera placed in front of the TV capturing the users and working with 3D motion sensor, facial recognition and voice recognition (see 3). These facts lead to one big advantage compared to Nintendo’s remote: the user does not have to hold a remote in his hand and therefore the user isn’t constrained within his motions and movements.

Microsoft also offers a SDK and Development ToolKit to allow programmers to build their own Kinect games or application. One of these experiments was built at the University of Minnesota and its goal was to measure or detect diseases like autism. It’s also possible to connect a Kinect remote to a Windows PC which makes it easier to run such applications used in a scientific area.

5.1.3 Playstations Remotes Eye and Move

Sony also introduced in the year 2007 and 2009 two remotes, very similar to the previous described remotes from Microsoft and Nintendo.



Figure 2: Wii Balance Board in action



Figure 3: Microsofts Kinect remote

Playstation Eye is very similar to Xbox Kinect, offering a camera and microphone to capture the users motions and voice. Playstation Move is an Wii Remote like remote with an additonal orb which can change the color to give additonal feedback to the user and is used as anchor point for the Playsstation Eye to recognize the movements. (see 4)

5.2 Socialisation of Healthcare

Another way of motivating people to live healthier and doing their regular workout is to add a social component to the expierence of making sport. The goal of this approach is to create a social network where you can track your own success and compare it to the progress of your friends.



Figure 4: Playstation Move and Playstation Eye

5.2.1 Introducing RunKeeper

RunKeeper was created several years ago and started as a simple tracking platform to track your runs. It works with several smartphones and uses their GPS sensor to track speed, distance, elevation and other things of a run.

In addition they build a website where you can see your previous runs on a map and give you overview of your last activities with monthly stats (see 5).

Social aspects: The next step was to add social features to their platforms to make this service more interesting for their users. They introduced a route-sharing feature, which makes it possible to find interesting routes near you posted by other runners. To get in contact with these people they introduced the so called Street Team to see the activities from your friends and match against each other, a simple way to gamify your daily workout.

Enhance the platform: RunKeeper also introduces some other features to motivate the users even more to do their workout. One of these was the ability to set goals on a monthly based, like total distance or furthest run, etc.

They also thought how to make this platform a little bit more profitable and released a new way to manage your training with this platform, called “Training Plans”. You can subscribe to these plans after paying a small fee and attend a class. The plans are created from professional trainers and have different goals, e.g. complete a 10 kilometres run within 50 minutes. The users track their run to the classes and are allowed and welcome to spread their success within the class with their classmates.

The look over the rim of a tea cup: RunKeeper tried to expand their offer to cover more bases. First step was to include more different sports to allow cyclist or swimmer to track their activities too.

Offering sport equipment to track your heart rate or your body weight and body fat were another steps in this direction to track more measurement parameter to observe the users health status.

In their blog they are spreading really nice success stories about people losing a lot of weight because of the motivation they got from RunKeepers apps, platform and equipment.



Figure 5: RunKeeper website and mobile clients

HealthGraph is another platform they are hosting which focuses more on the social aspects and this system is covering even more health parameter than the original RunKeeper website, but this platform is still in kind of a beta mode.

To catch even more ideas and possibilities they also released an SDK to integrate RunKeeper into other apps and allow other platform to use these collected data.

5.2.2 Similar Platforms

There are several other platforms tracking your sport activities, a lot of them do not offer that many features as RunKeeper does, do not have that many users, or do not follow such an intense social approach.

- **Runtastic:** This is a very similar system like RunKeeper but also had a lot of success during the last few years. The company is situated in Linz in Austria and expanded their user base all over the world. A lot of people switched from RunKeeper to Runtastic because of several individual reasons (e.g. design, user-base, etc.).
- **Nike+:** Nike also started with a tracking service for runners, but they used another sport equipment to track the distance of your run. The user had to place these small sensor on one of his shoes and this sensor tracked your step like a step counter and calculated your run distance. They also began to work on an app and introduce new features and also selling their combined sport equipments like gears and so on. Also the social aspect became more and more important in their system.
One big advantage is the use of Xboxes Kinect which not only combine these two platforms but also combine the two strategies of gamification and socialisation.
- **Other platforms introduced by several sport equipment manufacturers:** Other manufacturers like Polar also introduced their own platforms but have problems to reach a big user-base. They tried to jump on this movement made by platforms like RunKeeper or Runtastic, but couldn't get that much success with their systems, although they have a lot of success with their equipment.

6 Method

- *Length: 2-5 pages*
- **How?**
- How should the expected results be achieved?
- What method(s) will be applied? (e.g., empirical study, user-centered design, prototype implementation,...)
- Description of the methods.
- Justifications for chosen methods.

7 Detailed description of the workpackages

- *Length: 2-4 pages*
- Structuring the project into self-contained parts.
- Additional verbal descriptions.
- Work packages
 - title
 - goal(s)
 - description
 - expected results
 - responsible person(s)
 - dependencies

8 Time plan (Gantt chart)

- *Length: 1-2 pages*
- Realistic estimation of schedule based on workpackages.
- Including milestones (not only when but also what is to be achieved for each milestone).
- Generation of a Gantt chart. (Including phases, milestones, buffer times, critical areas, etc.)

9 Human resources / team

- *Length: 1-2 pages*
- Description of the team that is needed to carry out the project. (For the execution phase of the project, not the planning phase.)
- How many people?
- To what extent are individual members needed?
- What knowledge, skills, and experiences are needed for each member?
- Demonstrate that the members will be able to carry out the project successfully.
- Work structure
 - Who will lead the project?
 - How do they work together?
 - Management and coordination
 - * What communication structures will be established? (e.g., mailing list, blog, CMS, CVS, ...)
 - * How often will meetings take place? (Who will participate?)
 - * How will the work be documented?
 - * How will information be stored and shared?
- Cooperations
 - Will external cooperators be part of the project? (e.g., other research institutions or companies)
 - What is their role?
 - Why are they needed?

10 Costs

- *Length: 2-3 pages*
- Rough estimation of cost in form of calculation (table(s)) + descriptive text.
- Justification for the personnel and non-personnel costs (equipment, material, travel and other costs)
- An Excel template is provided as supplementary material to support budgeting.
- Personnel costs
 - Justification for the personnel to be assigned to the project (type of position(s), description of nature of work, length and extent of involvement in the project)
 - The application should include all persons who will be required for the proposed project (project lead, researchers, developers, advisory board, etc.). The available legal categories of employment are contracts of employment for full- or part-time employees (DV) and reimbursement for work on an hourly basis (GB). In addition, a part-time contract of employment (DV 50%, “studentische Mitarbeiter”) may be requested for people who have not yet completed a Master or Diploma program (Diplom) in the relevant subject.
 - The justification of the requested personnel should contain:
 - * description of type of work;
 - * extent of involvement (part-time contracts are permitted).
 - Exact numbers of employment categories can be found on the FWF Website (<http://www.fwf.ac.at/de/projects/personalkostensaetze.html>)
- Equipment costs
 - Indicate reasons for equipment costs. The “scientific equipment” category includes instruments, system components, costs for the use of software required by the project and other durable goods provided the cost per item (including VAT) exceeds EUR 1,500.00.
- Material costs
 - This category encompasses consumables and smaller pieces of equipment where the cost per item is below EUR 1,500.00 including VAT. The calculation of requested material costs should be justified with reference to the schedule, work plan and experimental plan. Experience with previous projects should be taken into account.
- Travel costs
 - Funding may be requested for the costs of project-specific travel and accommodation, field work, expeditions, etc. Applicants are to provide a detailed travel (cost) plan broken down by project participant. For brief stays, the calculation of the travel and accommodation costs should be based on the federal regulations governing travel costs (RGV). The RGV rates governing Austria and abroad may be found in the FAQs on the FWF Website (<http://www.fwf.ac.at/de/faq/reisegebuehrevorschrift.html>). For longer stays an appropriate and comprehensible cost plan should be prepared.
- Other costs
 - Independent contracts for work and services (costs for work of clearly defined scope and content assigned to individuals, provided that this is scientifically justifiable and economical)
 - Costs that cannot be included under personnel, equipment, material or travel costs, such as:
 - * reimbursement of costs towards or for the use of research facilities, e.g. of large-scale research facilities (project-specific ‘equipment time’). Applicants should obtain and submit multiple offers;
 - * costs for project-specific work carried out outside the applicant’s research institution (e.g. for analysis work performed elsewhere, for interviews, for sample collection, for preparation of thin slices etc.). Applicants should obtain and submit multiple offers;
 - * honoraria for test persons;

11 Expected implications and risks

- *Length: 1-2 pages*
- Importance of the expected results for the discipline
 - To what extent does the proposed research address important challenges?
- Importance of the expected results for other areas
- What are possible risks of the project and how can they be alleviated?
 - What factors could lead to a failure of the project?
 - Which factors or persons could support the project and increase the chance for success?
 - What if important team members leave the project?

12 Ethical considerations & security issues

- *Length: 1-2 pages*
- Provide a brief explanation of the ethical issue involved and how it will be dealt with appropriately.
- Are there any security-sensitive issues that apply to your proposal?

References

[rki] Artikel über gesundheitsbericht rki der süddeutschen zeitung.

Abbreviations

MSWP Management von Software Projekten

WP Work Package

OECD Organisation for Economic Co-operation and Development

RKI Robert Koch Institut