JOYxUT.

Designing an e-Health web-platform to promote joyful physical activity amongst university employees

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Abstract

Background: Changing health behaviour is notoriously difficult, with many lifestyle interventions having limited success. Meanwhile, sedentary behaviour amongst employees has become a worldwide health issue. Scientific literature suggests that designers of lifestyle interventions should focus more on the psychological aspects of behaviour change. *Objective:* This graduation project aims to design such an intervention: a web-platform that encourages University of Twente (UT) employees to become more physically active, by choosing to partake in physical activities which elicit positive emotions. *Methods:* 3 iterative user tests were performed with members of the UT workforce, with the participation of 8, 16, and 21 UT employees (in that order). The feedback from these user tests helped shape the design of the web-platform. *Results:* The web-platform showed high usability amongst the target group (SUS-score of 75), and a majority of users believed that the platform could be helpful to employees in acquiring a more active lifestyle, and would like to see it be developed further in the future. Moreover, users who engage in physical activity rarely, referred to from here on out as 'beginners', found the website content to be inspiring and relatable. *Conclusion:* The development of a web-platform aiming to improve physical activity amongst UT employees by focusing on joy has shown to be a novel and promising concept, with high usability within the target group. Further development and empirical research is recommended in order to evaluate the effectiveness of the platform, which lies outside the scope of this graduation project.

Acknowledgement

There are several people I would like to thank for their support, collaboration and guidance throughout this project. Firstly, I would like to thank Alma Schaafstal for her enthusiasm, guidance and passion for our project - she is a person who embodies positivity in physical exercise. Hearing her talk so passionately about running, whether it was in a local run or in the Swiss Alps, was a never ending source of inspiration. Secondly, I would like to thank Femke Nijboer, for her support, guidance, and involvement in this project, which extended much further than the responsibilities of a critical observer. She helped keeping this project on track, and always provided clarity and constructive criticism when needed. Thirdly, I would like to thank my project partner, John Kim, for embarking on this journey with me. His input, creativity and ideas were invaluable to this project. Lastly, I would like to thank our co-designers: all of the helpful University of Twente employees who volunteered in our user tests, giving us feedback throughout the making of this project.

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Introduction

In this section, the motivation behind the graduation project is introduced, together with the challenges faced, as well as the guiding research questions.

1. Introduction

1.1 Motivation

Sedentary behaviour in the workplace is a large threat to employee health. Sitting for prolonged periods of time is correlated to a range of medical conditions, such as cardiovascular diseases, diabetes, obesity, high blood pressure, and cancer (Wang, Wu, Lange, Fadhil, & Reiterer, 2018). Even though many individuals desire to lead a healthier life, this is often difficult to achieve, and not to mention, maintain. Moreover, previous lifestyle interventions designed to increase physical activity have had mixed results (de Jersey, Mallan, Callaway, Daniels, & Nicholson, 2017). Therefore, innovation in the field of behaviour change interventions is needed.

In order to facilitate lifestyle change, research suggests that partaking in physical exercise that brings joy can increase user adherence (Van Cappellen, Rice, Catalino, & Fredrickson, 2018). Yet, many lifestyle interventions focus on changing behaviour through *Extrinsic Motivations*, such as financial rewards, or digital point systems. For example, '*Movetivate'* is a mobile application for companies, that challenges employees to partake in physical activity, in order to win gift cards ("Movetivate," n.d.). Though extrinsic motivation plays a role in the adoption of a health behaviour, maintaining a behaviour relies on internal, *Intrinsic Motivation*, such as enjoyment (Buckworth, Lee, Regan, Schneider, & DiClemente, 2007). Thus, motivation driven by financial reward alone may be exciting at first, but may not be enough to fuel sustainable, long term behaviour change.

By teaching individuals to *'prioritize positivity'* in physical exercise, meaning choosing activities that spark positive emotion, users may be more likely to change long term behaviour (Van Cappellen et al., 2018). Aside from focusing on positive emotions during exercise, researchers suggest building psychological factors such as *Self-Efficacy* (a person's perception of their ability to perform) can be an influential part of behaviour change interventions (Buratta et al., 2016; de Jersey et al., 2017; Duan et al., 2018; Elfhag & Rössner, 2005; Schwarzer, 2008).

Therefore, the goal of this graduation project is to develop an online platform targeted at University of Twente (UT) employees, that aims to improve physical activity, by encouraging participation in activities that spark joy. The platform will function as an activity overview for employees to explore physical activities they can partake in during, as well as outside of working

hours. The UT campus provides excellent facilities for a range of different physical activities. By making it easier for employees to connect with others, as well as receive recommendations of joyful activities to try, the platform can hopefully help them acquire a more sustainable healthy lifestyle.

This project was developed under the supervision of Alma Schaafstal, and critically observed by Femke Nijboer, who are both UT employees. The idea behind the platform, was formulated by myself (Fredrika Astrom), and my project partner John Kim. Our separate contributions to the project stem from realizing during the early stages of the project, that the target group (UT employees), could be divided into three sub-groups: *beginner*, *intermediate* and *advanced.* In this context, we define a *beginner* as people that are rarely physically active, or practice physical activities less than weekly. This user type could be further subdivided into beginners who are interested in change, and those who are not. *Intermediate* users are defined as individuals who practice physical exercise regularly, once, or multiple times per week. These two user groups both benefit from a social platform that encourages continued physical activity, but in different ways. The user group that was excluded from this focus was *advanced* users, who are already physically active on an expert level, and therefore have very different needs. Thus, to ensure that the website catered to both beginner and intermediate users, I focused on the needs of beginners (more specifically beginners who are interested in change), while John Kim focused on intermediate users.

1.2 Challenges

There are several challenges regarding the development of a platform aimed to change sedentary behaviour, and improve physical activity. First, designing for a diverse target group, with a range of different levels of physical activity behaviours, can be difficult. For instance, while some users may already be physically active (intermediate, or advanced), others may struggle to even form an intention to change their sedentary behaviour (beginner). Additionally, users may have different levels of technical knowledge, and therefore, may be affected differently by the introduction of a digital behaviour change intervention. Finally, the users within the target group cover a wide demographic, including different ages, genders, cultures and nationalities. Thus, it is

important to engage in a dialogue with a variety of users throughout the development, in order to get a fair representation of the diverse target group.

An additional challenge for the developers of a platform that aims to improve physical activity amongst employees, is the harsh reality that changing behaviour is inherently difficult. Provided the mixed results of previous interventions, as well as the limited time frame of the development, this was considered the largest threat to the success of the project.

Furthermore, the design of the platform also posed challenges for the developers. The platform needs to be user-friendly, unobtrusive and attractive to the user, with an engaging *User Experience*, increasing adherence to the platform. It should also support the user in the tasks they want to perform, such as: (1) get an overview of recommended activities, and (2) make social connections with other users, and (3) help them turn behaviour intention into action. Finally, the platform needs to be secure, and protective of user data.

1.3 Research Question

In order to develop an online platform that addresses the goal and challenges presented in the previous sections, the main research question that will guide the project is:

RQ *How can an online platform be designed to promote physical activity amongst University of Twente Employee, by focusing on enjoyment in exercise?*

In order to answer the research question, the following sub-questions are posed:

SQ1 *How can an online platform be designed to build self-efficacy in individuals, significant for behaviour change?*

SQ2 *How can an online platform be designed to create an engaging and inspiring User Experience (UX)?*

State of the Art

In this section, research gathered from scientific, as well as non-scientific, sources is gathered. First, the findings from a scientific literature review are presented, on the topic of behaviour change, followed by an analysis of relevant work, such as behaviour change interventions targeted at improving physical activity among employees. The findings from this research provide valuable insight into the development of a digital behaviour change intervention targeted at making UT employees more active.

2. Literature Review

2.1 Introduction

Though many desire to lead a healthier and more active lifestyle, this is often difficult to achieve. Changing behaviours such as physical inactivity can be difficult (Schwarzer, 2008), and weight-loss programs often show modest long-term results (Elfhag & Rössner, 2005). Simultaneously, overweight and obesity have become worldwide health issues, associated with a shortened lifespan and an array of related diseases (Bray et al., 2018; "WHO - Obesity and overweight," n.d.). Being overweight is a complex condition, resulting from multiple factors, such as genetic, environmental as well as behavioural factors (Bray et al., 2018). Many weight-loss interventions focus on improving behavioural factors, which requires behaviour change (Bray et al., 2018). Changing behaviour is therefore an important part of healthy lifestyle interventions.

Faced with the issue of lifestyle interventions showing modest long term results, it is of importance to evaluate the factors involved in acquiring a healthy lifestyle. Although most interventions, such as weight loss programs, often include physiological, as well as psychological, strategies (Buratta et al., 2016), some researchers suggest that approaching the subject from a psychological viewpoint can provide a better understanding (Elfhag & Rössner, 2005). Additionally, experiencing psychological joy during a health behaviour change is related to a higher likelihood of behaviour maintenance (Cohn & Fredrickson, 2010; Van Cappellen et al., 2018) and strengthens the quest towards physical activity goals (Cameron, Bertenshaw, & Sheeran, 2018). Therefore, exploring the literature on psychological factors that influence behaviour change can provide insight on how to increase adherence to lifestyle interventions.

This literature review strives to understand the complexity of behaviour change, and the challenges that individuals face in their pursuit of a healthier lifestyle. Ultimately, the review tries to answer the research question:

> What are the psychological factors that facilitate user adherence to long-term healthy behaviour changes, that lifestyle interventions should strive to build?

By exploring the role of lifestyle interventions, the influence of psychological resources and positive emotions on lifestyle change, as well as existing theoretical models of behaviour change, this review tries to answer the posed research question. The gathered knowledge serves as a theoretical underpinning for the development of an online platform that empowers UT employees to acquire and maintain a more active lifestyle.

2.2 The Role of Lifestyle Interventions in Changing Behaviour

The success, and role, of lifestyle interventions in facilitating healthy behaviour change, has been debated in scientific literature. Schwarzer (2008) states that it is difficult to change behaviours such as physical inactivity and poor diet. This may be due to a number of factors, such as a lack of motivation, or because of the difference between an individual's intentions and actions, known as the *Intention-Behaviour Gap*. The intention-behaviour gap may arise due to unexpected obstacles in a weight-loss journey, or surrendering to temptation (Schwarzer, 2008). Bridging the intention-behaviour gap should therefore be an imperative part of a lifestyle intervention.

Scientific literature, however, offers some optimism for future lifestyle interventions. Findings from several researchers suggest that lifestyle interventions can facilitate successful long-term weight loss and management (Bray et al., 2018; Buratta et al., 2016; Duan et al., 2018; LeBlanc, O'Connor, Whitlock, Patnode, & Kapka, 2011). However, de Jersey et al. (2017) argue that previous interventions have had mixed results. Internet delivered interventions have been found to be able to provide health behaviour changes (Bray et al., 2018; Duan et al., 2018), although Bray et al. (2018) states that they have had limited result as compared to on-site programs. Thus, even though the extent to which previous lifestyle interventions have been successful has been debated, there is some evidence suggesting that they can facilitate healthy behaviour change.

2.3 Psychological Resources to Facilitate Adoption of Healthy Behaviour

Recent studies have suggested that psychological factors of an individual play a significant part in behaviour change. Several authors argue that the psychological resources of an individual should be a focus point in lifestyle interventions (de Jersey et al., 2017; Duan et al., 2018; Elfhag & Rössner, 2005). In a study by Duan et al. (2018) on the efficacy of a web-based lifestyle intervention targeted at increasing physical activity in cardiac patients, the intervention improved the patient's psychological resources such as motivation, self-efficacy and planning, as well as their lifestyle. The authors concluded that the more the internal psychological resources of the individual increased, the more likely they were to adopt and maintain the new lifestyle changes. Consequently, focusing on building the psychological resources of a user is an interesting field of research for designers of lifestyle interventions.

Researchers have debated which set of psychological resources are the most predictive of healthy lifestyle change. In this section, the most commonly mentioned psychological factors in the reviewed scientific literature are discussed.

Motivation is recognized as an essential psychological resource for lifestyle interventions to build. Researchers agree that motivation plays a fundamental role in the behaviour change process (Buratta et al., 2016; de Jersey et al., 2017; Duan et al., 2018; Elfhag & Rössner, 2005; Schwarzer, 2008). Buratta et al. (2016) characterize motivation as a dynamic state that fluctuates throughout the change process. Schwarzer (2008), however, states that although motivation is an important part of forming intention, alone it may not be predictive of behaviour. This is explained by the intention-behaviour gap. Schwarzer (2008) also makes the distinction between *Preintentional Motivation* (the process of forming intention) and *Postintentional Volition* (the process of turning intention into action). In the preintentional phase, where the intention is formed, interventions should focus on increasing self-efficacy, positive outcome expectancies, as well as risk perception (de Jersey et al., 2017; Duan et al., 2018; Schwarzer, 2008). Furthermore, Schwarzer (2008) states that risk-perception on its own is not enough to form intention. Hence, for healthy behaviour changes to occur, there first must exist a motivation to change, however, this motivation alone may not be predictive of behaviour.

Self-Efficacy is a second psychological resource commonly mentioned as meaningful for behavior change to occur. Self-efficacy can be defined as an individual's self-perceived ability to perform across different situations (Milam, Cohen, Mueller, & Salles, 2019). Researchers agree that self-efficacy is highly important throughout the change process (Buratta et al., 2016; de Jersey et al., 2017; Duan et al., 2018; Elfhag & Rössner, 2005; Schwarzer, 2008). Schwarzer (2008) distinguishes between different constructs of self-efficacy, such as: *Action*, *Maintenance* and *Recovery* self-efficacy. *Action Self-Efficacy* occurs before the individual takes action, thus in the preintentional motivation stage. Users with high action self-efficacy imagine a successful outcome of the action, and are therefore more likely to act. *Maintenance Self-Efficacy* is an individual's perception of their ability to cope with challenges along the behaviour change journey. *Recovery Self-Efficac*y refers to an individual's perception of their ability to bounce back from setbacks. Clearly, self-efficacy is a helpful psychological resource when adopting a new health behaviour.

Planning and *Self-Regulation* are additional frequently mentioned psychological factors for behaviour change. Self-regulation is an individual's ability to act and adjust their behaviour, attention and emotions towards attaining a personal goal (van Genugten, Dusseldorp, Massey, & van Empelen, 2017). Schwarzer (2008) states that the ability to focus on goal-directed behaviour may be fundamental throughout the entire behaviour change process. Similarly, Duan et al. (2018) argues that interventions should focus on self-regulatory planning skills to help bridge the intention-behaviour gap. Being able to plan and adapt one's actions towards long-term behaviour goals is a psychological resource that individuals benefit from, when aspiring to acquire a healthy lifestyle.

Grit is a recent construct mentioned in the context of psychological predictors of achievement, but there are only a few studies on its potential connection to health behaviour change. Duckworth, Peterson, Matthews, and Kelly (2007), define the construct as "perseverance and passion for long-term goals". However, Credé, Tynan and Harms (2017) question the validity of the construct has been questioned in their meta-analysis on the topic. Graham Thomas, Seiden, Koffarnus, Bickel, and Wing (2015) were the first to show a relationship between a lower grit score and a higher *Body Mass Index (BMI)* in a study. Furthermore, in a study by Traino et al.

(2019), higher levels of grit were related to better health care management skills. Conversely, in a study made by Bessey (2018), grit was not related to health behaviour. Thus, the limited research on the topic is not sufficient to determine a positive relationship between grit and healthy behaviour change.

Being able to *Think Positively*, and bouncing back from adversity, is mentioned throughout scientific literature as supportive of health behaviour change. Coping mechanisms such as *Positive Outcome Expectancies* (Schwarzer, 2008)*, Overcoming Obstacles* (de Jersey, Mallan, Callaway, Daniels, & Nicholson, 2017; Elfhag & Rössner, 2005)*, Managing Negative Expectations* (de Jersey et al., 2017) and *Attitude* (Elfhag & Rössner, 2005) are mentioned as psychological factors that can be important for healthy behaviour change. Having a positive mindset is clearly helpful in overcoming obstacles, and is something that health interventions should aim to promote.

Thus, building an individual's psychological resources can be a paramount part to support behaviour change. Although scientific literature mentions several resources that are of specific importance, two that are mentioned frequently are motivation and self-efficacy. Therefore, these may be relevant areas of focus for future lifestyle interventions.

2.4 Influence of Positive Affect on Long-term Health Behaviour Change

There is growing evidence that experiencing *Positive Affect,* or *Positive Emotion*, can facilitate long-term healthy behaviour change. Cohen and Pressman (2006, p. 122) define positive affect as the "feelings that reflect a level of pleasurable engagement with the environment, such as happiness, joy, excitement, enthusiasm, and contentment". Behaviours that are experienced as pleasant are more likely to be maintained (Cohn & Fredrickson, 2010; Van Cappellen, Rice, Catalino, & Fredrickson, 2018). This has been found to be true across multiple behaviours, including physical activity (Van Cappellen et al., 2018). Therefore, increasing the positive affect experienced during a health behaviour should be the focus of future interventions in order to increase long-term adherence (Lawton, Conner, & McEachan, 2009; Van Cappellen et al., 2018). Furthermore, Salovey, Rothman, Detweiler, and Steward (2000) state that positive emotional

experiences can promote psychological resources in individuals, such as endurance and resilience. Lawton et al. (2009) agrees, stating that certain evidence even shows that positive affect increases the likelihood of engaging with a behavior more than cognitive processes. Therefore, partaking in physical activities that induce a feeling of joy can increase the likelihood of an individual repeating it.

Research indicates that prioritizing partaking in behaviours that elicit positive emotions in everyday life, also increases the joy experienced during the activities. Van Cappellen et al. (2018) call this *Prioritizing positivity*, and states that it is an effective way to increase positive affect during healthy behaviour. This starts with individuals choosing healthy behaviours that they know that they will enjoy when deciding on activities. Moreover, Van Cappellen et al. (2018) state that there is evidence that prioritising positivity can be taught. Thus, interventions could benefit from teaching users to prioritize healthy behaviours that brings them joy.

2.5 Theoretical Models Used to Predict Behaviour Change

The scientific world is yet to reach consensus regarding which theoretical model best captures the complexity of behaviour change. Researchers have created different explanatory models that often overlap (Schwarzer, 2008). Some commonly mentioned behaviour change theories are the *Theory of Planned Behaviour* (Ajzen, 1991; Schwarzer, 2008; Van Cappellen et al., 2018; Lawton et al., 2009), the *Transtheoretical Model of Behaviour Change (TTM)* (Buratta et al., 2016; Schwarzer, 2008; Van Cappellen et al., 2018), the *Health Action Process Approach (HAPA)* (Duan et al., 2018; Schwarzer, 2008), the *Health Belief Model* (Lawton et al., 2009), the *Theory of Reasoned Action* (Schwarzer, 2008), the *Protection-Motivation Theory* (Schwarzer, 2008), the *Goal-Setting Theory* (Van Cappellen et al., 2018), the *Social-Cognition Theory* (Van Cappellen et al., 2018) and the *PRECEDE-PROCEED Model* (de Jersey et al., 2017). The three most commonly mentioned cognitive theories in the reviewed scientific literature are discussed in this section, together with one theory that focuses on the influence of positive affect, or emotion, on behaviour change.

The *Theory of Planned Behaviour* is one of the most commonly mentioned behaviour change theories. Introduced by Ajzen (1991), the theory claims that behaviour can be predicted by attitude and subjective norms towards a behaviour, as well as perceived control over the behaviour. The Theory of Planned Behaviour falls under the category of *Continuum Models*, where individuals are placed on a range of their likelihood to take action (Schwarzer, 2008). However, Schwarzer (2008) argues that a limitation of continuum models is that they typically do not address the phase where the intentions are turned into actions, thus overlooking the intention-behaviour gap. Theory of Planned Behaviour therefore has some limitations when it comes to describe long-term behaviour change.

The *Transtheoretical Model of Behaviour Change* is another prominent behaviour change theory. The theory is a stage model, introduced by Prochaska and Velicer (1997). It includes five stages: *Precontemplation* (not yet thinking about changing behaviour), *Contemplation* (considering behaviour change), *Determination* (deciding and planning to change behaviour), *Action* (changing behaviour), and *Maintenance* (maintaining new behaviour over time) (Buratta et al., 2016). Although the model is widely accepted, it has been criticised for creating arbitrary stages out of something continuous, and that it has only received moderate support (Schwarzer, 2008). Although the theory seems applicable, the concerns raised against the Transtheoretical Model may make it less suitable to describe behaviour change accurately.

The *Health Action Process Approach (HAPA)* model is a theoretical model that explicitly aims to overcome the intention-behaviour gap. The model, as introduced by Schwarzer (2008), makes a distinction between the initial *Preintentional Motivation Phase* of behaviour change that leads to intention, and the subsequent *Postintentional Volition Phase* that leads to actual change in behaviour (Schwarzer, 2008; Duan et al., 2018). The model highlights how different types of self-efficacy is needed throughout the change process, illustrated in Figure 1. By focusing on bridging the intention-behaviour gap, the *HAPA* model may be the most suitable cognitive model for predicting health behaviour change.

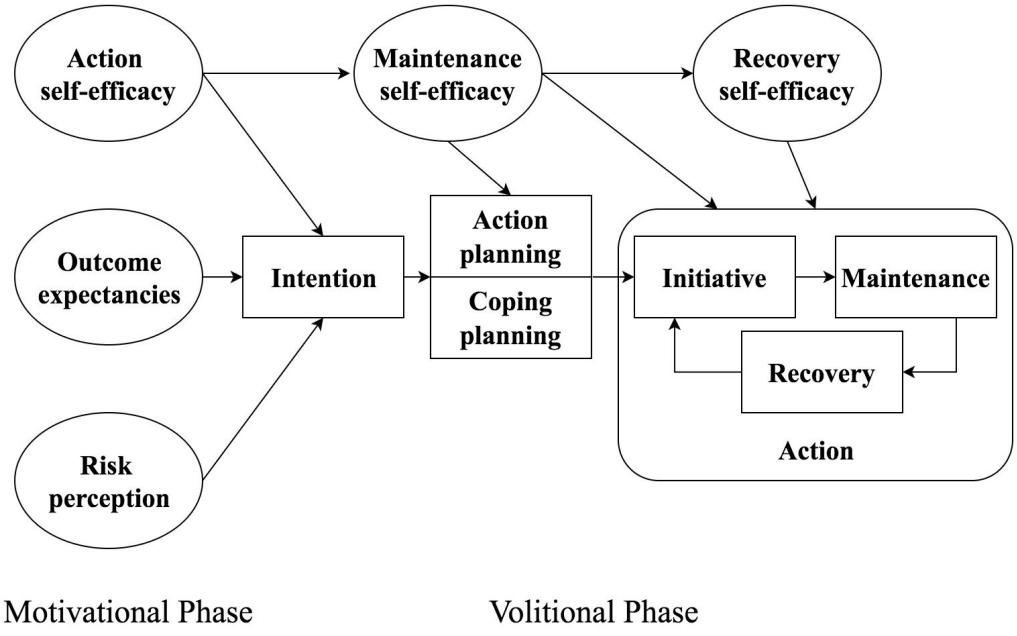

Figure 1. Diagram of the Health Action Process Approach, adopted from Schwarzer (2008).

However, what the previously mentioned models fail to describe, is the influence of *Affect* (i.e. an individual's emotions) on health behaviour change. Evidence suggests that affect is more predictive of behaviour change than cognitive factors (Lawton et al., 2009; Van Cappellen et al., 2018). A theoretical model that describes how affect and *Nonconscious Motivation* influences the lifestyle changes, is the *Upward Spiral Theory of Lifestyle Change,* explained by Van Cappellen et al. (2018). The theory does not aim to replace other theoretical models of behaviour change, but rather serve as an addition. Van Cappellen et al. (2018) argues that there is an internal loop that describes the nonconscious motives of individuals that leads them towards behavioural maintenance, illustrated in Figure 2. This inner loop suggests that when *Positive Affect* is experienced during a healthy behaviour, incentive salience for cues associated with those behaviours increases. The outer loop illustrates that positive affect increases *Vantage Resources* over time, which are resources that make an individual more susceptible to additional positive experience, such as improved coping mechanisms or social integration. These external positive experiences serve as fuel for inner loop of nonconscious motivations to practice a behaviour (Van Cappellen et al., 2018). The focus on the influence of positive affect on the behaviour change process, makes the *Upward Spiral Theory of Lifestyle Change* a relevant addition to cognitive theories.

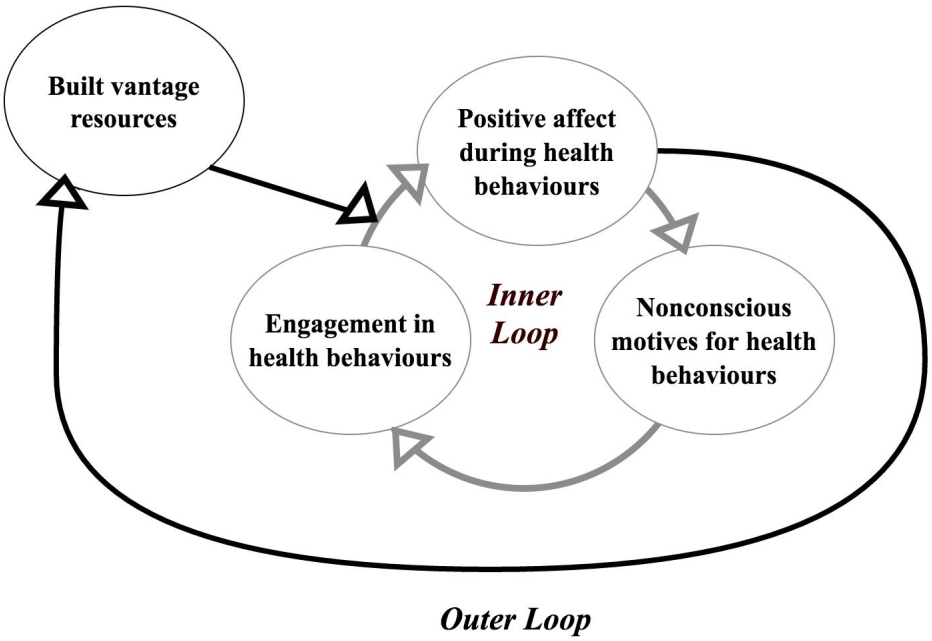

Figure 2. Diagram of the Upward Spiral Theory of Lifestyle Change, adopted from van Cappellen et al. (2018).

Therefore, in order to accurately depict the psychological processes involved in the behaviour change process, a cognitive model may not be enough on its own. However, the theoretical models that seem the most promising, is a combination of the *HAPA Model* introduced by Schwarzer (2008), that aims to bridge the intention-behaviour gap, and the *Upward Spiral Theory of Lifestyle Change* by Van Cappellen et al. (2018), that sheds light on the importance of positive affect in behaviour change.

2.6 Conclusion

This review strives to answer the research question: “What are the psychological factors that facilitate user adherence to long-term healthy behaviour changes, that lifestyle interventions should strive to build?”. Even though it can be difficult to achieve long-term health behaviour change, there is sufficient evidence that lifestyle interventions can make this possible. Lifestyle interventions aiming to encourage health behaviour change should focus on building the psychological resources of the individual, such as *Self-Efficacy* and *Motivation*. Additionally, practicing physical activity that makes the user feel *Positive Affect* (i.e positive emotions) during the exercise, increases the likelihood of maintaining the behaviour. In conclusion, new interventions could benefit from focusing on building the psychological resources of individuals, as well as encouraging them to partake in health behaviours that they enjoy.

A theoretical model of behaviour change that emphasizes the importance of self-efficacy and motivation, is the *Health Action Process Approach* (*HAPA) model*, that also strives to bridge the intention-behaviour gap better than comparable theories. The *Upward Spiral Theory of Lifestyle Change* can serve as an additional model, that sheds light on how experiencing positive emotions during the intended behaviour makes the individual more likely to engage with said behaviour again.

Some limitations to this study is the quantity of the journals reviewed, as well as the fact that some of the theories discussed are rather recent, and have not had to stand the test of time. Furthermore, the fact that many lifestyle interventions have limited success is a threat that remains, and overcoming this can prove difficult. Simultaneously, the scientific world has not reached a consensus regarding the best theoretical model to describe behaviour change. Therefore, there may be other theoretical models that are suitable to base a lifestyle intervention on. Finally, to understanding if an intervention is able to support health behaviour change, empirical testing may be necessary, in order to provide first-hand evidence for its validity and applicability.

3. Relevant Work

3.1 Introduction

In this section, relevant work in the field of physical activity interventions is explored and summarized. The purpose of this state of the art review is to gain an understanding of the current state of the market, as well as to learn from the strengths, and weaknesses, of different lifestyle interventions. The accumulated knowledge can then be applied to the development of an online platform.

The selected platforms were *Fulbacho*, *Strava*, *Nike Running Club*, *Movetivate* and *Virtuagym*. The two main criteria for choosing these platforms were:

1. The intervention is a *platform* that aims to encourage users to partake in *physical activity*
2. The platform has an element of either *enjoyment*, *social interaction*, or is specifically *targeted at employees*

In the following subsections, each platform is evaluated on their *key functionalities, emotional focus, strengths, weaknesses*, as well as quality of *User Experience (UX)*. UX is a rather recent concept in the field of *Human Computer Interaction (HCI),* which researchers have not yet reached consensus on its definition. However, it relates to an individual's emotional response and attitudes towards an interaction with a system's *User Interface (UI)*, which may be subjective (Law, Roto, Hassenzahl, Vermeeren, & Kort, 2009; Lallemand, Gronier, & Koenig, 2015). It is generally considered a multifaceted construct, which may include a system's ease of use, efficiency, aesthetics, attractiveness (Hinderks, Schrepp, Mayo, Escalona, & Thomaschewski, 2019) and usability (Lallemand et al., 2015). Therefore, the UX of competitive systems will be evaluated. Although subjective to the author, it can still provide important insight to the project.

3.2 Fulbacho

Fulbacho.net is an activity booking platform for sport activities, commonly used amongst students from Enschede, the Netherlands, where the University of Twente is located. The users can create and sign up for upcoming events in their area.

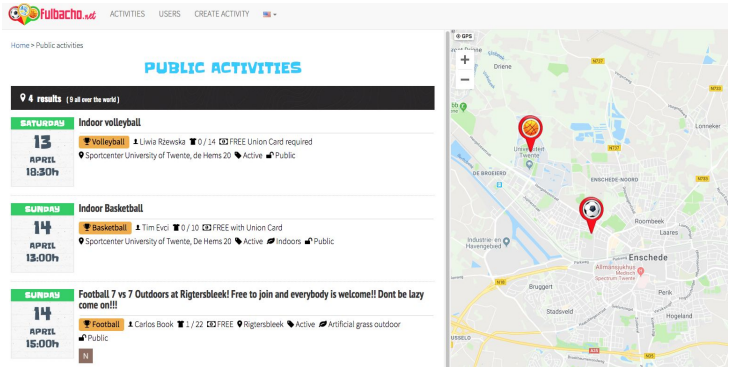

Figure 3. Screenshot of Fulbacho.net

Key Features There is an activity overview, a user profile with past and present activities, an activity map, as well as the functionality to create events.

Emotional Focus The purpose of the platform is to make social gatherings for physical activities easier. However, there is no explicit focus on joy, nor building psychological resources.

Strengths The focus on social gatherings, and the general overview of activities, that makes it easier for the users to partake in the activities, is a strength of the website.

Weaknesses The platform only focuses on the booking of activities, and not really on the user experience, nor to empower behaviour change. The overall interface is rather unattractive, and since the platform relies on user generated content, there are often only a few activities to join.

Quality of UX Very poor, with unappealing, rather static, graphic design.

3.3 Strava

Strava is a fitness platform, which allows users to track many aspects of their activities. It is one of the most popular fitness tracking applications in the market.

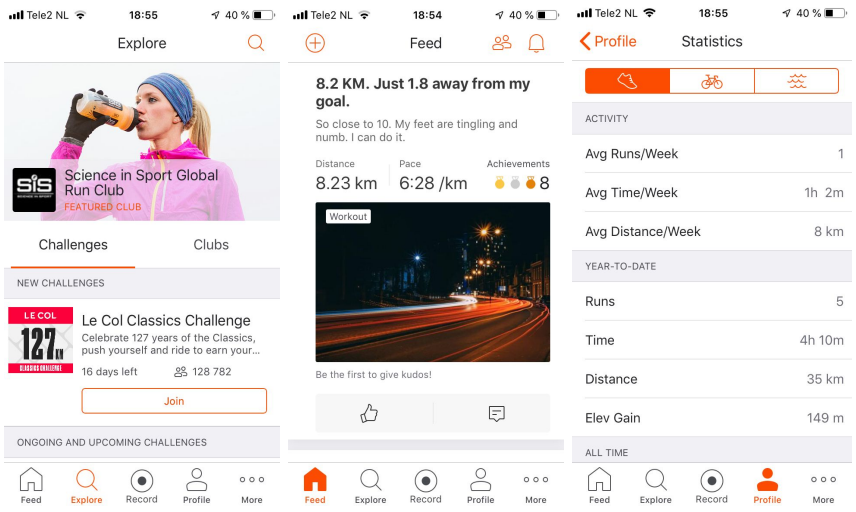

Figure 4. Screenshot of Strava

Key Features *Fitness-tracking* for different activities (step counter, distance, time, heart rate), a *user feed*, *user profile*, *challenges, badges* etc.

Emotional Focus There is no explicit focus on enjoyment, the blog post functionalities could encourage emotional reflection.

Strengths There are several strengths to Strava, such as the *community feeling* it creates by allowing you to share experiences with your friends, the built in tool for *posting*, the *ease of use,* the *design*, the *cross-platform accessibility*, as well as the *personalized data collection*.

Weaknesses Much of the motivation relies on extrinsic rewards, such as social praise from others, instead of intrinsic motivation, such as joy. The application claims that it is targeted at athletes, which may scare off some beginners.

Quality of UX Very good! Nice design, with inspiring content and clear navigation.

3.4 Nike Running Club

Nike Running Club is, similarly to Strava, a fitness platform which tracks physical activity. The platform is available for mobile devices, and allows users to track and evaluate their runs, connect with others, receive customized training plans, etc.

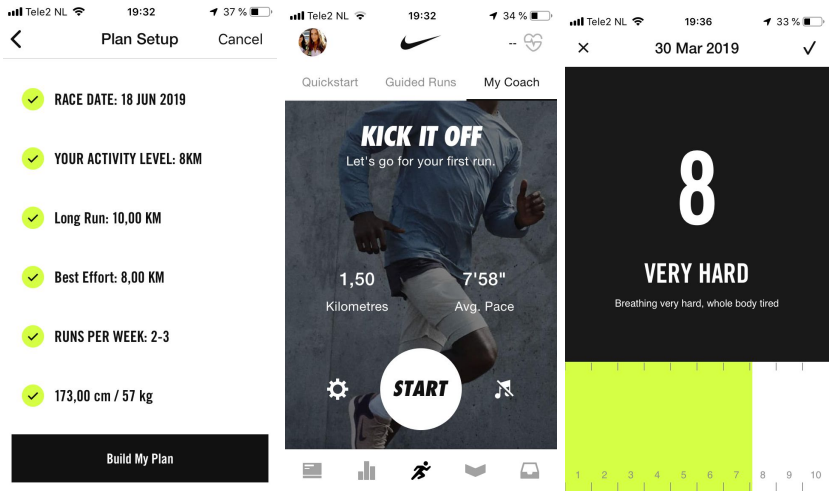

Figure 5. Screenshot of Nike Running Club

Key Features The application allows for *fitness-tracking* (step counter, distance, time, heart rate), *activity suggestions* with instructional videos, *personalized coaching*, *user feed*, *user profile*, and *challenges*.

Emotional Focus There is no explicit focus on experiencing positive emotions during exercise. However, the application does encourage self-reflection after each activity, using a very intuitive slider.

Strengths The application can make *activity recommendations* based on goals, contains *inspirational content*, and has excellent *design*.

Weaknesses It is limited to running, and related activities, and does not explicitly focus on experiencing joy during exercise.

Quality of UX Excellent! Very inspirational, dynamic content, and beautiful design.

3.5 Movetivate

Movetivate is a free application targeted at employees, encouraging them to partake in challenges to win gift cards. The core functionality of the app is to motivate users to become more active, by accepting challenges sent by their friends or employers, in order to win gift cards.

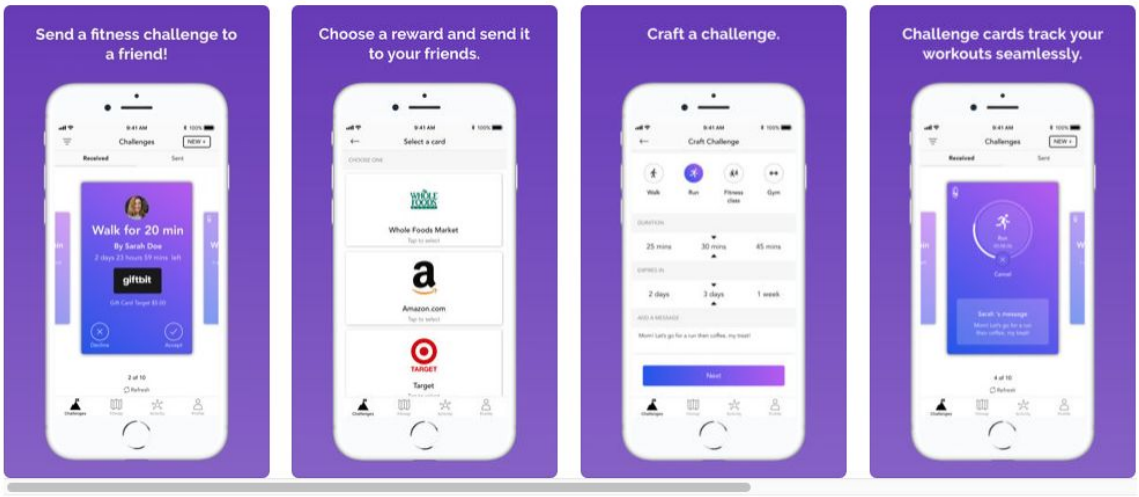

Figure 6. Illustrations of the Movetivate application

Key Features Functionalities include a *dashboard* (create fitness challenges for your friends or employees), a *map overview* and *user profile*.

Emotional Focus There is no explicit focus on enjoyment, however there is an element of fun to accepting, and completing, a challenge.

Strengths There is an element of *social interaction,* the ability to *challenge* friends, as well as an aesthetically pleasing *design*.

Weaknesses The application relies heavily on extrinsic motivation (winning gift cards), which on its own may not be enough to create sustainable lifestyle changes. Furthermore, some users may be uncomfortable with their employers knowing whether or not they have completed challenges.

Quality of UX Good, attractive design, but rather basic.

3.6 Virtuagym

Virtuagym is an online platform, sold as a service for corporations to encourage physical activity amongst their employees. The platform exists for both mobile and web, and mainly functions to suggest exercises, and instructional videos, to the user.

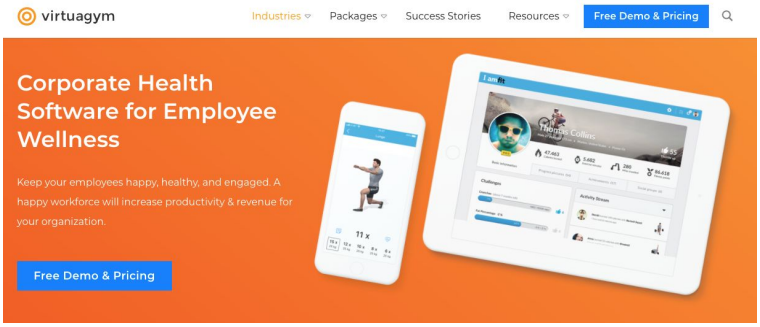

Figure 7. Screenshot of the virtuagym website

Key Features The application includes an *exercise overview*, *instructional videos*, *progress*, and *challenges*, *activity booking* functionalities and *user profile.*

Emotional Focus There is no explicit focus on enjoyment.

Strengths The user profile can be personalized and contains rather diverse information. The purpose of the platform is to improve employee health.

Weaknesses Overall, the application comes of as rather uninspirational, and boring. It shows no regard for the emotional experience of exercise, and is mainly focused on traditional exercise training that can be done alone. Thereby, the social interaction that can come with exercise has very low priority in this solution as well. It seems to be based on the premise that if people know how to perform certain exercises, they will, neglecting the intention-behaviour gap present in most people's decision making.

Quality of UX Poor, unattractive design that feels outdated.

3.7 Discussion of Relevant Work

Conclusively, there is an abundance of applications and web-platforms that focus on making the user more physically active. However, the selection of platforms targeted at improving physical activity amongst employees is significantly more limited. Some of these platforms are sold as packages to corporations, which they can then offer to their employees. However, at this point in time, no platform that focuses specifically on joy in physical activity exists, to the knowledge of the author. Supported by the findings from the scientific literature review, this means that the development of such a platform could offer the users a novel, and unique, experience.

Furthermore, there are several features of the reviewed platforms which could serve as inspiration for the platform which was to be built, such as: the event overview in *Fulbacho*, the aesthetically pleasing design from *Nike Running Club*, as well as the social aspects connecting users in *Strava*. The state of the art review of scientific literature, as well as relevant work in the field of physical activity platforms, shows great potential for the development of a platform which encourages users to choose activities that elicit positive emotions.

Methodology

This section summarizes the methods and techniques followed throughout the graduation project. A structured approach was applied, in accordance with *The Design Methods of Creative Technology*, as described by Mader and Eggink (2014). Moreover, a high involvement of users throughout the design process was necessary, integrating elements of co-design.

4. Method

4.1 The Creative Technology Design Process

The *Design Methods of Creative Technology* was developed as a guide for all student projects in the B.Sc. Creative Technology program at UT. The method is adapted from several related design disciplines, such as Industrial Design, Interaction Design, and more. It is an iterative method with four main phases: *Ideation, Specification, Realisation* and *Evaluation* (Mader & Eggink, 2014).

In the *Ideation Phase*, ideas are generated and collected. These ideas can result from a range of stimuli, such as brainstorming, studying related work, or interviewing stakeholders. After expanding the design space, the ideation phase results in a more elaborated project idea.

In the *Specification Phase*, the idea is typically evaluated using prototypes, and iterative feedback loops from users. Several prototypes may be created, based on the new requirements from user testing. The acquired knowledge from the user tests shape the specifications of the project.

In the *Realization Phase*, the proposed idea is analyzed in terms of how it can be realized. Once the analysis is concluded, and a planning is made, the idea is realized.

In the *Evaluation Phase*, the results of the usability tests are carried out and evaluated, in order to, amongst other things, understand if the original requirements were met. A reflection on the progress, the ideas position compared to related work, and suggestions for future improvements can be made.

In each of the first three phases, a *Divergence* and *Convergence* approach is applied. This means that at the beginning of a new phase, the design space is widened (divergence), to later be reduced into one final solution (convergence). An overview illustrating the design process can be found in Appendix A, Figure A1.

4.2 Participatory Design Techniques (Co-Design)

Throughout the Creative Technology Design Process, certain elements of participatory design were infused into the methodology. Participatory design invites stakeholders other than the designers to partake in different co-design activities throughout the design process (Sanders, Brandt, & Binder, 2010). In the case of this graduation project, the stakeholders involved were the end users. The reason for this involvement, was to enhance the fit between the intended users and the solution. In this section, the different techniques used to include the user in the design process are described briefly.

4.2.1 Interviews

Unstructured, as well as, structured, interviews with members of the target group were used in order to obtain important insight regarding their needs, problems, and context. In the early part of the project, 3 UT employees were casually interviewed to understand the target group better, and in User Test 1 and 2, structured interviews with pre-scripted questions were implemented.

4.2.2 User Tests

The user needs were explored by carrying out user tests of the platform with the intended target group, iteratively, throughout the design process. The tests implemented the *think aloud method*, which consists of encouraging people to speak their thoughts aloud as they go through the user test (Van Somaren, Barnard, & Sandberg, 1994), to gather insight from the users. The user tests also contained structured interviews with open questions, as well as online questionnaires. Based on these user tests, feedback was analyzed and implemented iteratively into the design of the platform.

Usability Test 1: Explorative test where the user can interact with the website freely.

Usability Test 2: Task performance test, where the user is asked to perform certain tasks on the website, to test layout, clarity and navigation

Usability Test 3: Evaluation test, where the user is told to carry out specific tasks, as well as evaluate the different aspects of the website

4.3 Method Overview

The adaptation to the Creative Technology Design Method, infused with a larger co-design phase that shaped both specification and realization, is illustrated in Figure 8.

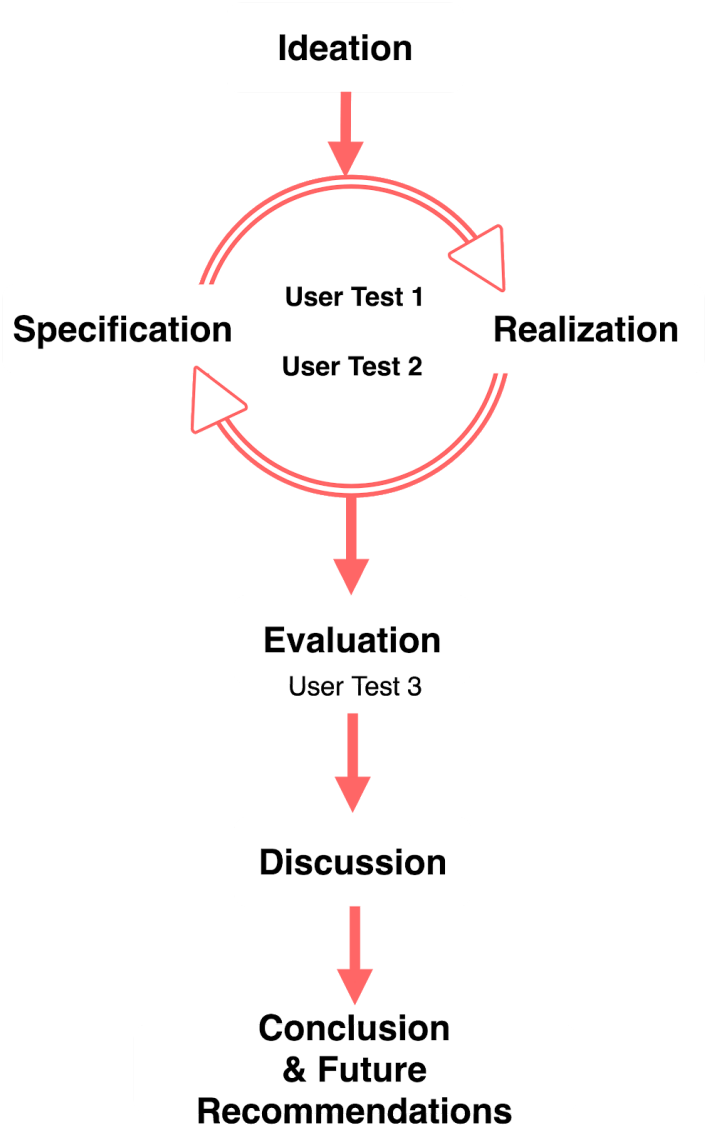

Figure 8. Illustration of the methodology and design process implemented throughout this project.

Ideation Phase

At the earliest stages of this bachelor project, the problem statement was rather broad: *how can an intervention produce more long term, sustainable, active behaviour amongst UT employees?* Furthermore, the state of the art review of scientific literature, as well as related work in the field, had revealed the potential of an intervention which focuses on enjoyment in exercise. This section describes the iterative ideation journey to the chosen solution: developing a web platform for UT employees, which focuses on joy.

5. Divergence

5.1 Context Analysis

The University of Twente is a research university located in eastern Netherlands, which educates over 10,000 students (University of Twente, n.d-a), and employs approximately 3,150 individuals, out of which 1,810 are academic staff, and 1,340 are support staff (University of Twente, n.d-b). The slogan of the university is: 'High tech human touch', mirroring its focus on the societal impacts of technology, and innovation (University of Twente, n.d-a). The university campus stretches over 146 hectares, offering a range of indoor and outdoor sport facilities (University of Twente, n.d-c). Furthermore, the UT mentions the access to 'Company sports' high on the list of benefits available to employees (University of Twente, n.d-d). Although the university is striving towards inclusivity and equality, the academic staff currently consists of 71% males and 29% females (University of Twente, n.d-e). The UT attracts many international employees and students, and one of the core values mentioned in the university's vision for 2020 is *Internationalization,* and curating an international community (University of Twente, n.d-f).

5.2 Target Group Analysis

In order to gain an understanding of the needs of UT employees, unstructured interviews were carried out with 3 members of the target audience, in the early stages of the design process. These unstructured interviews came in the form of casual conversations, discussing the problem statement, and possible solutions. What was found out in these interviews was:

1. Employees differ largely in terms of their level of physical activity. Some struggle to find motivation at all, while others are already very active. It may therefore be necessary to distinguish between different levels of experience.
2. UT employees are very diverse, with different backgrounds, nationalities and experiences. They are also multidisciplinary, however, a uniting factor is their interest in scientific research, as the majority of the workforce is academic staff.

3. The amount of physical activity practiced by a university employee may be affected by a number of factors, one significant one being, time limitations. Understanding these hindering factors can be key in developing a physical activity intervention.
4. Even though there are excellent facilities offered by the UT, the usage of these varies amongst employees.

5.2 Concept Brainstorm

Due to the broad nature of the problem statement, the initial ideation phase was divergent in nature, exploring a wide range of possible solutions. This early ideation was carried out together with John Kim and Mahandra Raditya, two fellow students working on the same problem statement, and with the same supervisors.

5.2.1 Word Associations Exercise

To let the mind wander freely on the topic of joy in physical exercise, a word association exercise on the topic was carried out (see Figure B1, in Appendix B). Categorizing the noted words helped uncovering the following underlying themes: *hobbies, physical health, lifestyle, values, environment, social, mental, entertainment* and *technology*. These themes would serve as inspiration for a brainstorm, with the purpose of generating solutions to the problem statement.

5.2.1 General Brainstorm of Concept Idea

Based on the underlying themes found in the word association exercise, a general brainstorm of potential solutions was carried out. A total of 40 concept ideas were generated, varying in levels of complexity (see Figure B2, Appendix B). In order to choose one idea, the 3 ideas that showed the most promise were compared based on four criteria: *user solution fit*, *innovation*, *feasibility* and *believed ability to produce long term behaviour change*. These ideas were: "*Training Tinder*" - an application for UT employees to find workout partners, "*Running Audiobook"* - a mobile application that plays an audiobook, music, or podcast, as long as the user is still running, and "*Joy in Exercise*" - a platform that shifts the focus of physical exercise from the traditional

quantification of calories or number of steps taken, to evaluating how much enjoyment a physical exercise actually brings the user (see Table 1).

Table 1

Evaluation of concept ideas based on four criteria.

	Training Tinder	Audiobook	**Joy in Exercise**
Criteria 1: User Solution Fit	-	-/+	+
Criteria 2: Innovation	-	-/+	+
Criteria 3: Feasibility	+	+	+
Criteria 4: Long Term Behaviour Change	-	-	+

Note. + = positive evaluation, - = negative evaluation, -/+ = positive evaluation

Based on the analysis illustrated in table 1, the "Joy in Exercise Platform" idea was further developed. Once this idea had been chosen, different ways of producing the platform, were proposed through further brainstorming. The most prominent ideas were creating (1) *a mobile application*, (2) *a web-platform*, or (3) *a mobile application accompanied with a wearable device* which helps users evaluate how much joy they were experiencing during a physical activity. Based on several factors, such as the time limitations of the project (10 weeks), the expertise of the developers (media, user experience and web design), as well as the user-solution fit, the web-platform strategy was chosen. Furthermore, during the state of the art review, no similar concept had been found, making it a relatively novel idea.

6. Convergence

6.1 Chosen Idea: The Joy in Exercise Web Platform

The concept that was chosen was to develop a web platform, with the aim of making UT employees choose to partake in physical activities they genuinely enjoy. The platform was to build upon scientific behaviour change theories, such as the *Upward Spiral Theory of Lifestyle Change* (Van Cappellen et al., 2018), in order to reduce sedentary behaviour. The platform would do this by focusing on enjoyment in exercise, and encouraging the users to make social connections, and try physical activities in, and around the University of Twente, which they enjoy. Moreover, the platform would try to help beginner users become more physically active, by building self-efficacy, as well as motivation, through design and content.

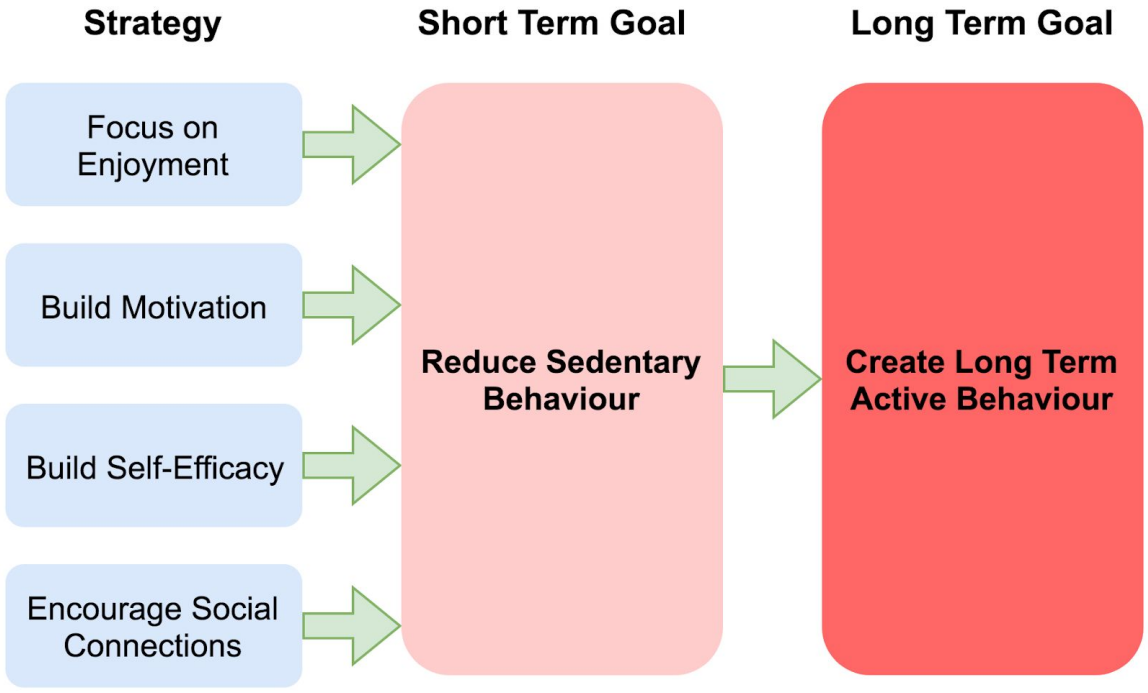

Figure 9. Flow chart of the aims and strategies of the platform

6.2 Functionalities

In order to conceptualize this new platform, a brainstorm was carried out together with John Kim, to find which functionalities would be essential to the core website user experience. Although several ideas were noted, some functionalities were more essential than others. Therefore, the additional ideas that were not considered essential to the concept, but that could function to enrich the user experience, were noted as potential future improvements. Both the core functionalities, as well as the potential future functionalities are displayed in Table 3.

Table 3

Core and Alternative Functionalities of the Website

Functionalities	**Essential (Core)**	**Alternative (Future)**
Private member website	✓	-
Forums & messaging	✓	-
Event planner	✓	-
Activity overview	✓	-
Private activity history	-	✓
Rating joy	-	✓
Personalized recommendations	-	✓

Note. The functionalities in **bold** are the core functionalities of the web-platform, which will be realized within the allotted 10 weeks of development time.

6.3 Organizational Identity

In order to create a brand identity for a website that efficiently and consistently communicates the intended messages from creators, it was meaningful to first define the platform's organizational identity. This is a growing focus in marketing literature, namely: how the platform is defined by its internal stakeholders (Balmer, 2008). This can be done by defining the core values of the organization, as well as its mission and vision. Furthermore, this is linked to *Value-Sensitive Design*, which focuses on designing systems around a set of values that stakeholders, such as the developers, find important (Friedman, Kahn, Borning, & Huldtgren, 2013). In this section, the ideation process of deriving the core values, mission and vision statements is described. Based on an internal organizational identity, a brand identity can be projected to outside stakeholders.

6.3.1 Core Values

At the heart of an organizational identity lies the organization's core values. Therefore, the first step of defining the platform's identity was to brainstorm about its core values. The results of the brainstorm are included in Appendix C, Figure C1. From this brainstorm session, three core values were selected as the most essential to the platform concept, and are described in Table 4.

Table 4

Core Values of the Platform

Core Value	Description
Enjoyment	One of the most important predictors of continued health behaviour, is the level of positive emotion experienced during the exercise. Focusing on physical activities that bring you joy is a guiding value for our service.
Sustainable Healthy Lifestyle	Our goal is to encourage lifestyle changes that are not just temporary, but that are sustained over time. Each individual's journey is different, but what will make them more likely to succeed, is doing what they enjoy.
Social	Sharing experiences, thoughts and ideas with others is the foundation of what we do. We believe that positive emotions are amplified when it is shared!

6.3.2 Crafting the Mission and Vision Statement

In order to clarify the purpose of the platform, a mission and vision statement were created. A mission statement explains the reason for an organization's existence, and helps distinguish it from others (David, 1989). Furthermore, it helps an organization align its actions towards their core purpose. In scientific literature, there are many suggestions for what components are necessary for a successful mission statement. According to David (1989), there are nine components which are valuable to include in a mission statement: (1) *customers*, (2) *products or services*, (3) *location*, (4) *technology*, (5) *concern for (financial) survival*, (6) *philosophy*, (7) *self-concept*, (8) *concern for public image*, and (9) *concern for employees*. However, since the web-platform is not designed to generate financial gain as of yet, component 5 (concern for survival) was deemed as not relevant. Therefore, the mission statement was written with the goal of including as many of the other components as possible, and can be found in Table 5.

Table 5

Mission and Vision Statement

Statement	Description
Mission	**Make enjoyment the goal of physical exercise for employees** Employee health lies at the heart of everything we do. Our mission is to encourage and inspire university employees to acquire a sustainable healthy lifestyle, by practicing sports and activities that they genuinely enjoy. By connecting people to like-minded others, we wish to make physical activity a more fun and gratifying experience.
Vision	We want to change the focus of physical exercise from the number of calories burned, to the level of enjoyment they elicit.

6.4 Inspiration

Once the concept and organizational identity had been formalized, mood boards were created to capture the intended feeling of the website (Appendix D, Figure D1), as well as to combine design inspiration gathered from other websites (Appendix D, Figure D2). Paper sketches, of the website, were also made at this point in the design process (Appendix D, Figure D3).

Specification

In order to build a web-platform that encourages UT employees to have a more physically active lifestyle, by focusing on joy, the early requirements of the *users,* the *system* as well as the *developers*, were defined. These early requirements are described in this section (Chapter 7).

7. Early Requirements

7.1 Early User Requirements

Prior to developing a web-platform that aims to support and encourage physical activity amongst UT employees, it was critical to consider what core elements the user requirements consisted of. During the ideation phase, four core functionalities were derived, that together formed the essence of the intended user experience of the platform. The website should (1) be private to *members* only (UT employees), (2) offer some form of functionalities that allow for *social interaction*, (3) provide an inspiring *activity overview* of physical activities available at the UT that spark joy, as well as (4) have a functionality for showing organized *events* (see Figure 10).

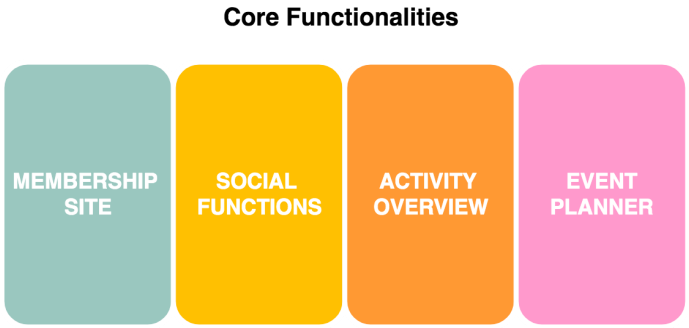

Figure 10. Summary of the core functionalities of the platform concept

7.2 Developer Requirements

From the developer side, there were certain additional requirements that needed consideration:

- The project needs to be concluded in ten weeks
- The project should aspire to support behaviour change towards a healthier lifestyle
- The project should be focused on enjoyment in exercise
- The project should focus on crafting and enhancing the user experience

7.3 Early System Requirements

Based on the requirements of the user experience, as well as those of the developers, the system requirements were defined (see Table 6).

Table 6
Early System Requirements

Criteria
● The website is exclusive to members, has a login/logout functionality, and protects user data ● Social interaction between members ● The website has (at least) the following pages ○ Home page ○ Activities Overview page ○ Specific page with more information about an activity (e.g. running page) ○ Forum ○ Members page ○ Events page

Realization

Based on the early requirements defined in Chapter 7, a first version of the website was realized as described in Chapter 8. However, in order to achieve a high user-solution fit, 2 user tests were carried out together with UT employees, which helped refine the requirements for the user and the system (Chapter 9). This then lead to the final version of the website (Chapter 10).

8. Building Version 1 of the Platform

8.1 Web-Development Strategy

There were several ways in which the platform could be realized. Either the developers could choose to code the entire web-site, using languages such as HTML5, CSS and JavaScript, or a web-building tool could be implemented, which would simplify the development process. Based on the requirements of the project, it was decided that a web-building tool would be the most suitable strategy, as this would allow for faster design iterations, it would leave more time for user testing, and would allow the developers to focus on crafting the user experience of the platform.

Therefore, 4 web-building tools were considered: *Squarespace*, *Wix*, *Craft.cms* and *Wordpress*. Based on an analysis of the alternatives based on 7 criteria (see Table 7), it became clear that *Wix*[1] offered the most promising solution. It met all the mentioned criteria, and as compared to *Squarespace* (the second most promising solution), Wix already supported unique membership logins. Therefore, it was decided that the platform would be built using Wix.

Table 7
Criteria to Choose Which Website Tool to Use

Criteria	Wix	Squarespace	Wordpress	Craft Cms
1. Social functionalities & user logins	✓	✖	✖	~
2. Multiple pages	✓	✓	✓	~
3. Sable services	✓	✓	~	~
4. Beautiful design options	✓	✓	~	~
5. Dynamic user experience	✓	✓	~	~
6. Easy of Use	✓	✓	~	✖
7. Meet requirements within 10 weeks	✓	~	~	✖

Note.

[1] https://www.wix.com/

✓ = Meets the requirement, ~ = Only meets the requirement under certain circumstances,
✖ = Does not meet the requirement

8.2 Building the Website Using ‘Wix’

The design of the first version of the website was based on the ideas and inspiration gathered in the ideation phase, as well as the early requirements for the users, system and developers. A sketch that was made as a paper prototype in the ideation phase was used as reference when designing the layout of the website. Subsequently, a new website was created using the ‘blank’ template offered by Wix, as shown in Figure 11. Based on this blank canvas, the entire website was built by adding a menu, pages, features, and content. The different tools that could be used to build the website are shown in Figure 11, labeled *a* - *h*.

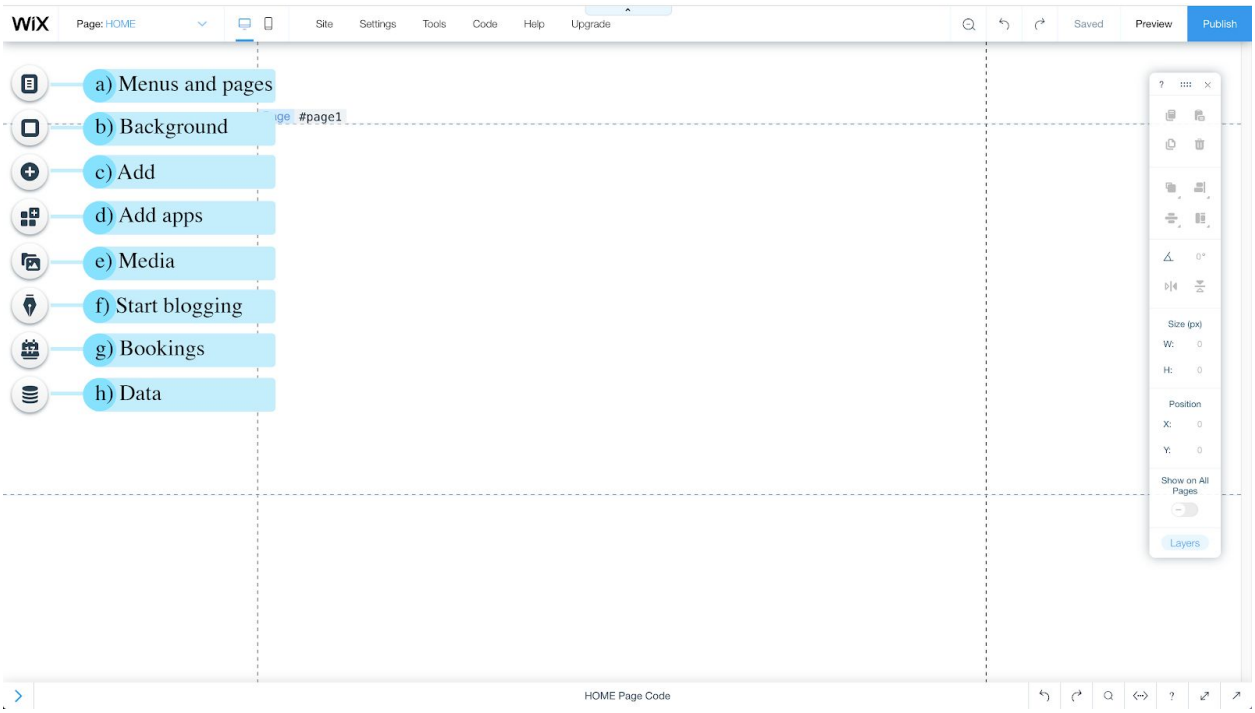

Figure 11. A screenshot of the empty template offered by wix. Some relevant functionalities to build the website are on the left hand side of the screen, and are notated as *a*-*h*.

8.3 Website Hierarchy

The pages which were included in the first iteration of the website are displayed in Figure 12, illustrating the hierarchy of the website. Some of the features, such as the menu, the chat functionality, and the link to the user page, are 'pinned to the screen' on all pages. The other pages are separated, and made available through the menu.

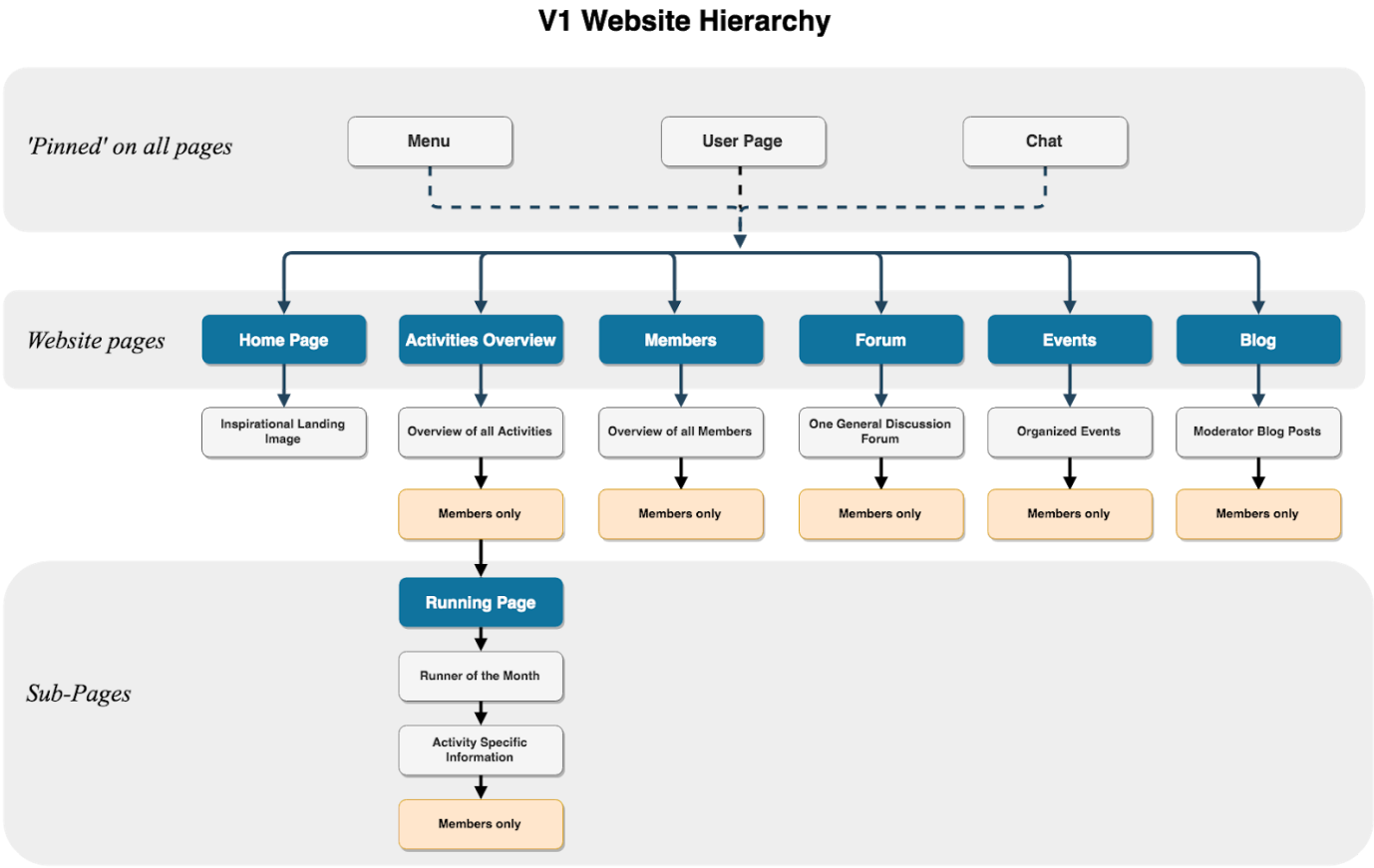

Figure 12. A diagram of the hierarchy of Version 1 of the Website

8.4 Visual Design

It was important that the visual design represented the organizational identity, which was based on the core values of: *enjoyment* in physical exercise, *sustainable lifestyle change*, and *social* interaction. Figure 13 illustrates a few of the pages of the website, while a complete overview can be found in Appendix E. In the first version, almost all the images used were acquired from Unsplash[2], a photo sharing website with high quality photography, free for use. The font used was DIN Neuzeit Grotesk for bold fonts (e.g. titles) and DIN Next Light for thin fonts (e.g. body of text), illustrated in the style guide in Figure 14.

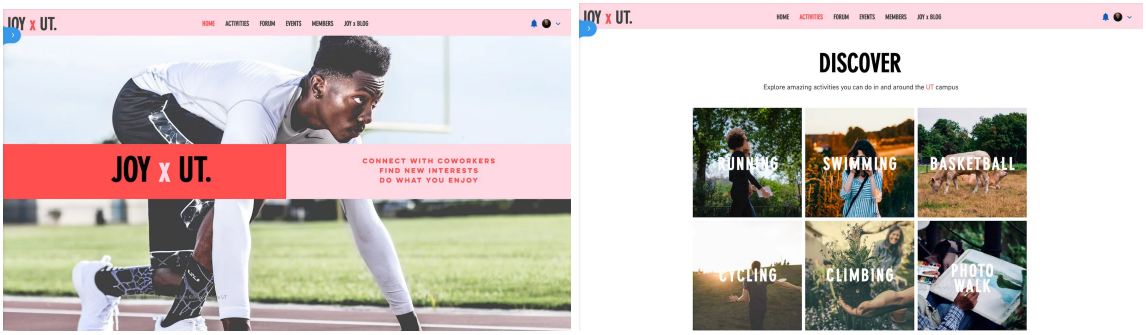

Figure 13. Screenshot of the homepage of Version 1 of the website

Figure 14. Styleguide of the platform

[2] https://unsplash.com/ - A stock website with high quality photography, free for use

9. Refining User Requirements: Co-Designing with UT Employees

In order to specify the requirements of the users in more detail, it was decided to involve the users early on in the process, through iterative user tests. This allowed for the target group to become co-designers of the platform, creating a closer customization to their wants and needs.

9.1 Usertest 1 - Exploration

9.1.1 Goal

The goal of the first user test was to test the earliest version of the platform on the user group, and to get feedback on general, as well as specific, details of the user experience, functionalities, and design of version 1 of the website.

9.1.2 Procedure

The user test was carried out with a total of 8 participants (3 male, 5 female), who were all employed by the UT. The test took place in the participants' various offices, and took approximately 20 minutes each, following the protocol included in Appendix F, section F.1. During the test, the users were encouraged to explore the website on their own computer, or one borrowed from the developers. Since the website is available to members only, the user needed to sign up to the website. Throughout the test, the users were prompted to speak their mind, in accordance with the *think aloud method*. The comments and actions of the users were noted by one of the developers. After the user had explored the website, 7 pre-scripted, open-ended questions were asked.

9.1.3 Results

In this user test, it became clear that the target group (UT employees) is diverse, and that categorizing the users into beginner, intermediate and advanced could help increase the users-solution fit. Therefore, the feedback from the first user test resulted in additional

requirements from the users (see Table 8), separated into requirements from beginners and intermediate respectively, as well as a to-do list with specific things to improve (Appendix G, section G.1), such as inconsistencies in design and content. With regards to feedback from advanced users, it was decided that it needed to be excluded, as they are not the users with the most need for this intervention.

Table 8

Additional User Requirements From Usertest 1

Beginner User Requirements	**Intermediate User Requirements (John Kim's)**
Shared Requirements ● Purpose of the website needs to be clear ● Focus on enjoyment in exercise needs to be a core part of the user experience *Specific Requirements* ● Visual content should not feel intimidating (this version felt too sporty) ● Want more casual activities that are not very intense ● Want to connect with like-minded others ● Want to know more about the scientific research behind the platform ● Activities should be categorized ● The website needs to protect user data	*Shared Requirements* ● Purpose of the website needs to be clear ● Focus on enjoyment in exercise needs to be a core part of the user experience *Specific Requirements* ● Platform needs to encourage users to maintain or improve their current level of physical activity ● Ability to meet other users on a similar intermediate level ● Visual media should neither be too casual nor too athletic ● Users need additional intermediate tips as compared to beginner tips ● Additional information about upcoming events within the activities that users already do ● More information about different aspects of the activities the users already do

The most significant findings from this user test were:

1. Beginner users found that the website focused too much on sports and athletic achievement at this stage, and not enough on enjoyment in exercise.
2. Users found the visual design and content of the website to be a strong suit of the intervention.
3. The blog was not essential to the users, and many found the content unrelated.

9.2 Making Improvements to Platform Version 2

Based on the findings in User Test 1, several changes were made to the platform to better cater to the new user requirements, creating the second version of the website. Some of the most notable changes are mentioned below.

- **Removal of the blog:** Since it was not an essential part of the user experience (as found in user test 1), it was decided the blog should be removed. Cultivating interesting content on a blog is a time consuming activity, and would require a large commitment from the editors or moderators.

- **Categorization of Activity Overview:** Since many of the users felt intimidated by the activities in version 1 of the website, and requested more casual activities, it was decided to categorize the available activities. The categories added were: *relax, energize, activate,* and *challenge*. This ranked the available activities in terms of how much time and energy commitment they required, as well as the level of intensity. The amount of time needed for each category was also added.

- **Adding an 'About Our Mission' page:** To clarify the purpose of the website to the users, the mission and vision statements of the platform were added to a new page.

- **Adding an 'About Our Inspiration' page:** To clarify the research which the website was built upon, a new page was added.

- **Updated home page**: Since many users found the background image on the home page too sporty, it was changed to a video and description that better captured the value of *enjoyment in physical exercise* (see Figure 15).
- **Adding section to running page, specifically targeted at beginner users:** In order to better appeal to beginner users, and help them over the intention behaviour gap, a section called “First Step” was created” (see Figure 16).

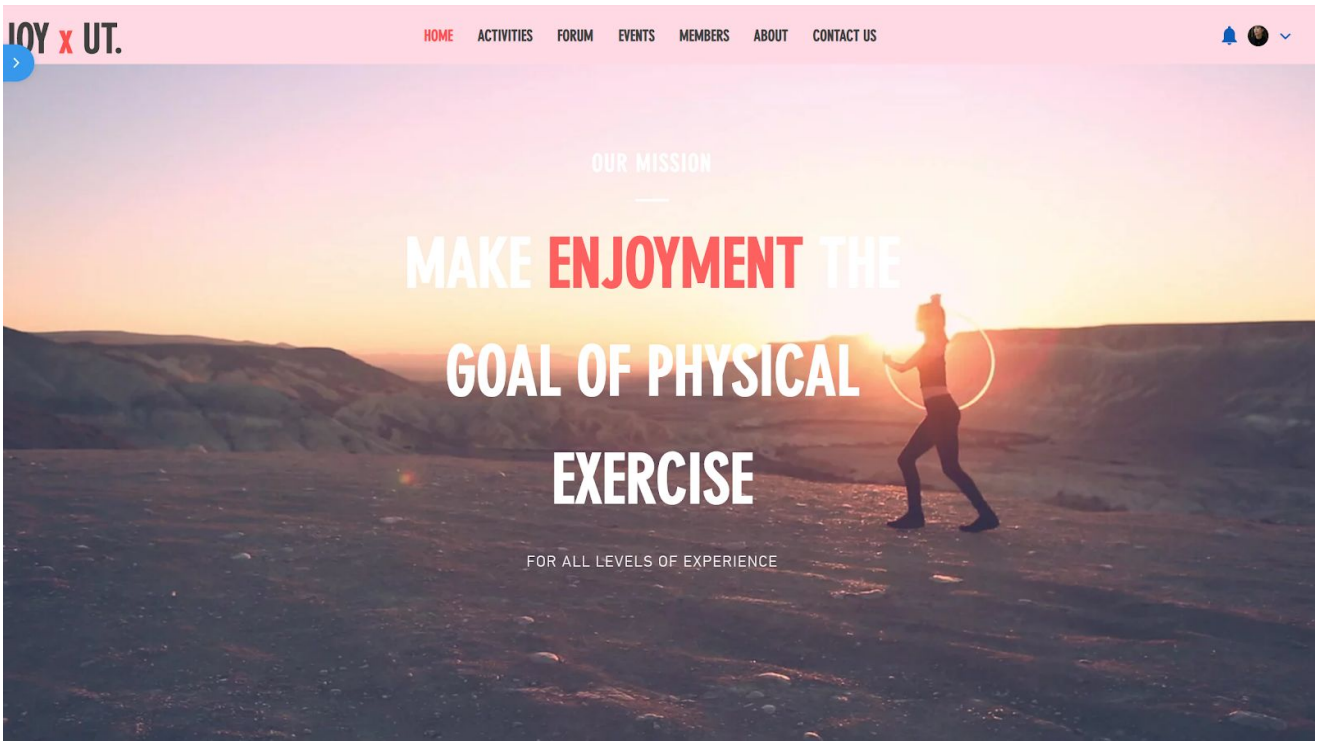

Figure 15. Screenshot of the home page in the second version of the website

Figure 16. Screenshot of added section to running page, targeting beginners

9.3 User Test 2 - Task Performance Test

9.3.1 Goal

The goal of the second user test was to observe how the users navigated the second version of the website, if they were able to complete given tasks, as well as to learn more about the different user groups (beginners vs. intermediate).

9.3.2 Procedure

The user test was carried out with a total of 16 participants (10 male, 6 female), who were all employed by the UT. The participant ages were distributed between 24 and 50 years old (see Figure 17). The test took place in the participants' various offices, and took approximately 20 minutes, following the protocol found in Appendix F, section F.2. During the test, the users first explored the website on their own computer, or one borrowed from the developers, and, once they were comfortable using the website, they were asked to perform 7 tasks. Similarly to User Test 1, the *think aloud method* was implemented. The comments and actions of the users were noted by the developers.

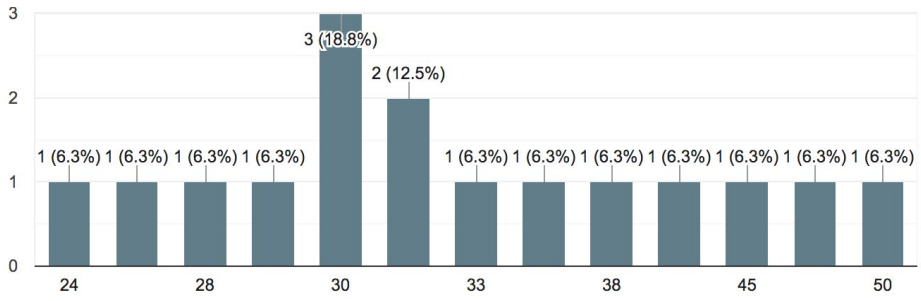

Figure 17. Bar graph of age distribution of the test sample.

After the user had explored the website, an online questionnaire was filled in by the participant. The questionnaire contained a filter question, which sorted the users to different sections of the questionnaire depending on their lifestyle (e.g. how often they partake in physical activity). This way, the different user groups (beginner, intermediate and advanced) could be identified.

9.3.3 Results

9.3.3.1 Observations

The users seemed to successfully navigate the website, and complete the requested tasks. Some of the more notable behaviours were:

1. Beginner users tended to not spend enough time on the 'First Step' section, before scrolling past it. Therefore, enhancing the user experience of this section may therefore be of importance.
2. Participants really appreciated the visual appearance of the website, including the images, as well as the video background on the homepage. They felt it better captured the element of joy than the previous version. However, some users felt that customizing the photos and videos to the context of the UT campus could improve the relatability of the website.
3. Some users struggled to find the chat icon in its current location (bottom right corner).
4. Some users felt that the landing page was not clear enough in terms of explaining what the website is for, and how it can be used.

9.3.3.2 Questionnaire Results

The results of the questionnaire can be found in Appendix G, section G.2. Out of the 16 participants, 7 participants were identified as beginners (43.8%), by answering that they never, rarely, or only sometimes exercise (irregularly), on the filter question. An anonymous list of the beginners can be found in Appendix G, Section G2, Table G2.1. In the 'beginner section' they were asked questions about their current attitude, believed capability of behaviour change (e.g. self-efficacy), as well as general opinions about the website. The average scores of the quantitative questions are displayed in Figure 18. Furthermore, 3 qualitative questions were asked to gain more insight into the user type, and their preferences for the website. The findings are summarized below:

- On average, 4 out of 7 beginners indicated that they were neutral to the prospect of doing physical activity that they enjoy, more often, and the remaining 3 wanted to do it more often (leading to an average score on the likert-scale of 3.71). This illustrated the diverse attitudes and levels of motivation amongst beginners.

- Beginners mostly believed that they are capable of doing a physical activity that they enjoy, more regularly (average score 4.14).
- The website made the majority of beginners (5 out of 7) feel like they wanted to partake in more physical activities that they enjoy (average score 3.57), however 1 user reacted negatively to this statement, and 1 user was neutral. This again attributed to the diverse attitudes of the beginner user type.
- The reasons most beginners gave for leading physically inactive lifestyles were *time constraints* (6 out of 7 users), as well as *not knowing what to do or where to start* (3 out of 7 users), as well as *not knowing who to activities with* (3 out of 7 users). Thus, it became evident that these needed to be focus areas in order to support beginners in engaging in a more physically active lifestyle. However, again, the beginner users showed diverging opinions, and indicated that there were several alternative reasons that kept them physically inactive, such as: *procrastination*, *lack of enjoyment, health related issues* and *other*.
- The beginner users favorite page was the activity page (5 out of 7 users).
- The points mentioned that the users did not like was that the website sometimes felt slow, the forum and members page could be better, and that the "*design is a bit too modern*" - Participant #7a (see complete list of participants in Appendix G2).

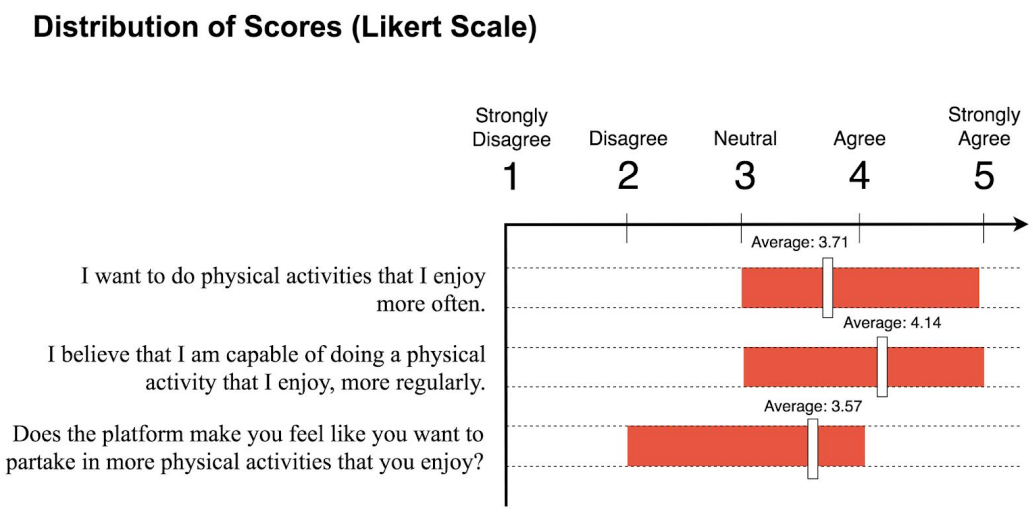

Figure 18: Distribution of scores on the 3 likert-scale questions asked in the beginner section of the User Test 2 questionnaire.

9.3.4 Refined User Requirements

The findings from this user test resulted in additional user requirements (see Table 9).

Table 9

Additional User Requirements From Usertest 2

User Requirements (Usertest 2)
● The landing page needs to clarify how the website can be used ● The visual content can be improved by incorporating the UT context better in the images and videos ● Need help with fitting exercise into a busy schedule ● Adding links (i.e. anchors) at the top of the running page would make it easier to find relevant information

9.4 Complete List of User and System Requirements

Based on the requirements found in user test 1 and 2, a complete list of user and system requirements was summarized.

9.4.1 Refined User Requirements

Table 10

Refined User Requirements

User Requirements	Explanation
Inclusivity	● The website should feel welcoming and *inclusive* of beginner users (i.e. the content should not feel intimidating, or too athletic) ● The website should feel like it was designed for UT employees
Clarity & Transparency	● The *research* inspiring the platform should be mentioned ● The *purpose* of the website should be clear ● The *functionality* of the website should be clear ● The landing page should clarify how the website is to be used ● The focus on *enjoyment* in physical activity should be clear
Supporting Behaviour Change	● The users need *support* fitting exercise into a busy schedule (i.e. there should be many casual exercise options to do during a workday) ● Activities should be *categorized* in order for beginners to be able to identify activities they are comfortable and interested in more easily
Social Interaction	● The website should enable new *social* contacts (i.e. want to connect with like-minded others)
User Friendly Design	● Navigation on all pages should be clear
Security	● The website is safe to use

9.4.2 System Requirements

Table 11

Refined System Requirements

System Requirements	Description
Membership Functionality	● Most pages are available to members only ● All users have unique profile pages
Security	● User data is protected ● The website has a login/logout functionality
Social Functionality and Interactivity	● Chat ● Forum ● Event sign-up
Pages	● Home page ● Overview of all activities ● Specific page with more information about an activity (e.g. running page) ● Forum (different forum for different activities, enable users to post, like and comment) ● Members overview (ability to search for other members) ● Events (ability for users to sign up, and for moderators to easily create new events) ● About page ● Contact page
Support Dynamic Content	● The website should support different dynamic content, such as videos and animations

10. Final Version of Platform

Based on the requirements from user test 1 and 2, several changes were implemented into the final website. In this chapter, the final hierarchy of the website is illustrated, as well as some of the more notable changes made to some of the pages. A more general overview of the final pages of the website (that were updated in the final version) is shown in Appendix H.

10.1 Website Hierarchy

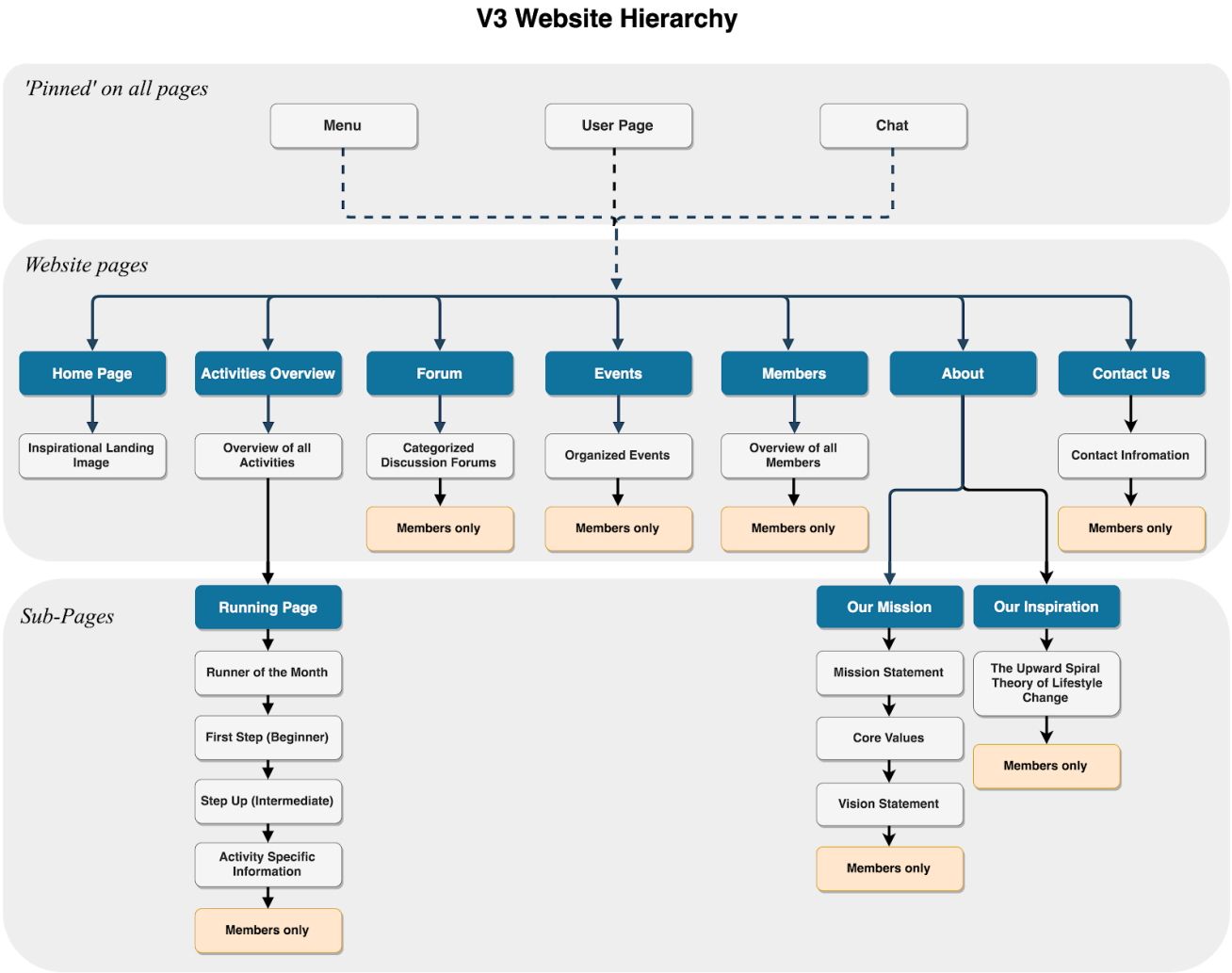

Figure 19. A diagram of the hierarchy of Version 3 of the website

10.2 Home Page

Based on the requirements found in the user tests, multiple changes were made to the home page (see Figure 20). One of the user requirements derived from the user tests was *Clarity and Transparency*. Users needed the website to be self-explanatory in terms of functionality and purpose. This was especially true for the home page, which is the first thing that new users encounter. Therefore, a section clarifying the functionalities of the website was added below the header image.

Furthermore, as another user requirement was *Relatability*, the video background was changed from stock footage, to a custom-made short video, filmed at the UT campus. The video also aimed to accommodate to the requirement of *Inclusivity*, focusing on enjoyable and casual activities that UT employees can partake in, rather than sports. The activities included in this video were: *yoga, photo walk* and *throwing a frisbee.* The video was planned, organized and directed by both developers, but filmed and edited by John Kim.

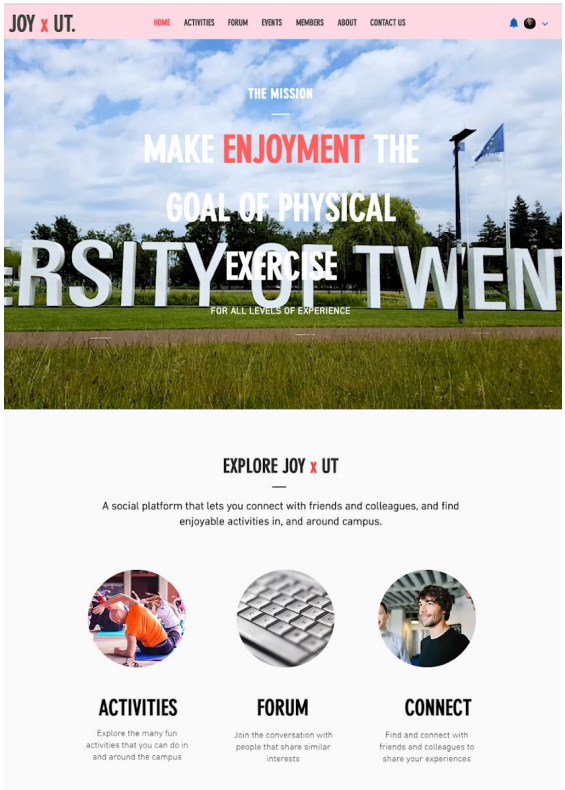

Figure 20. Final version of the home page of the website

10.3 Activities Page

In the activities overview, a description of each of the categories was added, in response to the confusion felt by some of the user test participants with regards to definition of each category. Furthermore, some clarification was made to the introduction text. The most notable addition, however, may be the listview of all of the activities available, at the bottom of the page (see Figure 21).

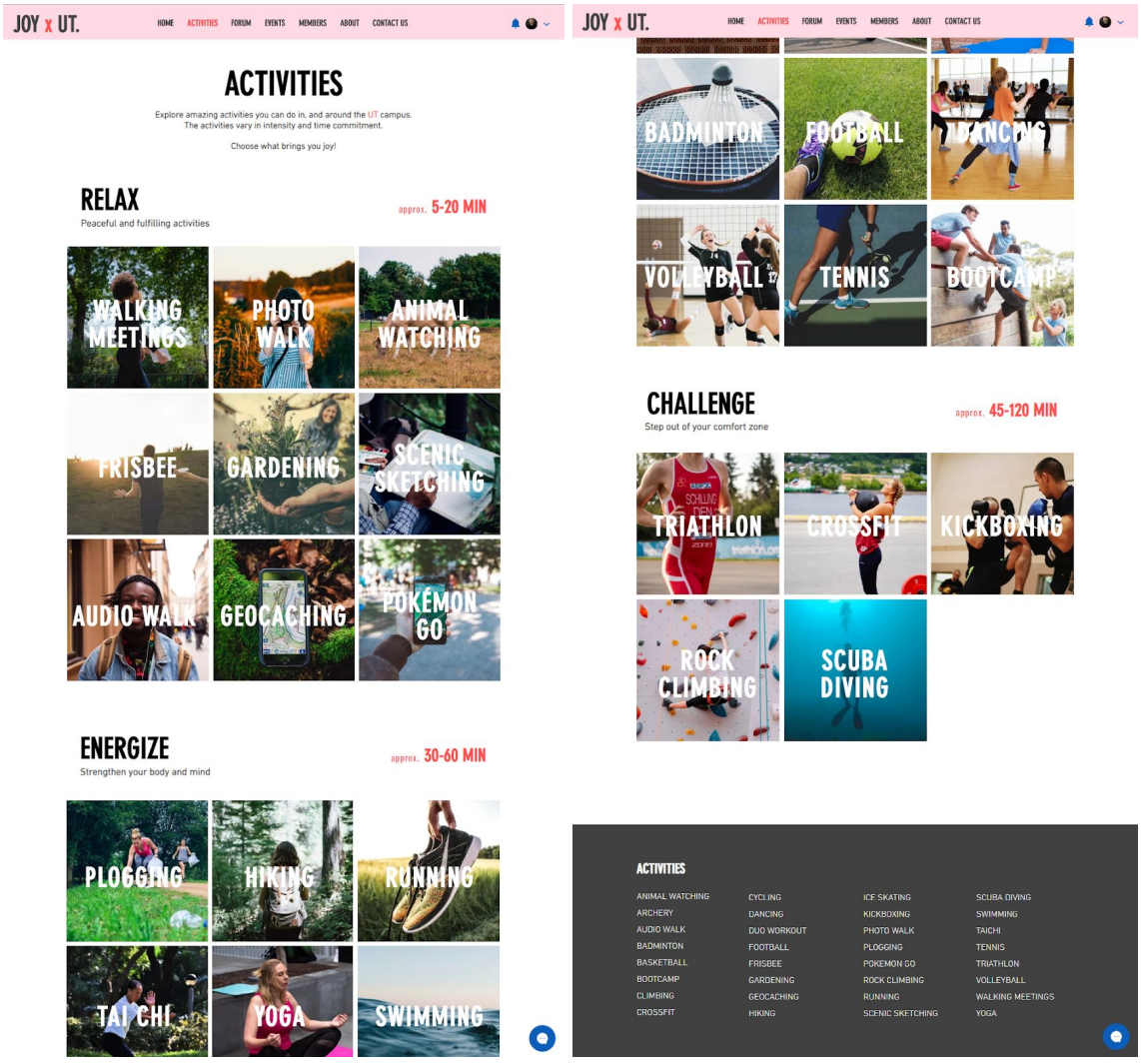

Figure 21. Screenshot of the activities page on the final version of the website (Version 3)

10.4 Running Page

In the running page, based on user feedback, changes were made to enhance relatability, navigation and user experience.

10.4.1 Featured Runner

In order to make the page more relatable to UT employees, a photo and quote of a UT employee, running at the campus facilities, as included in the 'Featured Runner' section of the 'Running Page' (see Figure 22), was added. The goal of this was to add a friendly face that some may recognize, an inspiration to those who want to start running, as well as to add some context related content. Navigation was improved by adding three buttons (i.e. anchors) below the top image, that allows for auto-scroll to the related section.

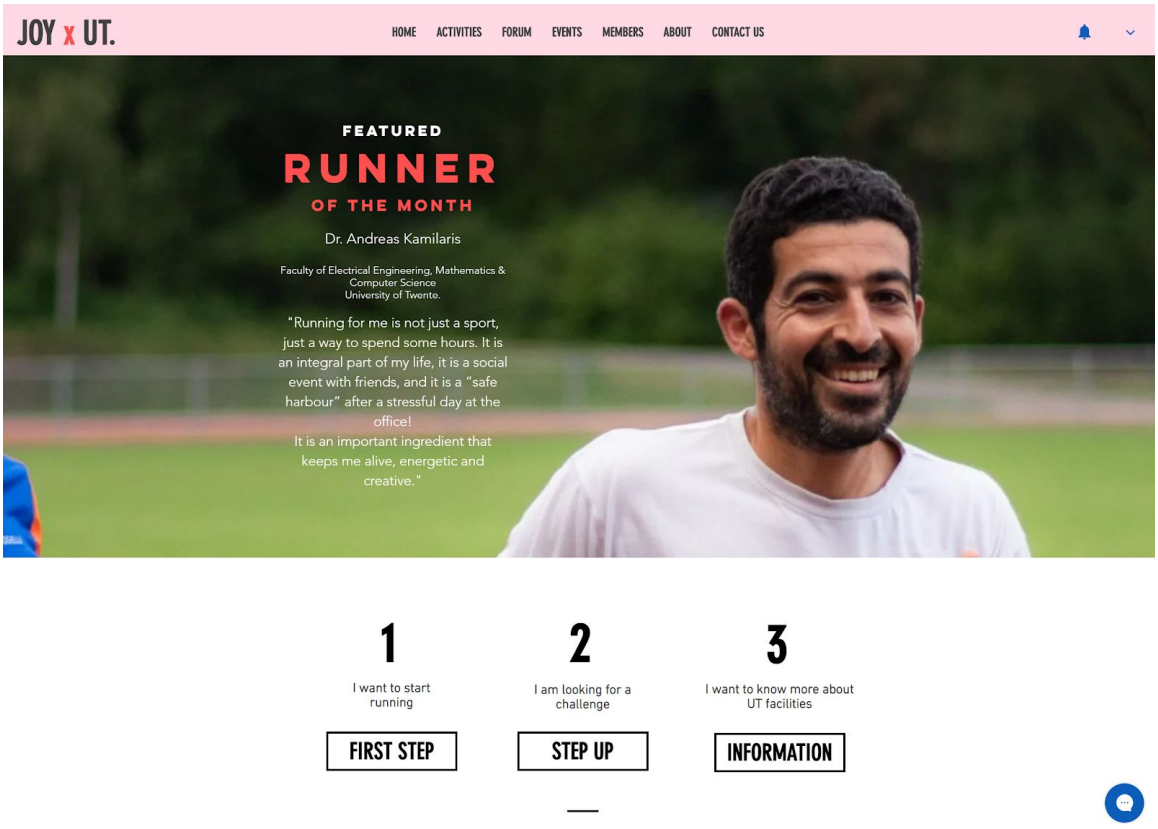

Figure 22. Top of activity page, including photo and quote from UT employee, as well as 'anchors' linking to each of the sections on the page (First Step, Step Up and Information)

10.4.2 First Step

Additionally, the ‘First Step’ section that is specifically targeted at beginner users, was updated (see Figure 23). In the second user test, it had been observed that users were quick to scroll past the ‘First Step’ section, and therefore missed some helpful information. Therefore, it was decided to add more inspiring images, as well as dynamic content and animations, to capture the attention of the viewer. More specifically, the list of running tips was made horizontal and accompanied with pictures, and a gallery slideshow with running paths were added.

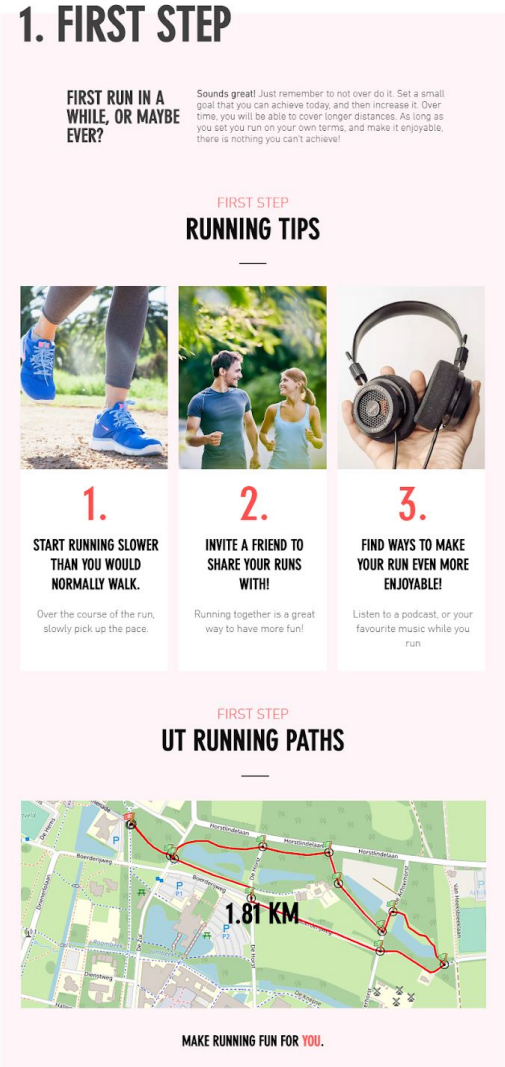

Figure 23. Screenshot of ‘First Step’ section of the running page, targeted at beginner users

10.5 Our Inspiration

Although no major structural changes were made to the inspiration page, some changes were made to the formulation of the text regarding positive emotion in behaviour change. During user test 2, it was discovered that some of the text that was originally meant as inspiring (e.g. "The lesson is easy: The more positive emotion an activity elicits, the more likely we are to repeat it), could be considered as condescending to individuals who are not physically active. Since the goal was quite the opposite, the phrasing was changed, to better reflect the difficulty of changing behaviour (see Figure 24).

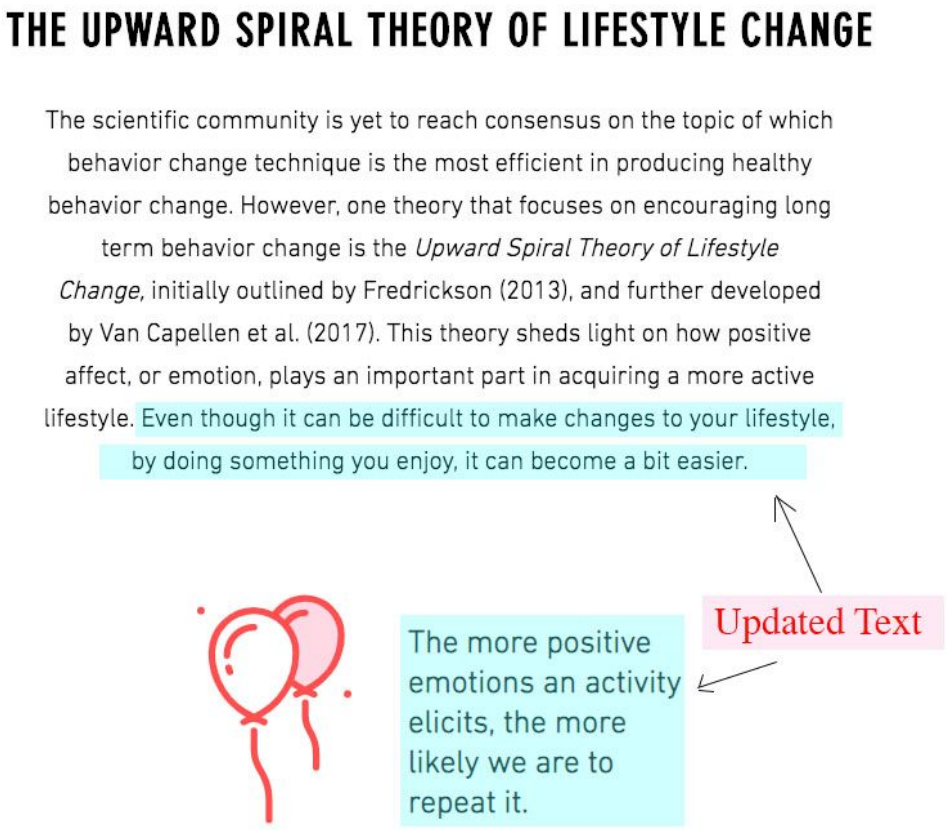

Figure 24. The final version of the text found in the 'Our Inspiration' page, updated to give a more nuanced picture of the difficulty of changing behaviour.

Evaluation

Upon completing the third and final version of the website, the platform could be evaluated, to see how well it was able to meet the requirements from the user, system and developers. This section describes the third, evaluative, user test carried out, as well as the results of the evaluation.

11. User Test 3 - Evaluation

11.1 Goal

The goal of the final user test was to determine how usable the platform was to the target group, using both quantitative methods such as the *System Usability Scoring (SUS)* as introduced by John Brooke (1996), as well as qualitative evaluation of the final version of the website. The SUS-system is a standardized and efficient way to collect insight on user's subjective rating of a system's usability (Bangor, Kortum, & Miller, 2008). Although there are many ways of evaluating the usability of a system, SUS scoring was chosen for its wide acceptance in the industry, the ease of implementation, as well as the fact that it is easily understood and interpreted by different stakeholders involved in the design process (Bangor et al., 2008).

11.2 Procedure

The user test was carried out online, with a total of 21 UT employees (9 Male, 12 Female), between the ages of 28 to 64 (see age distribution in Figure 25). It was conducted remotely, where the participant received instructions via email, accompanied with a link to the website, as well as an online questionnaire, that they could complete in their own time. The protocol that was followed for sending the instruction email is enclosed in Appendix F, Section F5. The test was estimated to take about 20 minutes (10 minutes for exploring the website, and 10 minutes for answering the questionnaire).

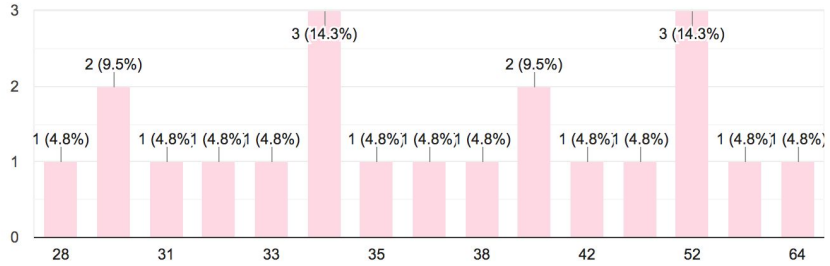

Figure 25. The age distribution of the participants of user test 3.

First, the user was encouraged to explore the website, and to look at the different pages. They were specifically told to visit the running page, but other than that, were free to navigate as they wished. Once they felt satisfied with the exploration, they were linked to an online questionnaire (see Appendix F, Section F.6). The entire sample of participants was asked to score the website using the 10 System Usability Scoring (SUS) questions, as well as 5 general qualitative questions. The SUS-system consists of 10 questions in which the user is asked to rate certain usability aspects of the system on a scale from 1 to 5. Depending on what the participant answered to the filter question: "Which statement best reflects your current lifestyle?", they were separated into different sections of the questionnaire, identifying which user fell under the category of beginner, intermediate and advanced. In the beginner and intermediate sections, 7 evaluative questions, specific to the user type were asked.

11.3 Results

11.3.1 SUS-Score

11.3.1.1 Calculating the SUS-Score

The average SUS-Score is a number between 0 and 100, and is calculated by following the following steps:

1. For odd numbered questions (number 1, 3, 5, 7, 9), subtract 1 from the average score
2. For even numbered questions (number 2, 4, 6, 8, 10), subtract the average score from 5
3. Add up the new values
4. Multiply by 2.5

The average SUS-score was calculated following the steps above, and resulted in an average score of 77 (see Table 12).

Table 12

Average SUS evaluation results, per question, and in total.

Q	Statement	Calculation	Item SUS:
1	"I think that I would like to use this platform frequently"	$\overline{\chi}_{q1} = 3.19$ 3.19 - 1 = 2.19 2.19 × 2.5 × 10 ≈ 55	**55**
2	"I found the platform unnecessarily complex"	$\overline{\chi}_{q2} = 2.10$ 5 - 2.10 = 2.90 2.90 × 2.5 × 10 ≈ 73	**73**
3	"I thought the platform was easy to use"	$\overline{\chi}_{q3} = 4.14$ 4.14 - 1 = 3.14 3.14 × 2.5 × 10 ≈ 79	**79**
4	"I think that I would need the support of a technical person to be able to use this platform"	$\overline{\chi}_{q4} = 1.19$ 5 - 1.19 = 3.81 3.81 × 2.5 × 10 ≈ 95	**95**
5	"I found the various functions in this platform were well integrated"	$\overline{\chi}_{q5} = 3.67$ 3.67 - 1 = 2.67 2.67 × 2.5 × 10 ≈ 67	**67**
6	"I thought there was too much inconsistency in this platform"	$\overline{\chi}_{q6} = 2.00$ 5 - 2 = 3 3 × 2.5 × 10 ≈ 75	**75**
7	"I would imagine that most people would learn to use this platform very quickly"	$\overline{\chi}_{q7} = 4.33$ 4.33 - 1 = 3.33 3.33 × 2.5 × 10 ≈ 83	**83**
8	"I found the platform was very cumbersome to use"	$\overline{\chi}_{q8} = 1.86$ 5 - 1.86 = 3.14 3.14 × 2.5 × 10 ≈ 79	**79**
9	"I felt very confident using the platform"	$\overline{\chi}_{q9} = 3.95$ 3.95 - 1 = 2.95 2.95 × 2.5 × 10 ≈ 74	**74**
10	"I needed to learn a lot of things before I could get going with this platform"	$\overline{\chi}_{q10} = 1.29$ 5 - 1.29 = 3.71 3.71 × 2.5 × 10 ≈ 93	**93**
			SUS-Score: **77**

11.3.1.2 Interpreting the SUS-Score

The obtained SUS-score for this user test was 77. As a rule of thumb, Bangor et al. (2008) state in their empirical evaluation of the SUS-rating system, that scores over 70 are considered acceptable, with good products scoring in the upper 70s and 80s, and excellent products score over 90 (see Figure 26). Thus, since the the SUS evaluation of the web-platform was over 75, this can be considered as a good rating from the target group.

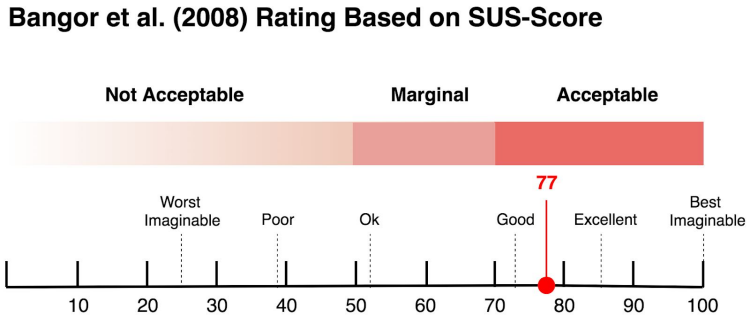

Figure 26. A comparison of the SUS score ratings, and what it indicates about the usability of the system, adapted from Bangor et al. (2008), p. 592. The red dot indicates the score of the web-platform.

11.3.2 General Section

11.3.2.1 Quantitative Questions

Outside of the SUS-Scores, all 21 of the participants were asked to rate their level of agreeance with 4 statements regarding the web-platform, on a likert scale from 1 - 5, from which an average score could be calculated for each statement (see Table 13). The following findings were made:

- On average, the participants were positive about the platform's potential usefulness for employees that want to become more active (average score 4.24), and wanted to see the platform being developed further (average score 4.38).
- The idea was considered a relatively innovative, in the field of employee health interventions (average score 3.52).
- The participants thought that the platform conveyed enjoyment in physical exercise (average score 4.05).

Table 13

Results from the Quantitative Questions Asked to the Entire Sample

Question	**Average Score**	**Interpretation**
"Do you think this platform (if developed further) could useful for UT employees that want to be more active?"	4.24	*Agree → Strongly Agree*
"Do you think that the platform is an innovative/novel idea, in the field of improving employee health?"	3.52	*Neutral → Agree*
"Would you like to see this platform being developed further?"	4.38	*Agree → Strongly Agree*
"Do you think this platform conveys enjoyment in physical exercise"	4.05	*Agree*

11.3.2.1 Open-Ended Question

Outside of the quantitative questions asked to the entire sample, the participants were also asked the open-ended question:

> "*Do you know of any other interventions similar to the platform, that strive to improve employee health?*"

There seemed to be little awareness amongst UT employees about any direct competitors to the platform. Although there were several mentionings of examples, after analyzing the answers (see Appendix G, Section G4, Table G4.1), only two of the examples was deemed similar to the platform in this project: *UT-Kring* (a website informing UT employees about physical activity events) and *Beweegmeer.be* (a personal trainer that targets improving employee health). These could therefore be interesting competitors to study in detail, in future development. Important to note is that this question was non-obligatory, meaning only 14 participants answered it.

11.3.2.1 Filter Question

In order to filter the different users into different categories of user types (beginner, intermediate, advanced), the filter question was asked:

> "*Which statement best reflects your current lifestyle?*"

Out of the sample of 21 participants, 6 were identified as 'beginners' by answering "*I rarely exercise (or never)*" or "*I exercise sometimes, but not necessarily every week (irregularly)*" (see Figure 27). 12 were identified as intermediate users, and 1 as an advanced user.

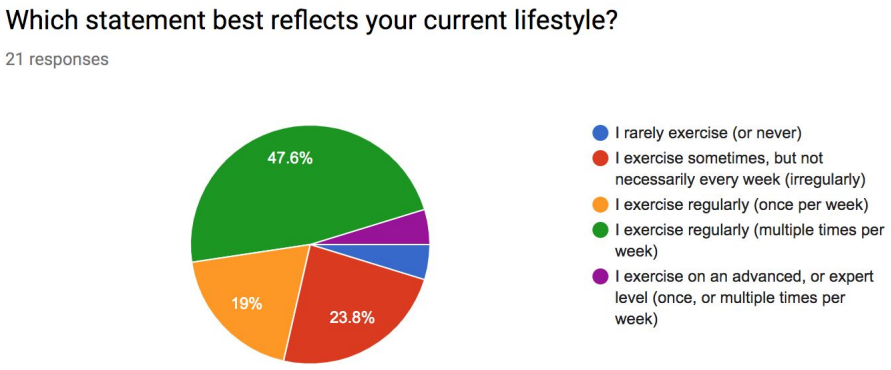

Figure 27. Overview of the distribution of answers in the sample to the filter question.

11.3.3 Beginner Section

In the beginner section, 1 quantitative question, 5 open-ended questions, as well as 1 voluntary open remark were asked. The open-ended questions were answered in written text, and therefore needed to be read and interpreted. These interpreted results are presented in Table 14. In the following subsections, each question is analyzed and interpreted in detail.

Table 14

Results from Beginner Section of Questionnaire

Quantified Question	**Average Score (Scale 1 - 5)**		
Did you find the content (images, text, videos) of the platform inspiring?	4.00	= *Agree*	
Open-Ended Questions	**Interpretation of Answers**		
	Positive	Neutral	Negative
Did you feel like the content (images, text, videos) was encouraging, welcoming and non-intimidating to you? (Why/Why not?)	5	0	1
Do you think this platform could help you find like-minded others that share your interests? (Why/Why not?)	2	1	3
Do you think the content of this website makes you feel a bit more positive about your own ability, and like you are capable of acquiring new healthy habits? (Why/Why not?)	2	2	2
Do you think this platform would make it easier for you to become more active in and outside of the workplace? (Why/Why not?)	3	3	0

11.3.2.1 Content

To understand how beginners experienced the website content, the following question was asked:

> "*Do you find the content (images, text, videos) of the platform inspiring?*"

The average score from beginner users was 4.00, corresponding with 'agree' on the 5 point Likert scale (see Table 14). Moreover, 5 out of 6 of the beginners found the content of the website to be encouraging, welcoming and non-intimidating (see Table 15). However, one participant did not fully agree, expressing that: *"[The content feels] a bit too 'popular' for me"* - Participant 3b (see anonymous list of participants in Appendix G3, Table G3.1).

Table 15

Results from Question to Beginners About Website Content

Question: Did you feel like the content (images, text, videos) was encouraging, welcoming and non-intimidating to you? (Why/Why not?)		
Participant	**Answer**	**Analysis**
#1b	Yes! I was immediately inspired and wanting to join some of the activities. I think the looks of the website are quite nice and it conveys an open atmosphere to join-in.	Positive
#2b	Very appealing and motivating to look further	Positive
#4b	Because appear normal people in the pictures instead of sporty people	Positive
#5b	I liked that is it not focused for experienced active persons but that there was enough for the inexperienced and giving encouraging options for that target group.	Positive
#6b	Nice pictures, welcoming you to try, low barrier.	Positive
#3b	A bit too 'popular' for me :)	Negative

11.3.2.2 Social Aspects

The following question was asked to obtain insight on the opinions of beginners regarding the social features:

> *Do you think this platform could help you find like-minded others that share your interests? (Why/Why not?)*

On this topic, beginner opinions were more divided: 2 were positive, 1 was neutral and 3 were negative (see Table 16). What seemed to be a uniting factor for the negative answers was the belief that it would be difficult for them to find users that are similar to them with whom they could form a friendship, as well as a lack of interest in meeting new people to exercise with.

Table 16

Results from Question to Beginners About Social Aspects of the Website

Question: Do you think this platform could help you find like-minded others that share your interests? (Why/Why not?)		
Participant	**Answer**	**Analysis**
#1b	Yes, it was clear that there is ample opportunities to get in touch with other people on the network.	Positive
#4b	Yes, why not. All depend the marketing that you will do about your website. If there are too much users is possible to find matches with people that share your same interests	Positive
#5b	Possibly, but you then really have to be active on the platform by posting activities or requests to get in contact with. I think though the regular or once of events being made known are better tools to encourage people to go and meet like minded people	Neutral
#3b	Probably not, if you mean like-minded as 'people that are also not exercising' :)(because I guess that people that are not exercising will not easily start using this platform) But for other like-minded people (starting out with exercising, etc), it could definitely work :)	Negative
#6b	Not sure yet if I really find someone to match my "character"together with "exercise"wishes	Negative
#2b	Not per se as this is not of my personal interest	Negative

11.3.2.3 User Self-Efficacy and Perceived Ability for Change

To evaluate the website's effect on beginner users self-efficacy, the following question was asked:

> "*Do you think the content of this website makes you feel a bit more positive about your own ability, and like you are capable of acquiring new healthy habits?"*

The results were again diverse amongst beginner users (see Table 17). 2 of the beginners experienced that the website made them feel a bit more positive about their own ability to acquire new healthy habits, while 2 beginners were more neutral, stating that it may not necessarily change their habits, but it may want to make them want to try more often, indicating that the website may support the formation of intention or motivation. Finally, 2 of the beginners stated that the website did not make them feel more positive about their ability to acquire new habits. Thus, it seems like the content of the website affect beginner users differently, and may only be able to build self-efficacy in certain users.

Table 17

Results from Question to Beginners About the Websites Effect on User Self-Efficacy

Question: Do you think the content of this website makes you feel a bit more positive about your own ability, and like you are capable of acquiring new healthy habits? (Why/Why not?)		
Participant	**Answer**	**Analysis**
#2b	Yes, also examples of smaller exercises	Positive
#5b	yes because as a not so sporty person it really caters for my kinds	Positive
#3b	not necessarily habits, but maybe to do an activity every now and then (like when it's nice weather)	Neutral
#6b	Not sure if is makes me possible to acquire things. It for sure makes me want to try	Neutral
#4b	Not really. I feel positive of doing sport but it is not linked to my ability for doing these sports	Negative

#1b	Not so much for me, the focus is more on being part of it	Negative

11.3.2.4 Creating a Healthy Lifestyle

When asked if they believe that the platform can help them become more active in and outside of the workplace, 3 beginners were positive, while 3 were neutral (see Table 18). This may illustrate that although beginners are cautious to assume that the intervention will work, it shows promise.

Table 18

Results from Question to Beginners About the Websites Ability to Support Healthy Lifestyle Change

Question: Do you think this platform would make it easier for you to become more active in and outside of the workplace? (Why/Why not?)		
Participant	**Answer**	**Analysis**
#1b	Yes, through the connection with others that it enables	Positive
#3b	Assuming I would want to become more active, then yes! :)	Positive
#4b	Maybe yes, Rigth now is a prototype but could be interesting after see how people use the platform	Positive
#2b	Dont know for now	Neutral
#5b	Not sure - a lot has to do with a person getting their act together by just starting. I do think though your variety of activities is encouraging to have that mind set changed and just pick something to start of with	Neutral
#6b	Easy to spot something, but not sure if it is enough of a big stick to keep me going	Neutral

11.3.2.5 Future Improvements

The beginners were asked the question: *In case of future development, how can this platform be improved?*. Analyzing the open ended answers (see Appendix I) lead to a list of improvements:

- Make it easier to connect with others
- Emphasize what content is relevant to beginners, and what is relevant to intermediate users, in the activity sections
- Make the activity overview the landing page
- Make it easier for colleagues to easily indicate when they are planning to do physical activity, to inspire each other to be more active

These are features that could be considered during future development of the project.

12. Evaluation of Requirements

12.1 Evaluation of User Requirements

Based on the findings in the three user tests, it could be evaluated whether or not the user requirements were met (see Table 19).

Table 19

Evaluation of User Requirements

User Requirements	**Explanation**	**Evaluation**
Inclusivity	The website should feel welcoming, *inclusive* and non-intimidating to beginner users The website should feel like it was designed for UT employees	✓
Usability	The functionality of the website needs to be clear, and the website easy to use	✓
Visual Design	The design should be aesthetically pleasing and functional	✓
Clarity	The *research, purpose, focus* and *functionality* behind the platform should be clear	(✓)
Supporting Behaviour Change	The website should aspire to support lifestyle changes, and making physical activity more accessible to employees	(✓)
Social Interaction	The website should enable new *social* contacts to occur between employees that share interests	(✓)
Security	The website should be safe to use	(✓)

Note.

✓ = Positive evaluation

(✓) = Conditional positive evaluation

× = Negative Evaluation

The requirement of *inclusivity* is considered as met, since the majority of beginner participants in user test 3 experienced the platform as inspiring, relatable and non-intimidating. The usability of the web-platform also scored high in user test 3 (SUS-score of 77), leading to a positive evaluation. Furthermore, one of the strong suits of the website discovered in user test 2 was the visual design of the website, including content, which therefore also leads to a positive evaluation.

The remaining requirements could only be evaluated as positive under certain conditions. Several design improvements were made throughout the design process to make the purpose and functionality of the platform, however, *Clarity* was still mentioned as an important area improvement during user test 3 by one of the beginner users. Moreover, although the general target group (UT employees) tested in user test thought that the web-platform could support behaviour change in users, the beginner sample were only cautiously positive regarding this statement. Additionally, user test 3 showed that the beginner users had varying beliefs regarding the websites ability to connect them with like-minded people. Lastly, the website was safe to use, but several users throughout the user tests indicated that they would have liked to have a better understanding of what they are signing up for when they were asked to create an account. Thus, these requirements were met, but with room for improvement.

12.2 Evaluation of System Requirements

Similarly to the requirements of the users, the list of system requirements were evaluated individually, and presented in Table 20.

Table 20

Evaluation of System Requirements

System Requirements	Description	Evaluation
Membership Functionality	Private membership website, with unique user profiles	✓
Security	The website has a login/logout functionality, protecting user data	✓
Social Functionality and Interactivity	The website offers interaction, such as in the chat, forum and event sign-up	(✓)
Pages	The website has a home page, activities overview, specific page with information about running, forum, members overview, events, about page and contact page	(✓)
Support Dynamic Content	The website should support different dynamic content, such as videos and animations	✓

Note.

✓ = Positive evaluation,

(✓) = Conditional positive evaluation,

× = Negative Evaluation

All requirements were positively evaluated, with only the requirements of *Pages* being conditionally positive, as in this prototype of the website, only the *Running Page* of all of the available activities had been developed. It was enough to show the concept of the website, but is not enough for a fully functioning platform. Furthermore, even though the platform had integrated several social functionalities (chat, forum), it was missing a functionality to create a social group

of like-minded people that the users could subscribe to, something that was requested throughout the user tests. Therefore, this requirement was only conditionally met.

12.3 Evaluation of Developer Requirements

Finally, the requirements of the developers were evaluated in Table 21, which were all evaluated positively. The project was completed within the time frame of 10 weeks, it aspired to support healthy lifestyle change, had a focus on enjoyment in exercise and was focused on developing the user experience.

Table 21

Evaluation of Developer Requirements

Developer Requirements	**Evaluation**
The project needs to be concluded in 10 weeks	✓
The project should aspire to support behaviour change towards a healthier lifestyle	✓
The project should be focused on enjoyment in exercise	✓
The project should focus on crafting and enhancing the user experience	✓

Discussion

In this final section, the acquired knowledge from the project is discussed, together with its limitations, and relation to the scientific literature. Furthermore, conclusive thoughts are shared, together with recommendations for future work.

11. Discussion

The aim of this graduation project was to design an intervention that encourages UT employees to become more physically activity, by partaking in activities that brings them joy. This resulted in the development of a web-platform, providing an online space where employees can connect with each other, be inspired to partake in a range of joy-filled activities available in and around the campus, as well as find tips and encouragement on how to become more physically active. Through 3 iterative user tests, the web-platform was customized to the needs and requirements of the target audience. The findings of this study show that the platform is a promising and novel concept, with few direct competitors. The target group found the user experience of the platform to be a strongpoint, giving the visual elements, as well as usability, good ratings. The web-platform received a usability SUS-score of 77, and a clear majority of the user test participants wanted to see that the platform is developed in the future.

By implementing co-design throughout the development of the platform, user requirements could be derived, which helped customize the user experience significantly. Therefore, this study adds to the body of literature that supports the use of co-design in the development of web-platforms. Furthermore, it was discovered that 'beginner' users (individuals who rarely, or infrequently engages infrequent physical activity) had different requirements from the other two user types (intermediate and advanced). The most important 'beginner' requirements were *Inclusivity*, *Clarity and Transparency*, *Supporting Behaviour Change*, *Social Interaction*, *User Friendly Design* and *Security,* which served as a guide for the design of the platform. The results from evaluative testing suggest that beginner users were overall inspired by the content of the website, and feel like the content is relevant and non-intimidating to them. The beginner view on connecting with like-minded others on the platform is more scattered, with some people doubting their ability to meet like-minded others, while some find the social features to be the strong points of the intervention. Similarly, the content of the website made certain users feel a bit more capable of acquiring new healthy habits (perceived self-efficacy), while others felt indifferent to the websites effect on self-efficacy. Half of the tested beginners thought that the platform could help UT employees become more physically active, while the other half was neutral to the statement. It is clear that beginner users consist of a diverse group of people, whose opinions cannot always be easily generalized.

The findings of the project support the perspective of *The Upward Spiral Theory of Lifestyle Change* (van Cappellen et al., 2018), which is that focusing on enjoyment in exercise is a novel and promising concept in the field of behaviour change interventions. The target group agreed that the platform conveyed the message of enjoyment, and that they believed that it could be helpful to employees who want to be more active. Furthermore, there was early evidence suggesting that the web-platform positively affected self-efficacy in some beginner users, which was a focus point of the *Health Action Process Approach (HAPA)* by Schwarzer, (2008), suggesting that continued study and implementation of this theory into the website could be of value. In general, the findings indicate that the combination of *The Upward Spiral Theory of Lifestyle Change* and the *HAPA Model*, could be impactful to lifestyle interventions.

There were several challenges which this project needed to overcome. One of the main challenges was developing a web-platform for a diverse target group. This was tackled by identifying the 3 user types within the group, differentiated by their lifestyle with regards to frequency of physical activity. However, this project also shed light on the issue of generalizing about the users within each of these user types, as beginner users may all share a similar level of physical exercise at current, but they may have very different attitudes, experiences as well as abilities, that may need to be catered to differently. Therefore, a recommendation for future research is to further examine the types of users that are considered 'beginners', in order to cater to them better. Another significant challenge was, similarly to other interventions that aim to elicit behaviour change, this project faces the overhanging threat of failure, since previous lifestyle interventions have had mixed results . Turning intention into action is difficult, and therefore, future empirical testing on the platform's ability to produce behaviour change is recommended.

Given the positive evaluation amongst the target group of the web-platform, as well their interest in seeing the project being further developed, this illustrates that the concept is novel, and applicable in the context of UT employees. Shifting the focus of physical activity onto enjoyment can be a valuable insight both for this project, as well as other lifestyle interventions in the future.

12. Conclusion

12.1 Conclusion

Sedentary behaviour in the workplace is an increasing health problem worldwide. The aim of this graduation project was to design a platform targeted at increasing physical activity amongst UT employees, by focusing on experiencing positive emotions in exercise. The target group found that the system had high usability, was a novel idea in the field of employee health interventions, and could be promising in terms of helping UT employees to become more active. Furthermore, beginner users (individuals who rarely or infrequently engages in physical activity) felt that the platform contained inspiring and relatable content, and half of the included beginners believed that the platform could potentially help employees to become more active. Therefore, the platform seems like a relevant and promising addition to the current pool of lifestyle interventions on the market.

12.2 Recommendations for Future Work

An important part of this project was prioritizing which improvements to make, in order to meet the requirements of the user, system and developers, in the given time period. Therefore, throughout the co-design process with UT employees, good ideas that could not be directly implemented were collected and stored for future improvements. The complete list of future recommendations are presented in the Appendix I. Many of the suggestions revolve around performing comparative A/B-testing, a common technique used in web-design, that was not implemented in this project. A/B-testing allows the designer to see which design alternative the users prefer, typically by testing two variants of the same variable (Kohavi, Longbotham, Sommerfield, & Henne, 2009), such as: keeping the current homepage as landing page vs. turning the activities page into the landing page of the website, keeping the activity overview the same for all users vs.‘tunneling’ the information based on user type, keeping the chat button placed in the bottom-right corner vs. top-right, and much more. In general, further research, empirical studies and development of the platform is advised.

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Appendices

Appendix A. The Creative Technology Design Process

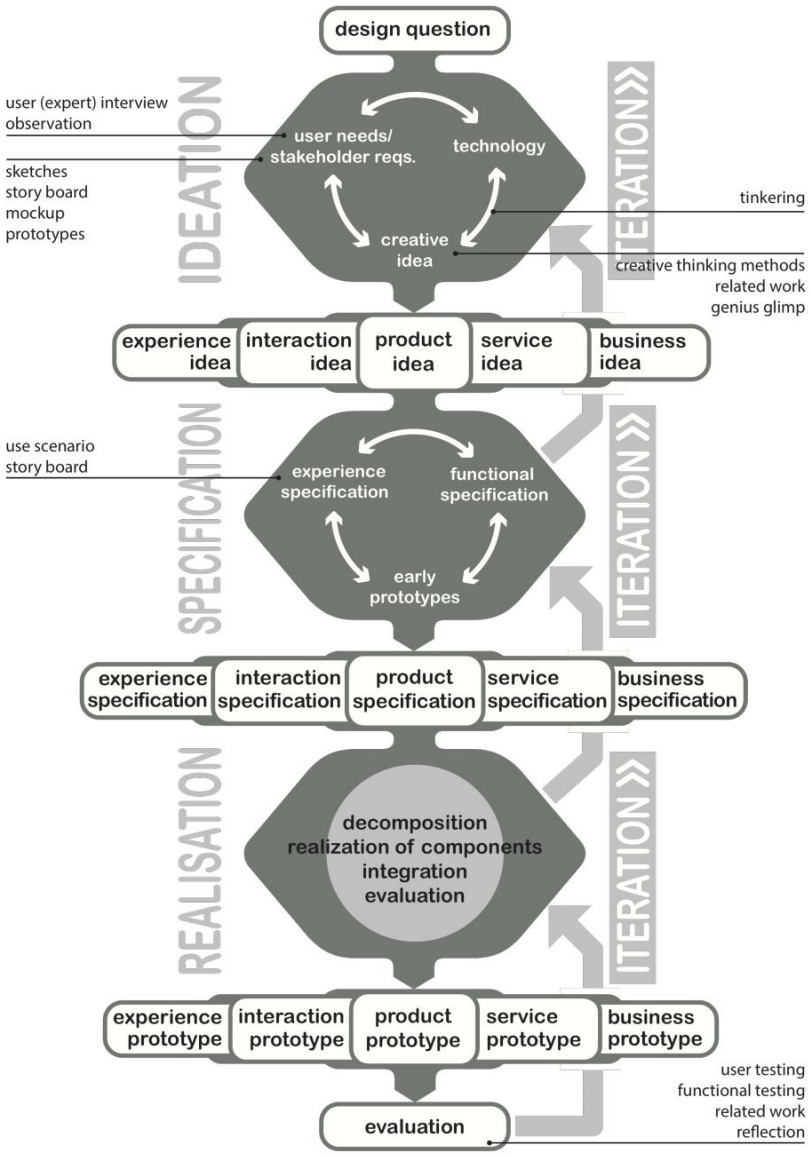


Figure A1. The Creative Technology Design Process (Mader and Eggink, 2014, p. 3)

Appendix B. Concept Ideation

Figure B1. Word Association Exercise

Hobbies

1. Smart Yoga mat
2. Smart yoga ball
3. Hobby coach/assistant
    a. UT facility based activity suggestor
4. Smart office sports
5. Pedal chair
6. Dance mat (Dance dance Rev)

Physical health

7. Smart Dumbbells
    a. Calculate reps (Altimeter or accelerometer)
    b. Calculate calories burnt
    c. Dumbbell alarm?
8. Smart Pull up bar
9. Bodyweight training
10. Mobile meetings
11. UT exercise networks

Lifestyle

12. UT Uniform
    a. Tight uniform to make people more self aware of their health
    b. Smart uniform
13. UT fashion day
    a. Empowerment
14. UT crowd event planner
15. **UT Training Tinder**
16. UT Student vs Teacher

Values

17. Experience suggestor
18. #trashtag / Plogging
19. Negative coach (feat. gordon ramsay)
    a. Humour coaching
20. Organizer (personal planner)
21. Activity during lectures

Environment

22. Environment specific cues
23. Playful office
    a. Smart mini golf
    b. Giant chess board (Chess pieces are worth a certain amount of weight)
    c. VR games
    d. Kinect giant screen area
    e. Maintaining a garden
    f. Exercise group discussions

Social

24. UT Hobby Connector
25. Smart foosball that needs at least four people to play
26. UT interactive activity overview map, showing what there is to do around campus
27. Digital sports friend, that encourages you to be active
28. Tamagotchi that dies if you do not work out
29. Video chatting software
30. Human coaching through app
31. Be a kid again - interactive photo reminder of what you like
32. **Joy in Exercise Intervention:**
    a. Create a scale for quantifying joy
    b. Rate a workout on "how fun it was"
    c. Receive personalized suggestions of what might spark joy for you
    d. Wearable bracelet where you can slide the joy scale while working out
    e. Platform within UT employee website
    f. Compare similar interests, driven by joy.

Mental & Entertainment

33. Each walk creates a new artwork
34. Treasure hunt
35. Activities that spark joy
    a. UT dog walk
    b. UT parkour + smart + skill points
    c. Role playing games
    d. UT Fight club
    e. Rock Climbing
    f. Swimming
    g. Trampoline
    h. Gymnastics

Technology

36. Chair that electrifies your butt
37. Alarm clock that runs away
38. Mobile bar
39. **Audiobook** (or song) that plays only if you keep running/moving
40. Bracelets that gives you more points when you work out together
    a. Points are burn into spending checks

Figure B2. List of Ideas for Intervention Designed to Improve Physical Activity

Appendix C. Core Values Brainstorm

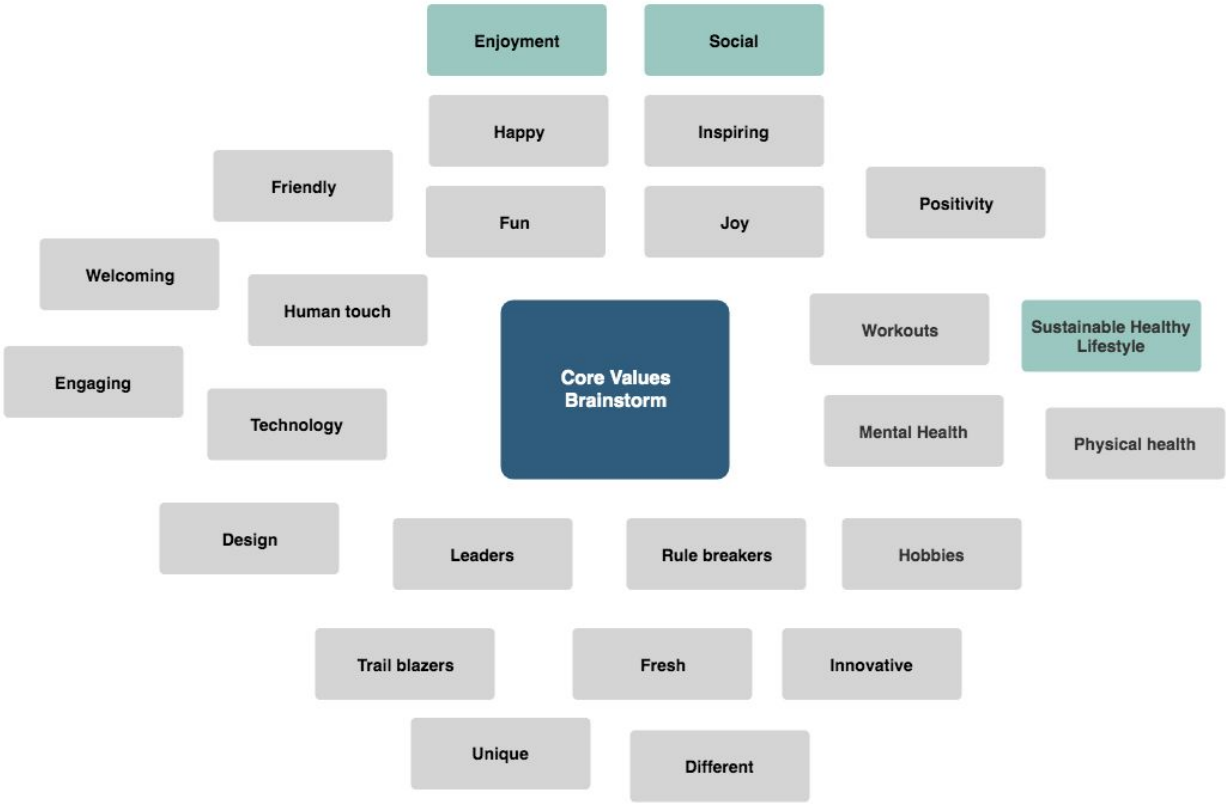


Figure C1. Mindmap of potential core values of the platform, highlighting the three chosen ones.

Appendix D. Design Inspiration

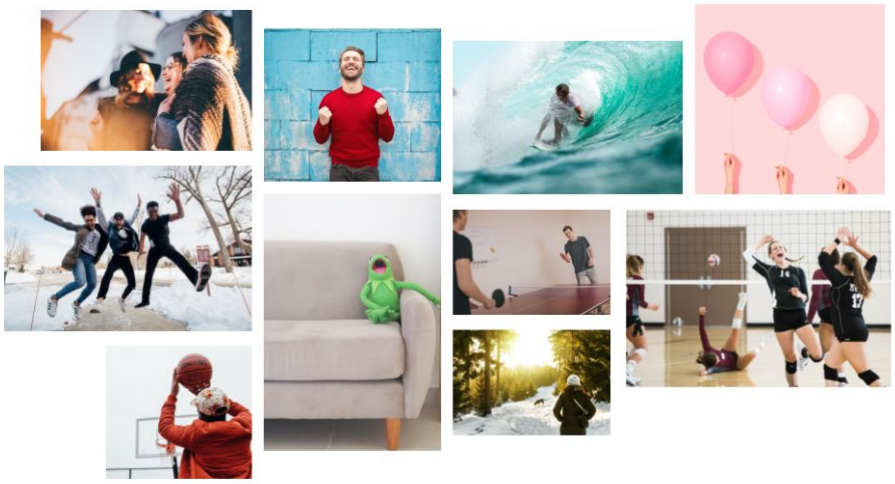


Figure D1. Inspiration Mood Board

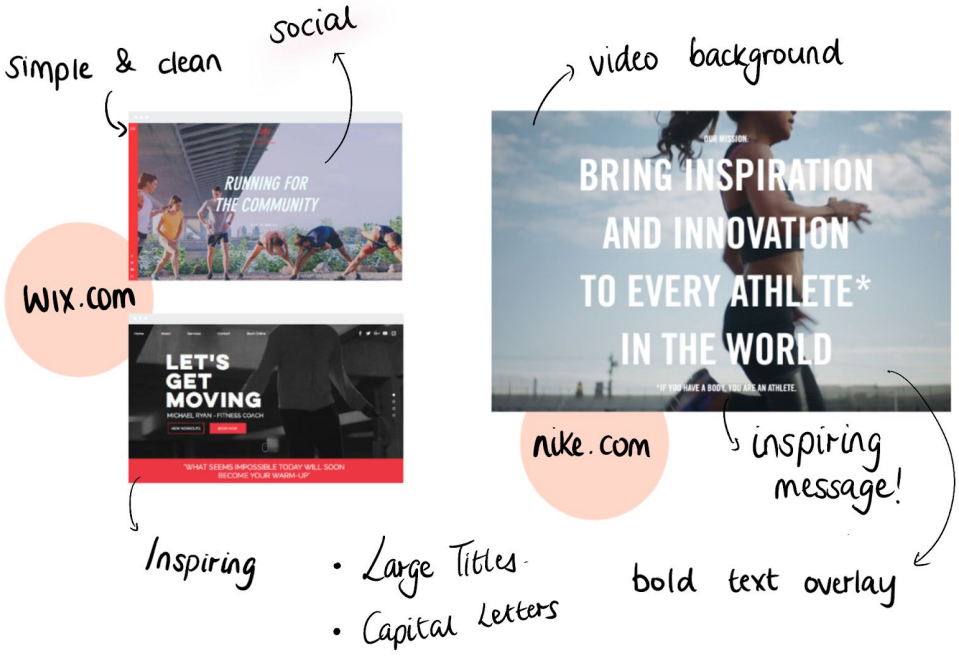


Figure D2. Moodboard of similar websites

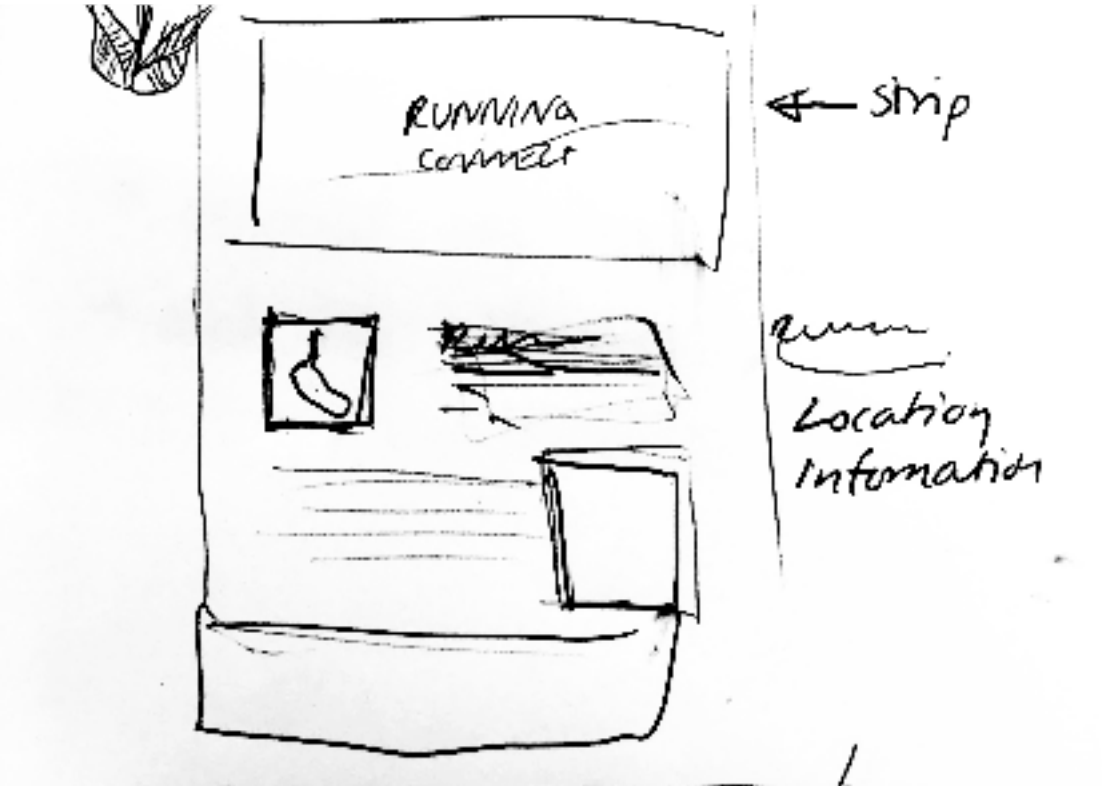


Figure D3. Paper sketch of one of the pages of the website

Appendix E. Website Version 1

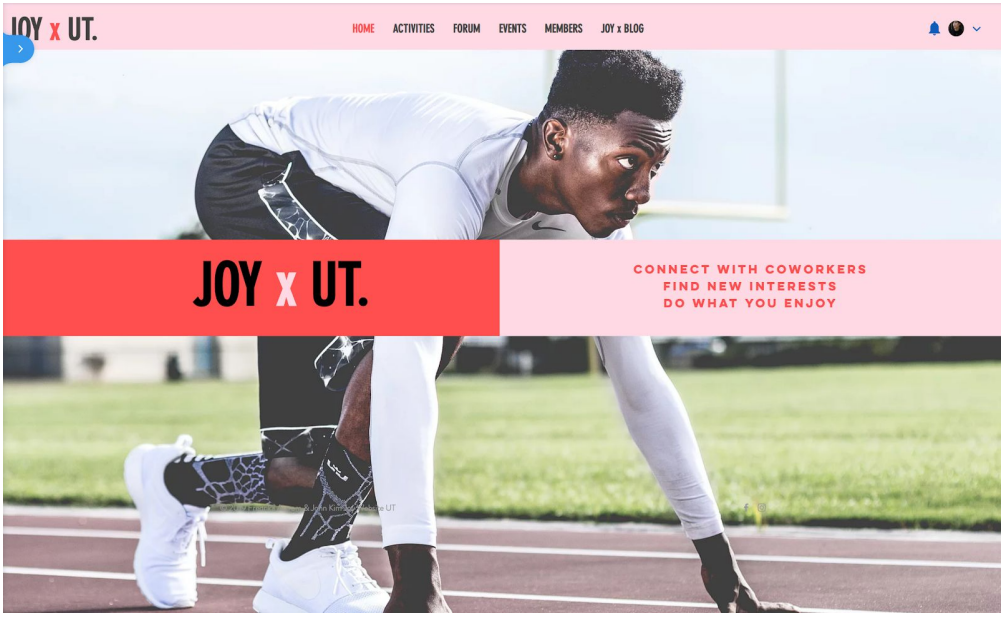


Figure E1. Homepage

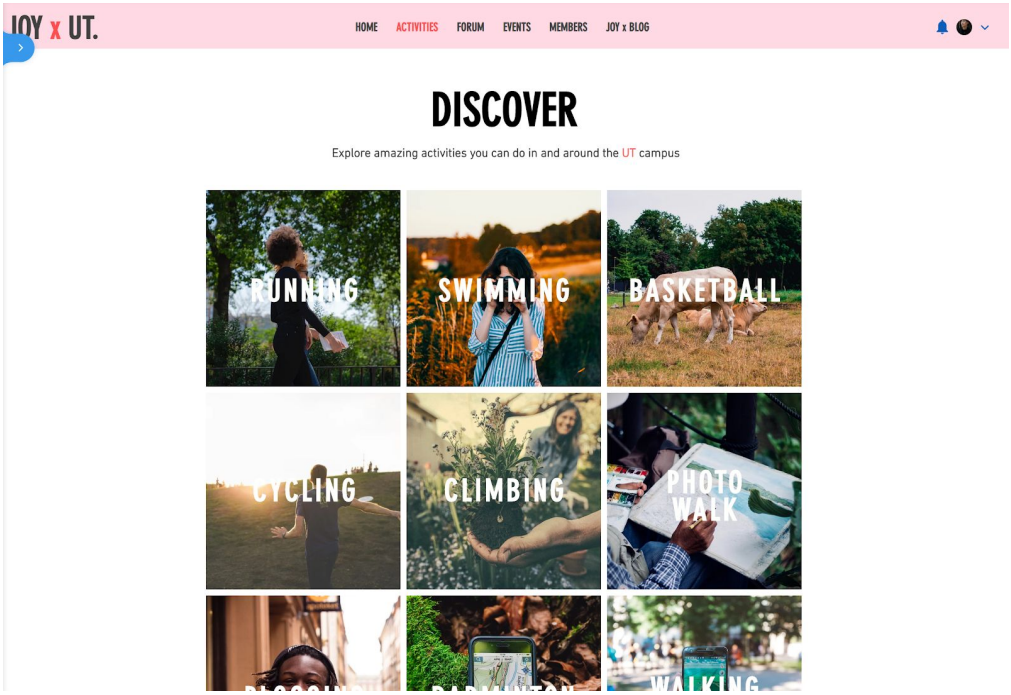


Figure E2. Activity Overview

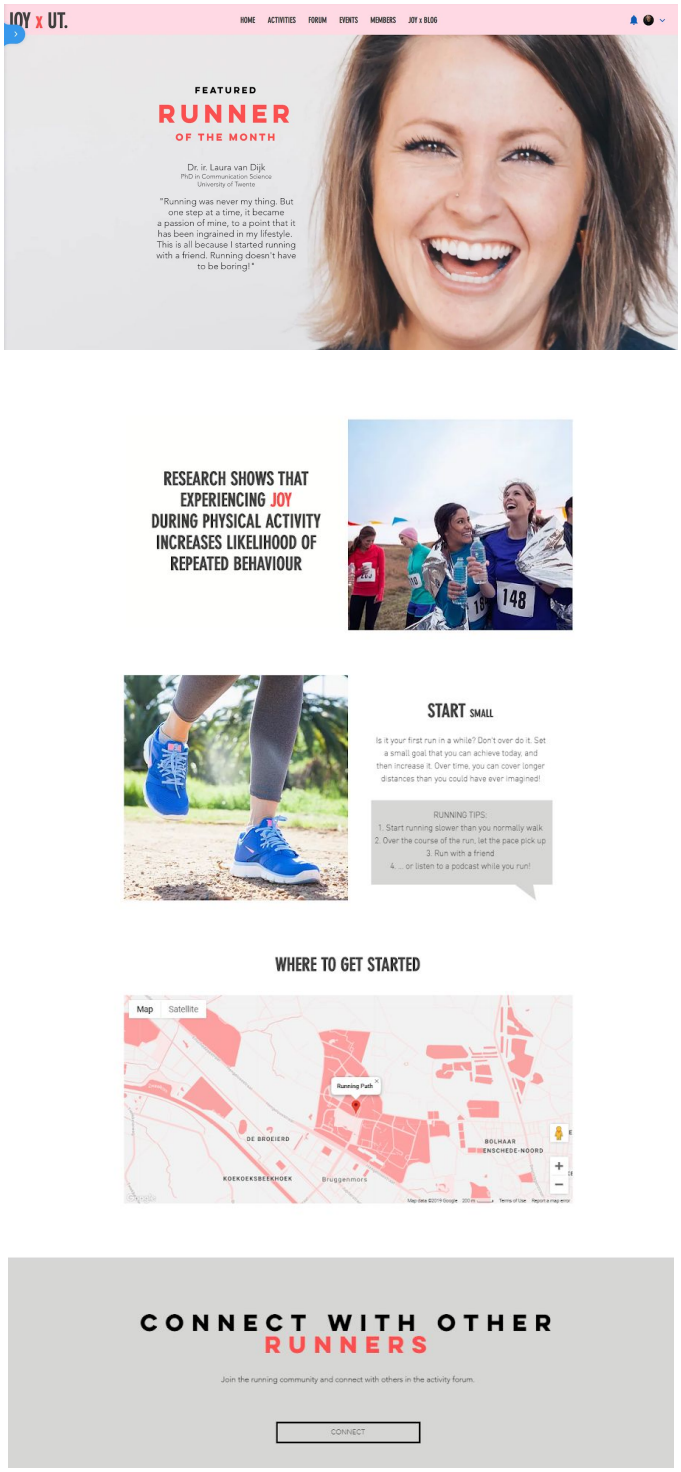


Figure E3. Running page

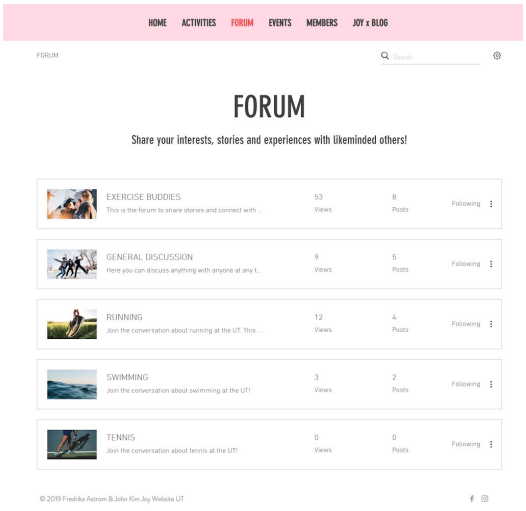


Figure E4. Forum

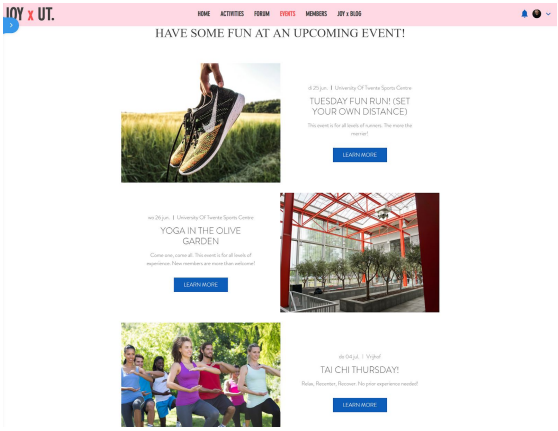


Figure E5. Events

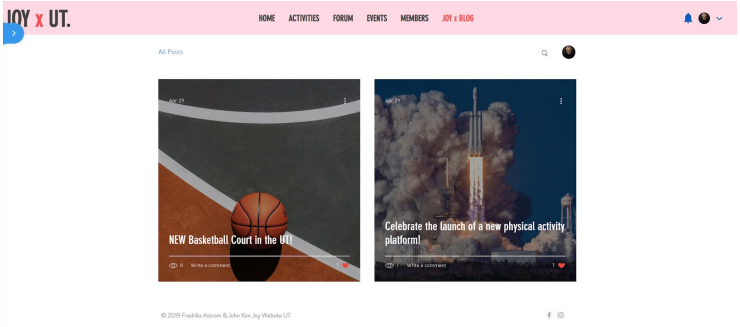


Figure E6. Blog

Appendix F. User Test Protocols

F.1 User Test 1 Protocol

This protocol is to be followed during the user testing. One team member will ask the questions and give instructions, while the other transcribes the conversations.

Greet user & explain testing procedure

Hello!

We are John & Fredrika from Creative Technology. Today we are user testing a platform that we are building for our graduation project. It is targeted at UT employees, and our aim is to encourage involvement in physical activity, with the focus on enjoyment.

We just want to make clear that we are testing the platform, and we are not testing you. We really appreciate any feedback you have to give us.

Please speak all your thoughts aloud as you go through the platform. This helps us better understand why you are making certain choices.

The study will take about 15 minutes (5 for exploring the platform, 10 for questions). We will answer any questions you have at the end of the study.

Consent form

We would like for you to sign this consent form. The information will only be used for research purposes.

Questions?

Do you have any questions?
Let's get started!

User test of platform

- Remind the user to think out loud.
- If the user asks for help, ask them “what do you think you should do?”

Notes:

Pre-scripted Questions:

1. Do you think this platform could be useful for you?

Notes:

2. Does this platform solve some problems that you had before?

Notes:

3. What did you specifically like about this platform?

Notes:

4. What improvements can you suggest for this platform?

Notes:

5. What are some activities you would like to see?

Notes:

6. Can we perform another user test with an updated version?

Notes:

7. Does this platform convey a focus on joy in exercise to you?

Notes:

Debriefing

- Do you have any questions?
- Thank the user for participating.

F.2 User Test 2 Protocol

This protocol is to be followed during the user testing. One team member will ask the questions and give instructions, while the other transcribes the conversations or any general notes.

Greet user & explain testing procedure

Hello!

We are John & Fredrika from Creative Technology. Today we are user testing a platform that we are building for our graduation project. It is targeted at UT employees, and our aim is to encourage involvement in physical activity, with the focus on enjoyment.

We just want to make clear that we are testing the platform, and we are not testing you. We really appreciate any feedback you have to give us.

Please speak all your thoughts aloud as you go through the platform. This helps us better understand why you are making certain choices.

Your task for today will be to find the Running activity page, and to submit a small post in a forum of your choice. After this task, you are free to explore the platform until you are comfortable to answer the questionnaire we have for you.

We hope that this study will take about 15 minutes (approximately 5 for exploring the platform, 10 for questions). We will answer any questions you have at the end of the study.

Consent form

We would like for you to sign this consent form. The information will only be used for research purposes.

Questions?

Do you have any questions?
Let's get started!

User test of platform - Task performance

- Remind the user to think out loud.

- If the user asks for help, ask them “what do you think you should do?”

Task 1: Like one or more of the activities in the activity overview

Notes:

Task 2: Find the place on the website where you can learn more about running.

Notes:

Task 3: Make a post in a forum of your choice

Notes:

Task 4: Follow John’s account

Notes:

Task 5: Find information about the Yoga in the olive garden event

Notes:

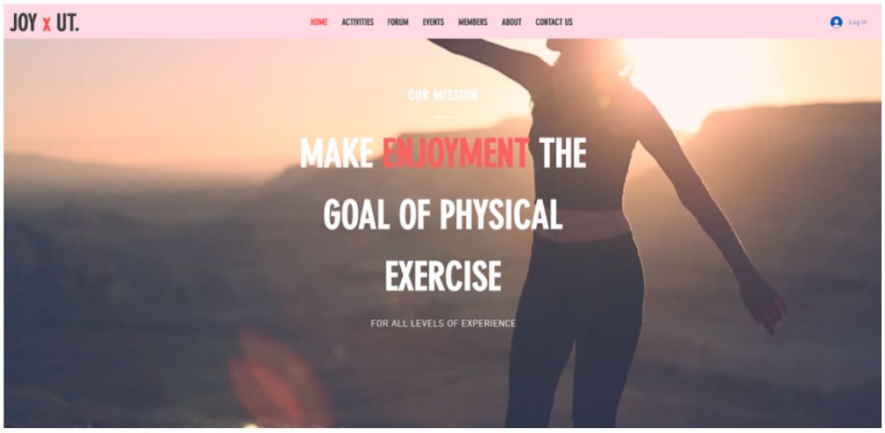
Introduce the Questionnaire.

Please feel free to ask us any questions that you may have, if you come across any difficulties or require elaboration.

Debriefing

- Do you have any questions?
- Thank the user for participating

F.3 User Test 2 Questionnaire



Take 5 minutes to help us improve the JOYxUT platform!

The purpose of this questionnaire is to examine how University of Twente employees feel about the JOYxUT platform, in order to improve it. We also wish to learn more about the users we are targeting.

Your participation is entirely voluntary, and the collected data will only be used to improve the project.

Thank you for your cooperation!

User Information

1. **What is your age?** *

2. **What is your gender?** *
   Mark only one oval.
   - ◯ Female
   - ◯ Male
   - ◯ Prefer not to say
   - ◯ Other: _____

3. **Did you participate in user test 1?**
   Mark only one oval.
   - ◯ Yes
   - ◯ No

[Filter Question]

4. **Which statement best reflects your current lifestyle (on average)?** *
   Mark only one oval.

   - ◯ I rarely exercise (or never) *Skip to question 5.*
   - ◯ I exercise sometimes, but not necessarily every week (irregularly) *Skip to question 5.*
   - ◯ I exercise regularly (once per week) *Skip to question 13.*
   - ◯ I exercise regularly (multiple times per week) *Skip to question 13.*
   - ◯ I exercise on an advanced, or expert level (once, or multiple times per week) *Skip to question 22.*

[Beginner Section]

This section contains 7 questions

1

Indicate to what extent you agree with the following statement:

5. **I want to do physical activities that I enjoy more often** *
   Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

2

Indicate to what extent you agree to the following statement:

6. **I believe that I am capable of doing a physical activity that I enjoy, more regularly** *
   Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

[Continuation of Beginner Section]

7. **What is currently keeping you from doing more physical activities? (multiple answers possible)**
Check all that apply.

- [ ] I don't know
- [ ] Procrastination
- [ ] Time contraints
- [ ] I do not enjoy the type of physical activities I do
- [ ] I don't know what to do, or where to start
- [ ] I don't have anyone to do activities with
- [ ] Health related issues
- [ ] Other
- [ ] Perfer not to answer

4

8. **What are your favourite pages on the JOYxUT platform? (you may select more than one answer)**
Check all that apply.

- [ ] Home page
- [ ] Activities page
- [ ] Specific Activity Page (e.g. Running Page)
- [ ] Forum Page
- [ ] Events Page
- [ ] Members Page
- [ ] About (Our Mission) Page
- [ ] About (Our Inspiration) Page
- [ ] Contact Us Page
- [ ] None

9. **... Why did you like this (these) specific page (pages)?**

[Continuation of Beginner Section]

10. **Is there anything you do not like about this platform?**

6

11. **Does the platform make you feel like you want to partake in more physical activities that you enjoy?** *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

7

12. **Other remarks on the platform (optional)**

This marks the end of the survey.

Thank you so much for your participation, and do not forget to press submit!

F.4 Consent Form

STATEMENT OF INFORMED CONSENT

Two Creative Technology students (Fredrika Astrom and John Kim) from the University of Twente are conducting user testing in order to gain feedback and suggestions for improvements for their graduation project. The information gathered in this feedback session will be used to improve the design and development of the platform.

The benefits of participating in this user test is to help improve the user experience of this platform. We hope that the research will benefit the users, namely, University of Twente employees.

This user test poses no risks to you other than those normally encountered in daily life. The information gathered will be kept confidential. We may save the notes for future use by ourselves or others, but your name will omitted.

Your participation in this user test is voluntary, and you are free to quit the user testing session at any time. Whether or not you choose to participate will have no impact on you whatsoever.

If you have questions about the research, you may contact:

- Fredrika Astrom - f.k.astrom@student.utwente.nl
- John Kim - g.s.kim@student.utwente.nl

If you would like, we can send you a copy of this form, for reference.

The details of this study were explained to me by:

Investigator Names: Fredrika Astrom and John Kim

Date: _____

I have read the above project description. I agree with the terms and hereby consent to participate in the user test.

Participant Signature: _____

Participant Name: _____

Date: _____

F.5 Protocol User Test 3 (Email)

A. Introduce the Project

B. Indicate the Expected Duration (20 Minutes)

C. Include Instructions:

Instructions:

1. Explore the website (on a computer, not a mobile device) using the following link: https://gskim3.wixsite.com/usertest3

(We recommend not using internet explorer!)

- You will be prompted to log in to the website for this user test. You can log in with Google or Facebook, or create a new account
- In the **Activities page**, only the **Running page** can be clicked and viewed. Please visit this page. It serves as an example for how all the other pages would look (for the other activities)
- Explore the website freely, hopefully visiting every page
- This phase could take about 10 minutes, or more if you prefer

2. Fill in our online questionnaire after exploring the platform, using the following link: https://forms.gle/3eoNhfvQQ4DiczWR9

- The questionnaire takes about 10 minutes to fill in
- We appreciate as much feedback as possible
- The questionnaire is anonymous

Questions?

If you have any questions about this user test, feel free to contact us.

D. Thank the Potential Participant

E. Provide Contact Information

F.6 User Test 2 Questionnaire

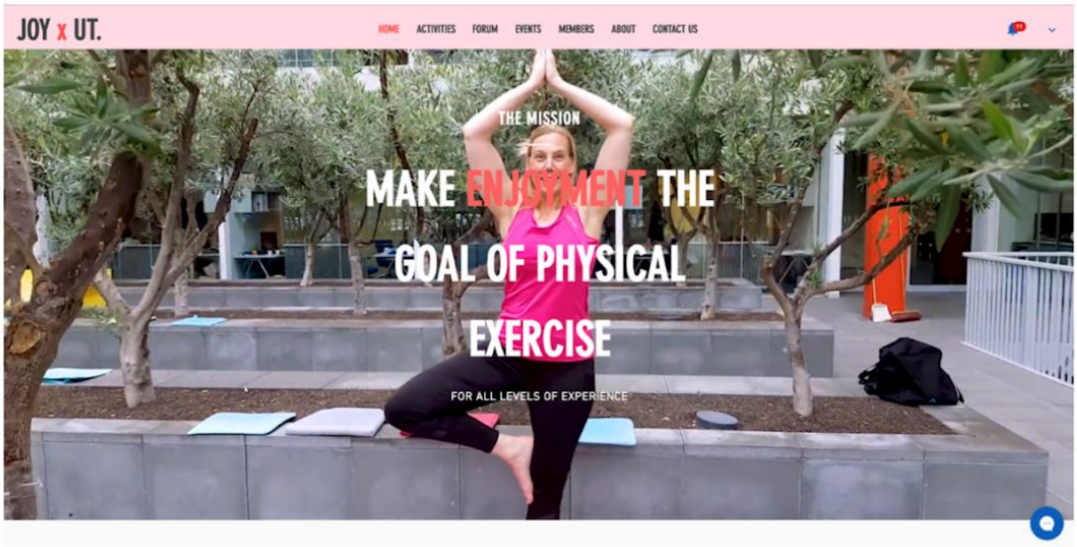
Help us improve the platform in 10 minutes!

This is a user test for the Graduation Project of John Kim & Fredrika Astrom of Creative Technology. The platform focuses on enjoyment in physical exercise!

The purpose of this questionnaire is to examine how University of Twente employees feel about the platform, in order to improve it. We also wish to learn more about the users we are targeting.

Your participation is entirely voluntary. The data collected is anonymous, and will only be used for academic evaluation of the project.

Thank you for your cooperation!



User Information

1. **What is your age?** *

2. **What is your gender?** *
   Mark only one oval.
   - ◯ Female
   - ◯ Male
   - ◯ Prefer not to say
   - ◯ Other: _____

Help us determine the platform's usability by answering these 10 questions.

Indicate using the five point scale, to which extent you agree with the following statements.

1

3. **I think that I would like to use this platform frequently** *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

2

4. **I found the platform unnecessarily complex** *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

3

5. **I thought the platform was easy to use** *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

4

6. **I think that I would need the support of a technical person to be able to use this platform** *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

5

7. **I found the various functions in this platform were well integrated** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

6

8. **I thought there was too much inconsistency in this platform** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

7

9. **I would imagine that most people would learn to use this platform very quickly** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

8

10. **I found the platform was very cumbersome to use** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

9

11. **I felt very confident using the platform** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

10

12. **I needed to learn a lot of things before I could get going with this platform** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

14. **Which statement best reflects your current lifestyle?** *

Mark only one oval.

- ◯ I rarely exercise (or never) *Skip to question 15.*
- ◯ I exercise sometimes, but not necessarily every week (irregularly) *Skip to question 15.*
- ◯ I exercise regularly (once per week) *Skip to question 22.*
- ◯ I exercise regularly (multiple times per week) *Skip to question 22.*
- ◯ I exercise on an advanced, or expert level (once, or multiple times per week) *Skip to question 29.*

[Beginner Section]

1. Content

15. **Do you find the content (images, text, videos) of the platform inspiring?** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

2. Content

16. **Did you feel like the content (images, text, videos) was encouraging, welcoming and non-intimidating to you? (Why/Why not?)** *

3. Social Aspects

. **Do you think this platform could help you find like-minded others that share your interests? (Why/Why not?)** *

4. Ability

18. **Do you think the content of this website makes you feel a bit more positive about your own ability, and like you are capable of acquiring new healthy habits? (Why/Why not?)** *

5. Active Lifestyle

19. **Do you think this platform would make it easier for you to become more active in and outside of the workplace? (Why/Why not?)** *

6. Future Development

20. **In case of future development, how can this platform be improved?**

7. Other Comments

Appendix G. User Test Results

G1. List of Improvements from User Tests

Home Page
- Refine the start statement
- Change home image to reflect more on joy in physical exercise
- Make home background image a slideshow to tailor for different user groups
- Make it clear that it is for everyone, think about your target group. (text, images, etc.)

Activity Overview
- Add more casual activities (not very time consuming, lunch walks)
- Add more creative activities (animal spotting, geocaching)
- Add Bootcamp
- Add link to running page from image
- Add names to all the activities
- Add hiking, triathlon, ice-skating.
- Make the text also clickable
- Clarify explanation (UT specific activities)
- Decide how to organize the sports (basic & intermediate)
- Divide between advanced and casual somehow (hierarchy? Separate pages?)

Specific Activities
- Add more small tips (beginner, intermediate)
- Make it clear and specific how an employee can make the activity a part of their day (e.g. running for 30 min, showering, fits in a lunch hour) (add time) BEGINNER
- Shower map? Or at least make clear. GENERAL
- Subscription/ join group functionality. GENERAL
- Add information GENERAL about associations from sports centre
- Add reference to joy statement, for cred.
- Mention different types of activities regarding running (intervals etc. INTERMEDIATE
- Add relevant events (faking it, mockup) [something the user can challenge themselves with] INTERMEDIATE
- Connect to users with the same interests (rephrase the running "connect" link)
- Change link to forum (maybe write: join the conversation, to clarify, or link to other members)
- Add name of UT running track on map

Forum
- Specialized forums for each activity
- Make it look a bit more inviting or engaging
- Clarify descriptions getting cut off
- Bold text to make it look clickable
- Remove social sharing
- Add daily invitations thread (?)
- Change name to Forum

Events
- Make event phrasing more inviting to everyone
- Change the "register now" to "learn more".

About Page
- Add an about page
- Mission and vision statement
- Contact form
- Research section about the Upward spiral and enjoyment in exercise

General
- Make it clear how to connect to like-minded people!

G2. User Test 2 - Questionnaire Results

Table G2.1 - Anonymous list of beginner participants in user test 2

Participant Number (#)	Age	Gender
#1a	38	F
#2a	31	M
#3a	47	M
#4a	25	M
#5a	30	M
#6a	24	M
#7a	34	M

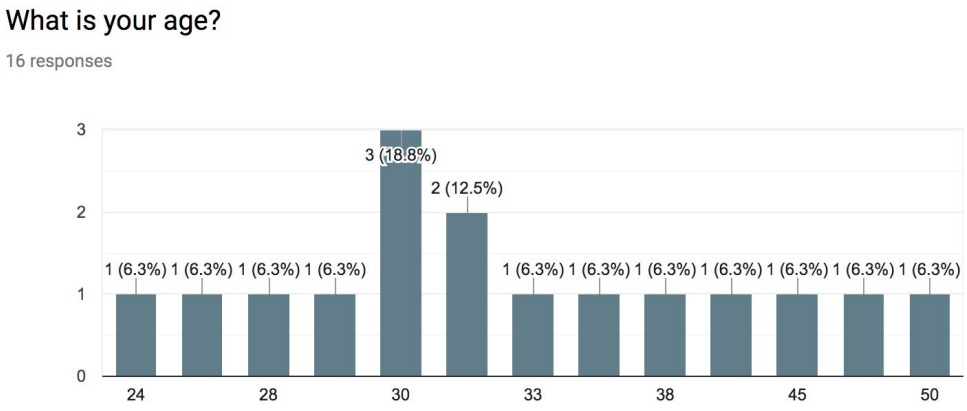


Figure G2.1 Question 1

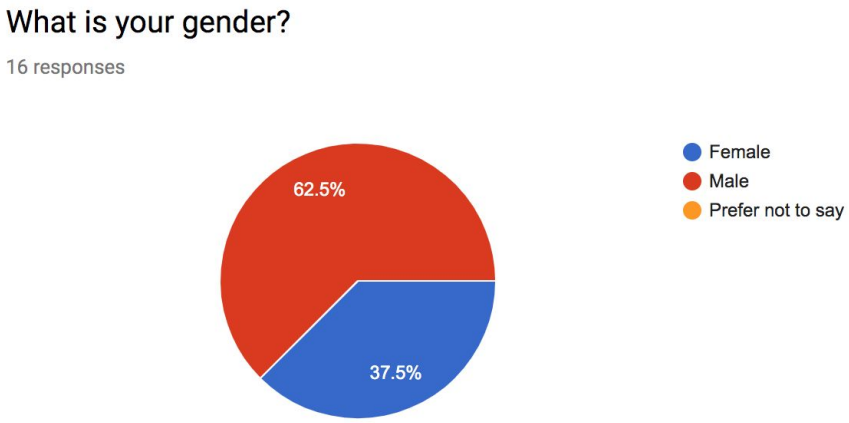


Figure G2.2 Question 2

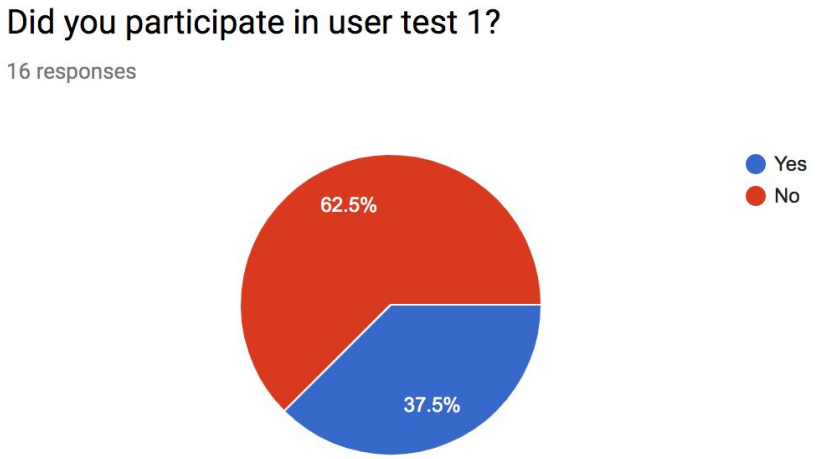


Figure G2.3 Question 3

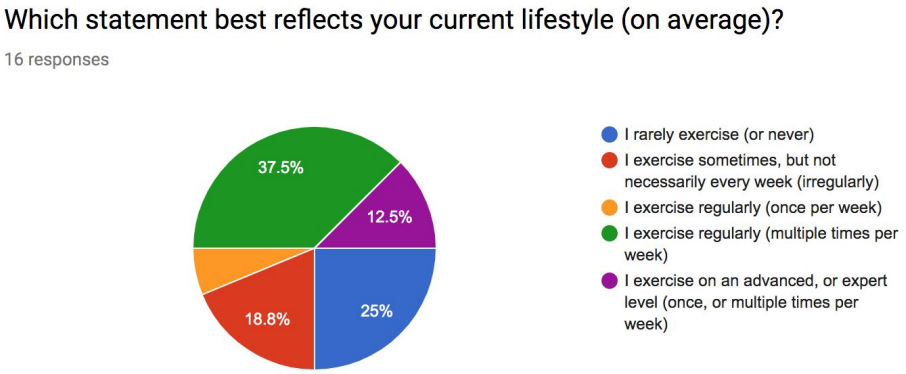


Figure G2.4 Question 4

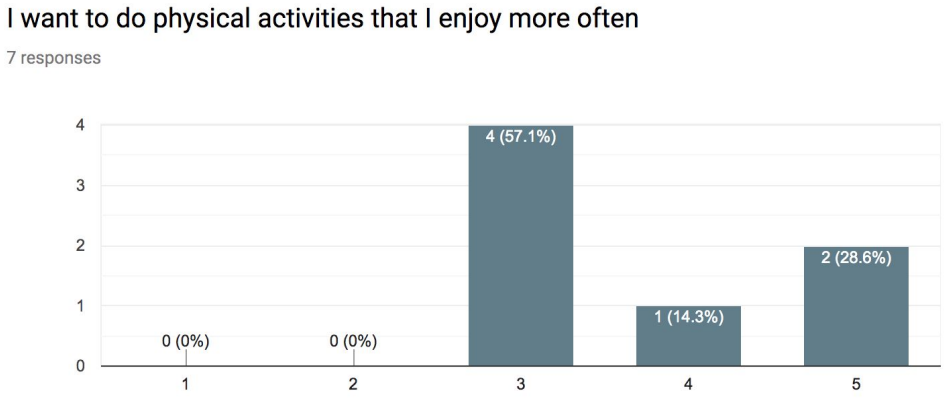


Figure G2.5 Question 5

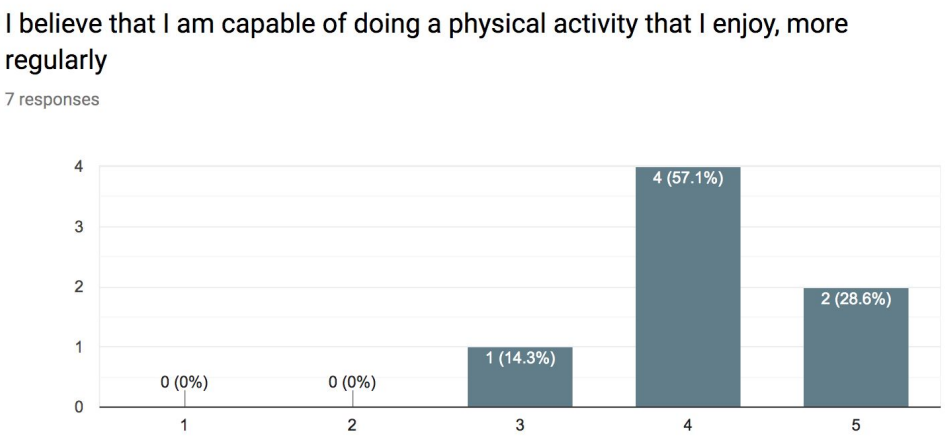


Figure G2.6 Question 6

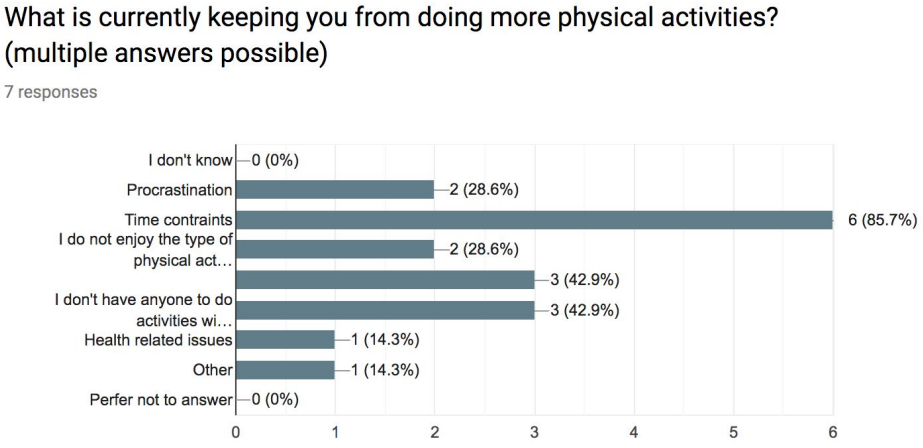


Figure G2.7 Question 7

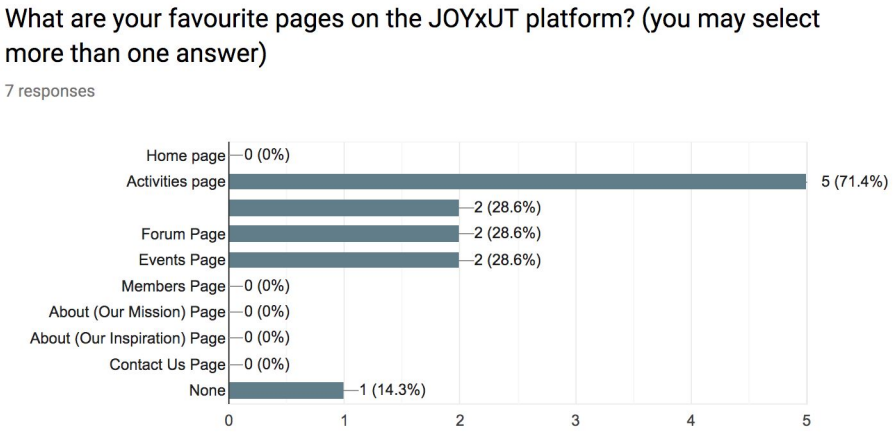


Figure G2.8 Question 8

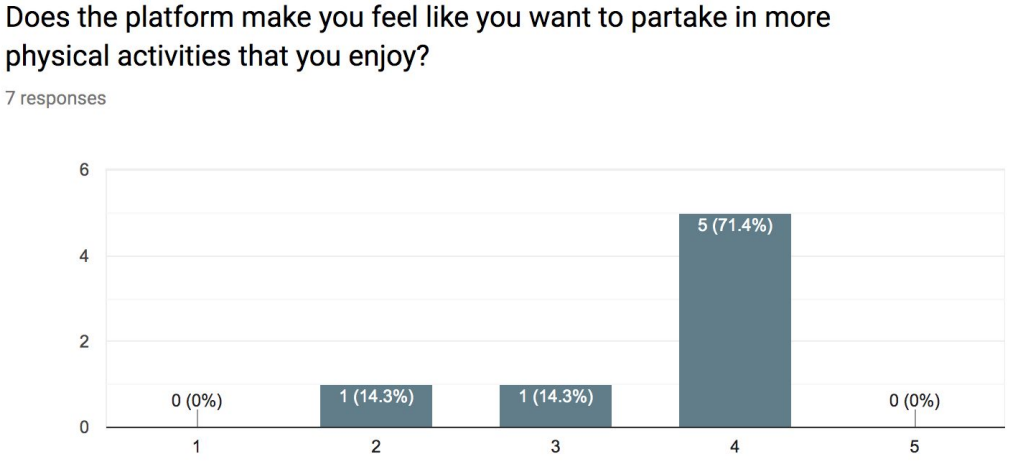


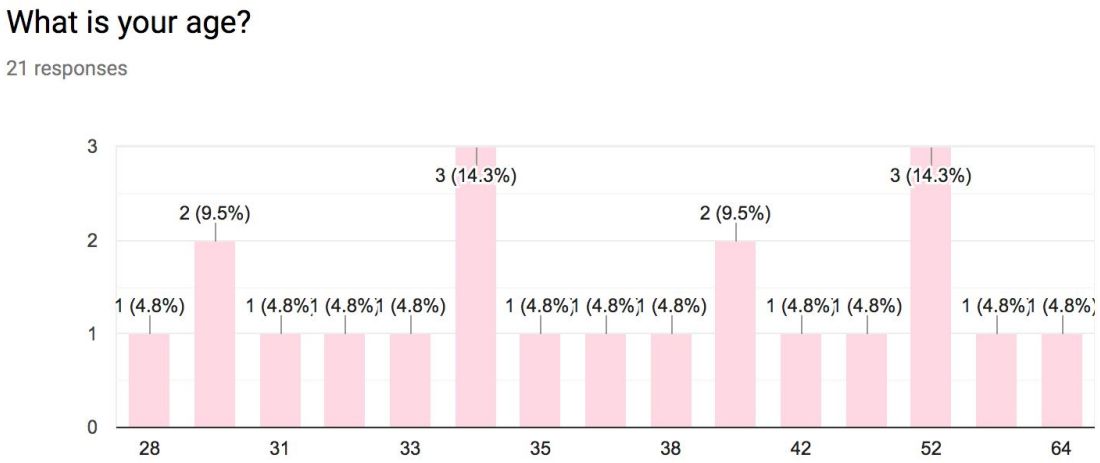
Figure G2.9 Question 9

G3. User Test 3 - Questionnaire Results

Table G3.1 - Anonymous list of beginner participants in user test 2

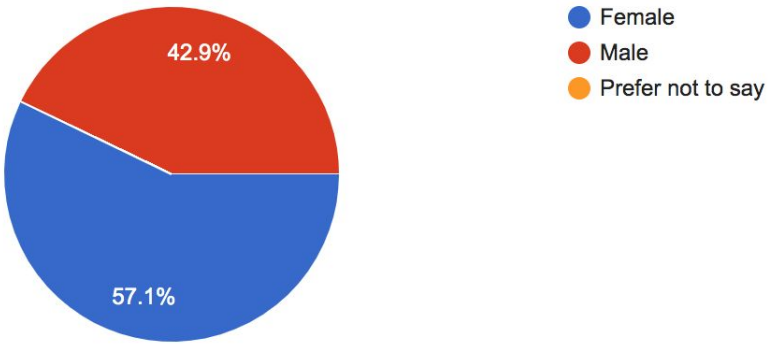
Participant Number (#)	Age	Gender
#1b	32	M
#2b	40	M
#3b	34	M
#4b	30	M
#5b	42	F
#6b	34	F

[Demographic Questions]



What is your gender?

21 responses

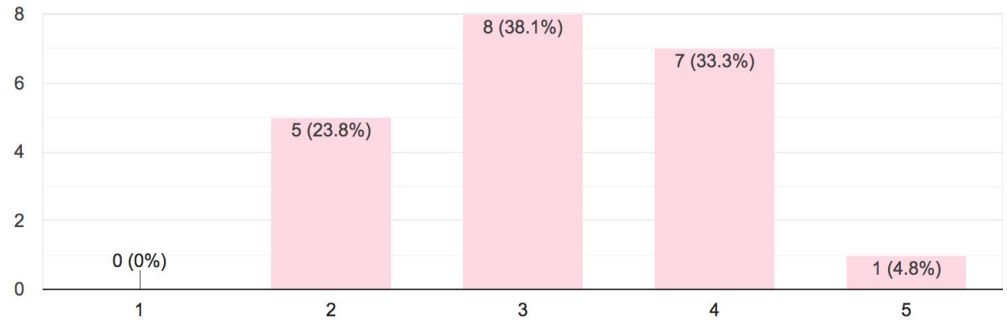


[SUS Questions]

1

I think that I would like to use this platform frequently

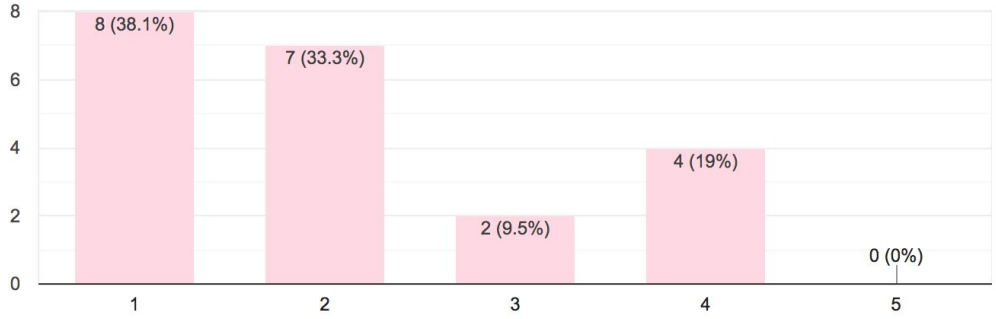
21 responses



2

I found the platform unnecessarily complex

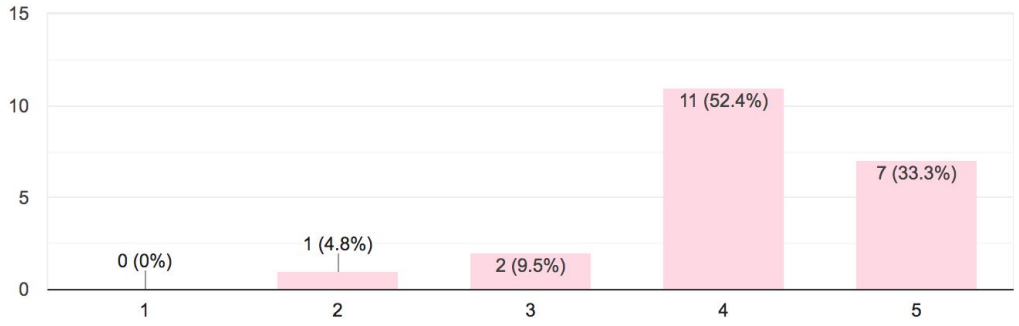
21 responses



3

I thought the platform was easy to use

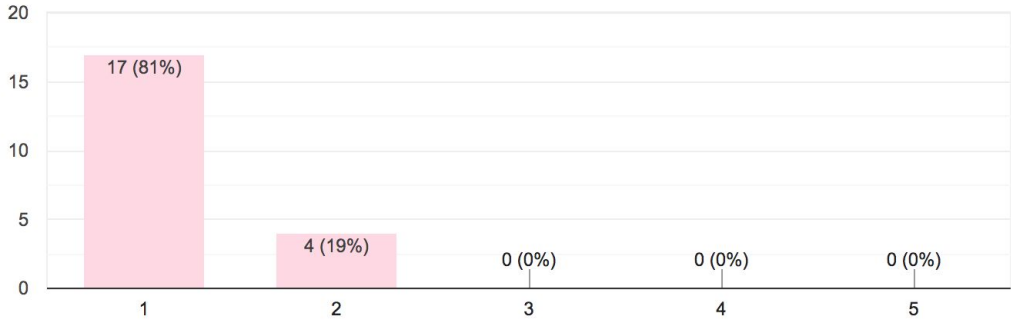
21 responses



4

I think that I would need the support of a technical person to be able to use this platform

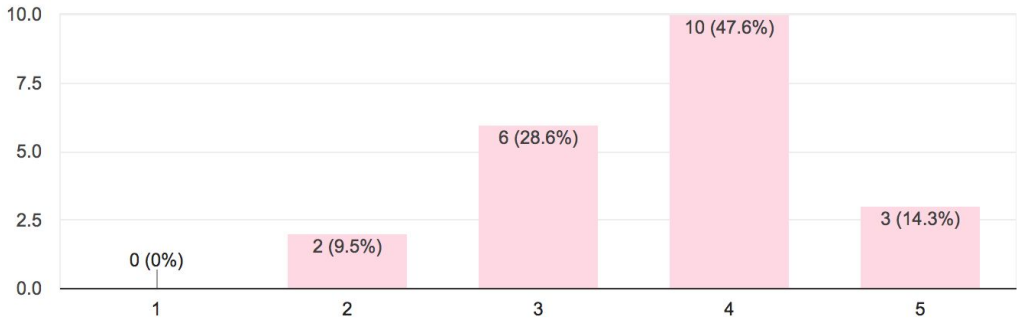
21 responses



5

I found the various functions in this platform were well integrated

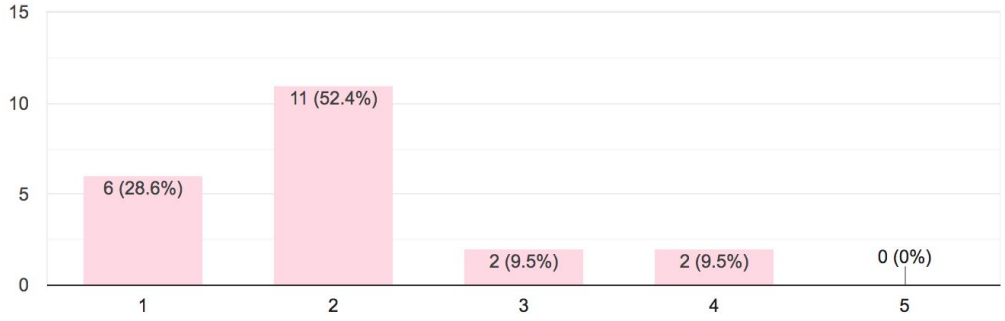
21 responses



6

I thought there was too much inconsistency in this platform

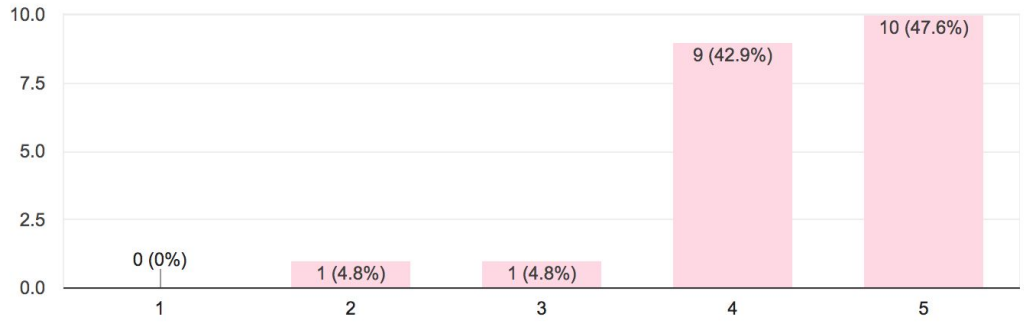
21 responses



7

I would imagine that most people would learn to use this platform very quickly

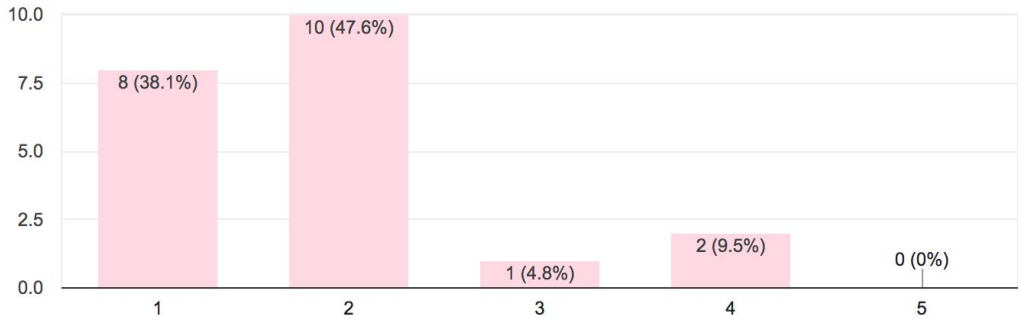
21 responses



8

I found the platform was very cumbersome to use

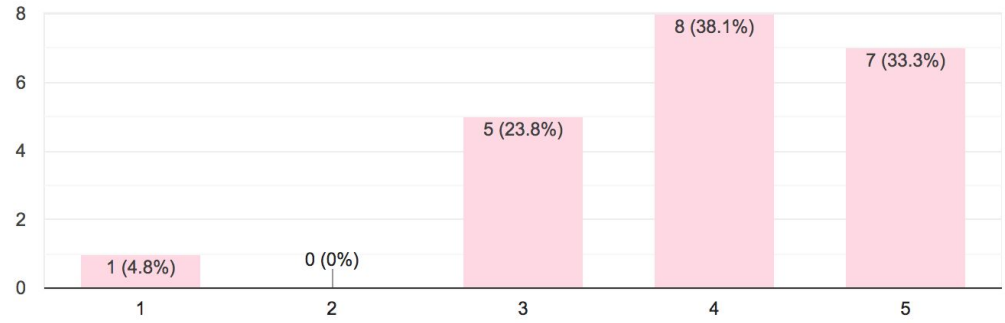
21 responses



9

I felt very confident using the platform

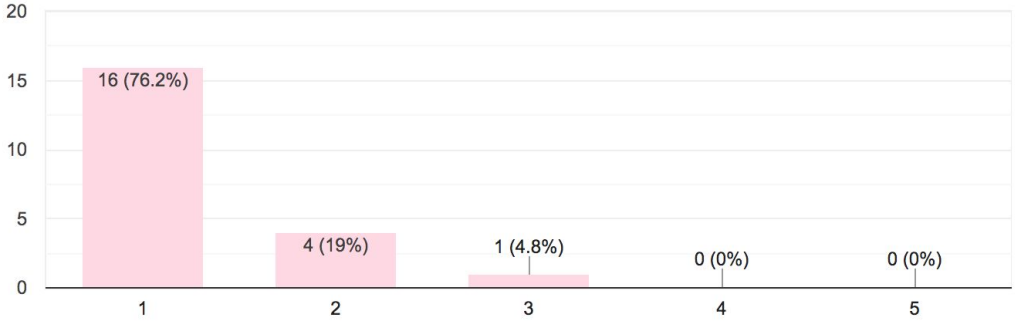
21 responses



10

I needed to learn a lot of things before I could get going with this platform

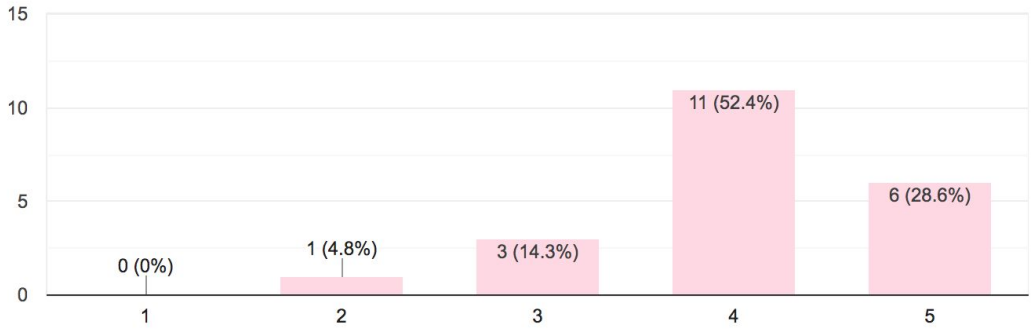
21 responses



[General Questions]

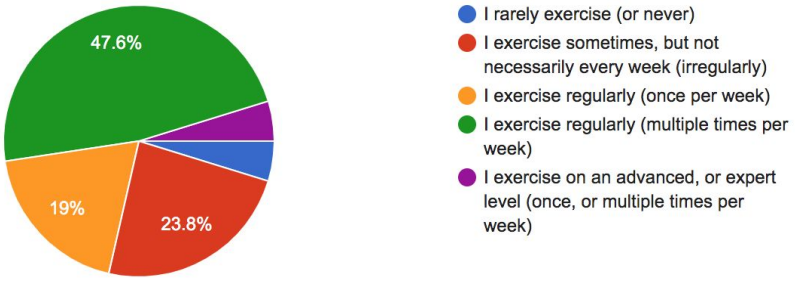
Do you think this platform conveys enjoyment in physical exercise?

21 responses



Which statement best reflects your current lifestyle?

21 responses

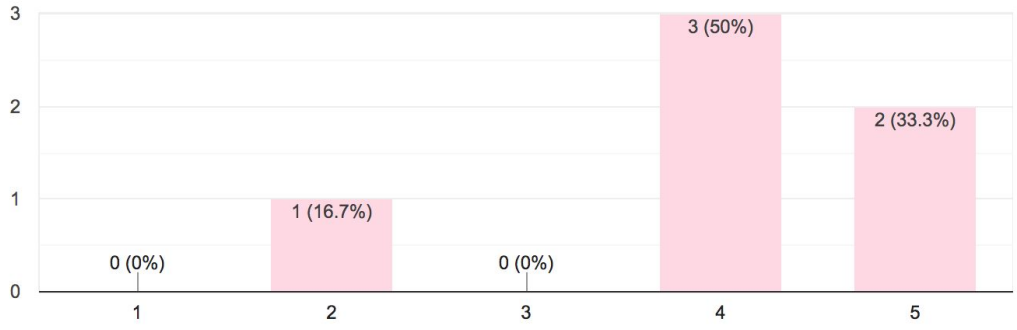


[Beginner Questions]

1. Content

Do you find the content (images, text, videos) of the platform inspiring?

6 responses



2. Content

Did you feel like the content (images, text, videos) was encouraging, welcoming and non-intimidating to you? (Why/Why not?)

6 responses

Yes! I was immediately inspired and wanting to join some of the activities. I think the looks of the website are quite nice and it conveys an open atmosphere to join-in.

Very appealing and motivating to look further

A bit too 'popular' for me :)

Because appear normal people in the pictures instead of sporty people

I liked that is it not focused for experienced active persons but that there was enough for the inexperienced and giving encouraging options for that target group.

Nice pictures, welcoming you to try, low barrier.

3. Social Aspects

Do you think this platform could help you find like-minded others that share your interests? (Why/Why not?)

6 responses

Yes, it was clear that there is ample opportunities to get in touch with other people on the network.

Not per se as this is not of my personal interest

Probably not, if you mean like-minded as 'people that are also not exercising' :)(because I guess that people that are not exercising will not easily start using this platform) But for other like-minded people (starting out with exercising, etc), it could definitely work :)

Yes, why not. All depend the marketing that you will do about your website. If there are too much users is possible to find matches with people that share your same interests

Possibly, but you then really have to be active on the platform by posting activities or requests to get in contact with. I think though the regular or once of events being made known are better tools to encourage people to go and meet like minded people

Not sure yet if I really find someone to match my "character"together with "exercise"wishes

4. Ability

Do you think the content of this website makes you feel a bit more positive about your own ability, and like you are capable of acquiring new healthy habits? (Why/Why not?)

6 responses

Not so much for me, the focus is more on being part of it

Yes, also examples of smaller exercises

not necessarily habits, but maybe to do an activity every now and then (like when it's nice weather)

Not really. I feel positive of doing sport but it is not linked to my ability for doing these sports

yes because as a not so sporty person it really caters for my kinds

Not sure if is makes me possible to acquire things. It for sure makes me want to try

5. Active Lifestyle

Do you think this platform would make it easier for you to become more active in and outside of the workplace? (Why/Why not?)

6 responses

- Yes, through the connection with others that it enables
- Dont know for now
- Assuming I would want to become more active, then yes! :)
- Maybe yes, Rigth now is a prototype but could be interesting after see how people use the platform
- Not sure - a lot has to do with a person getting their act together by just starting. I do think though your variety of activities is encouraging to have that mind set changed and just pick something to start of with
- Easy to spot something, but not sure if it is enough of a big stick to keep me going

6. Future Development

In case of future development, how can this platform be improved?

6 responses

No ideas at this moment

MAke it easier to connect to others

I would divide/emphasize the content a bit more specifically into 'beginner' content and other content. To highlight a bit more that there is lots of content perfect for real beginners. Dividing into 'relax'/'energize'/'activate' etc seems like a train of thought a bit more for people who actually do physical activity who want to mix it up/add some more, but not for people starting out.

Actually you received my feedback before (Yeray) but I did not see changes in the website, so I strongly encourage you to do some changes for improving the impact of your website.

How are you going to get it to be known amongst the employees so they are aware so as to encourage each other by one person doing something for example during lunch as indicating he this is possible. I would suggest this needs to be something to think about.

Get a buddy system alarm - to realise someone is waiting for you?

7. Other Comments

Open Remarks

1 response

There are still some words not spelled correctly. In the running activity the pace in which the map passes by goes to quickly. Another tip - in the dates of activities it is written in dutch which is weird as the site is in English. Need to have this be consistent. Also a suggestion - when link to other websites - is it possible it opens the English page first and not the Dutch one - you platform is English so then i think reference links should also go to English ones too.
I do really like the feel of the platform in terms of pictures used.

G4. User Test 3 - Analysis

Table G4.1

Analysis of Written Answers to General Question in User Test 3

Question: Do you know of any other interventions similar to the platform, that strive to improve employee health?		
Participant	**Answer**	**Competitor**
	"Health week, I believe **UT Kring** does things, main website might link to events (and to this page if this were to be implemented)"	Yes
	"http://beweegmeer.be/ https://sportenleven.nl/gezonder-in-het-leven-3-tips/"	Yes
	"UT website, campus card, sports centre with coaches to motivate you"	Not really
	"Yes, but not in this universities"	Not really
	"The free group lessons, health week, lunch walks, employee soccer training/tournaments, UT participation Twentse vrouwenloop."	Not really
	"Health week?"	Not really
	"not strictly directed to the employee but you have for example samengezond from Menzis."	No
	"Nope, but honestly not very focussed on finding them"	No
	"none"	No
	"no"	No
	"no but i am probably not the most right person to ask."	No
	"No"	No
	"not at this moment"	No
	"Anything that would decrease work related stress :)"	No

Appendix H. Website Version 3

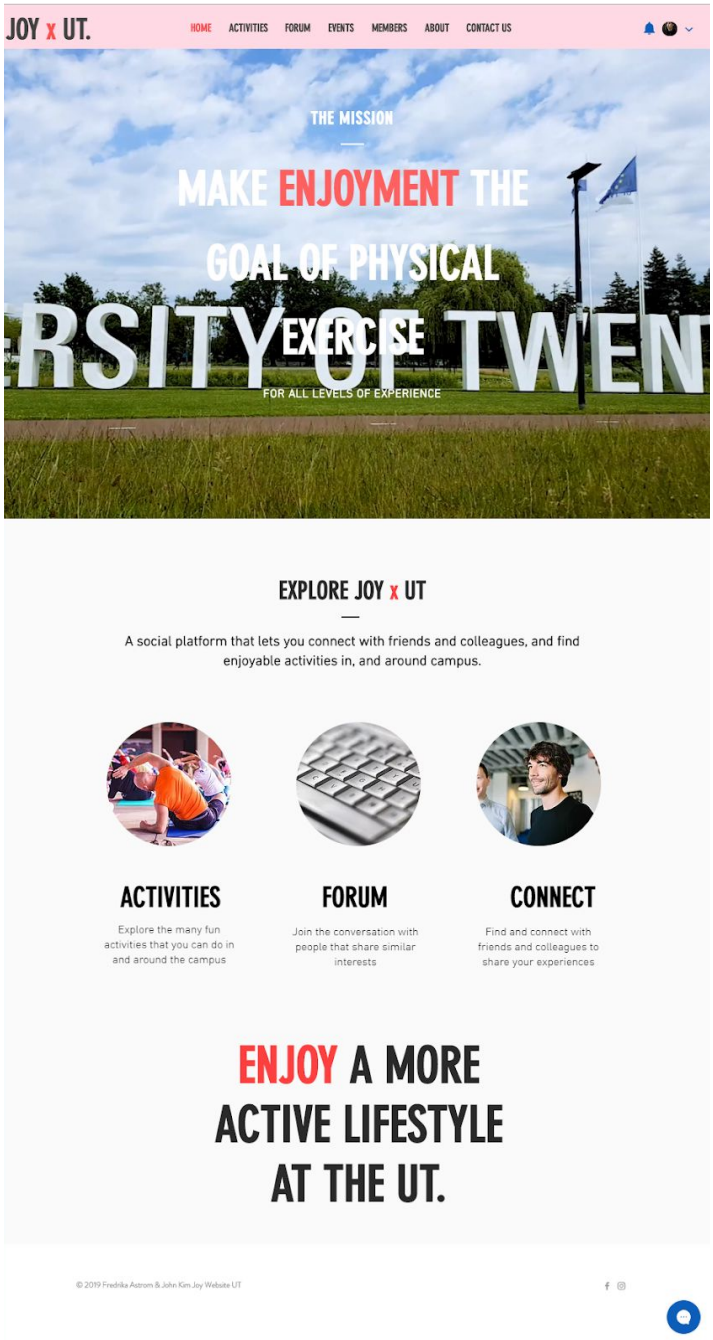


Figure H1. Homepage of final version of website

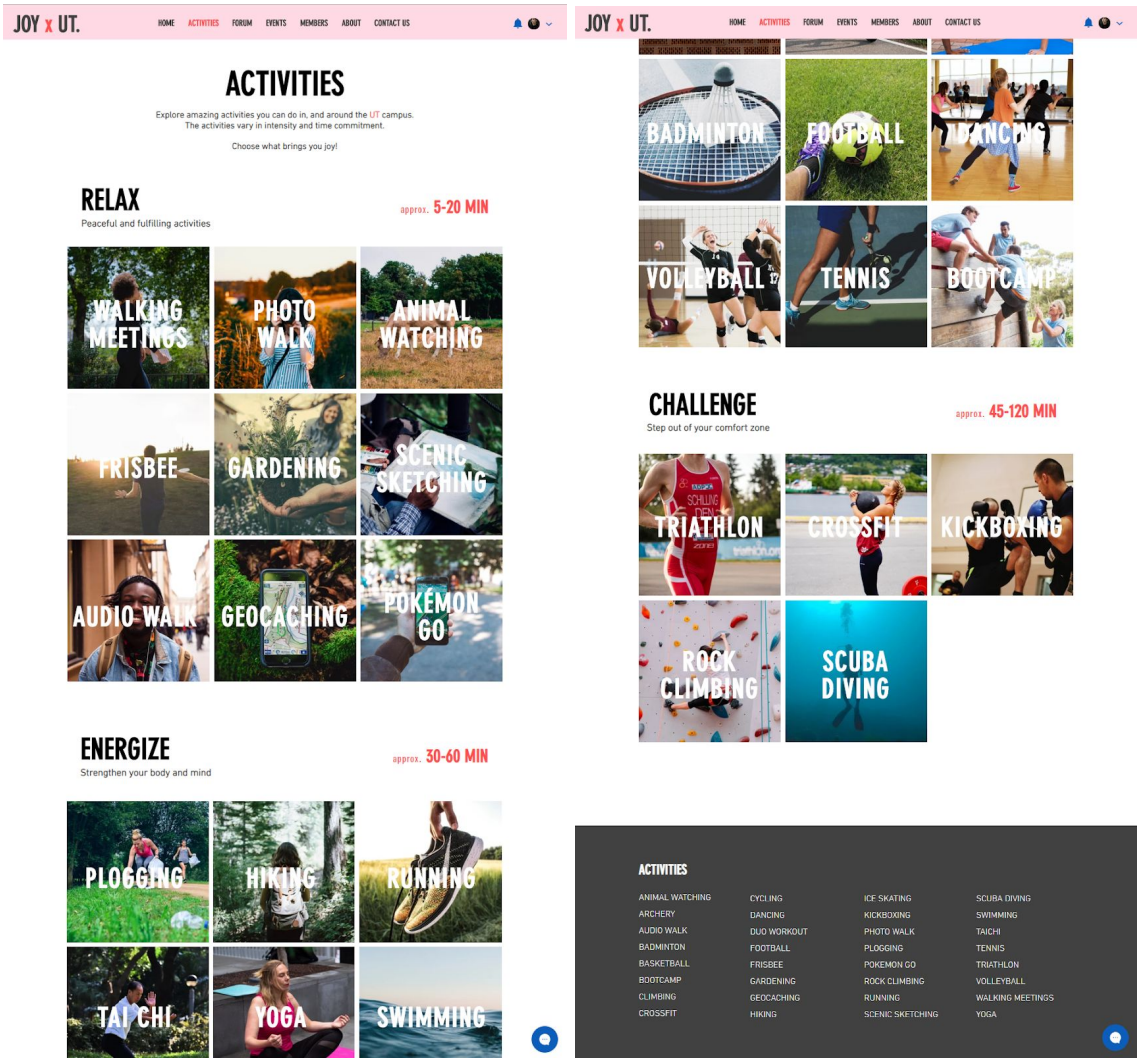


Figure H2. Activity page of final version of website (Version 3)

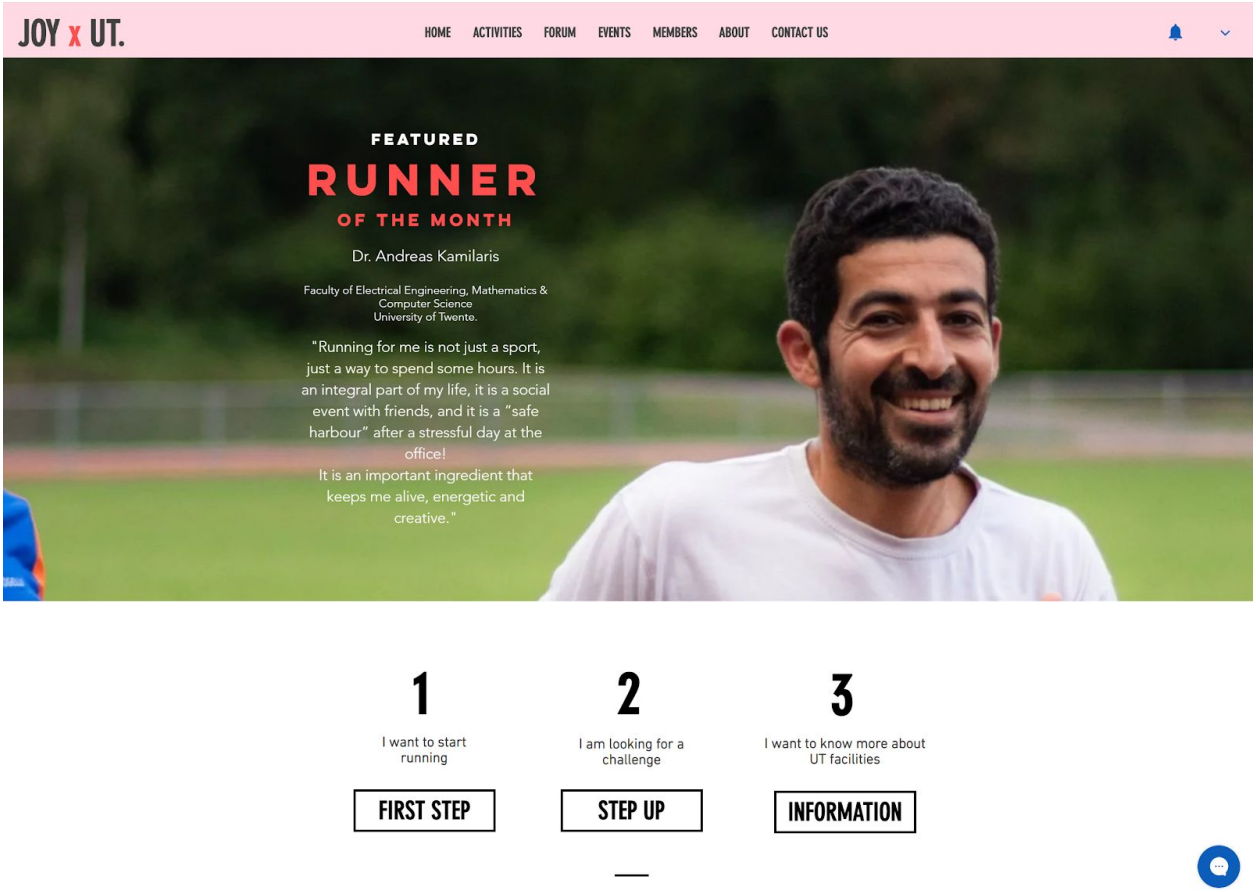


Figure H3. Top of activity page, including photo and quote from UT employee, as well as 'anchors' linking to each of the sections on the page (First Step, Step Up and Information)

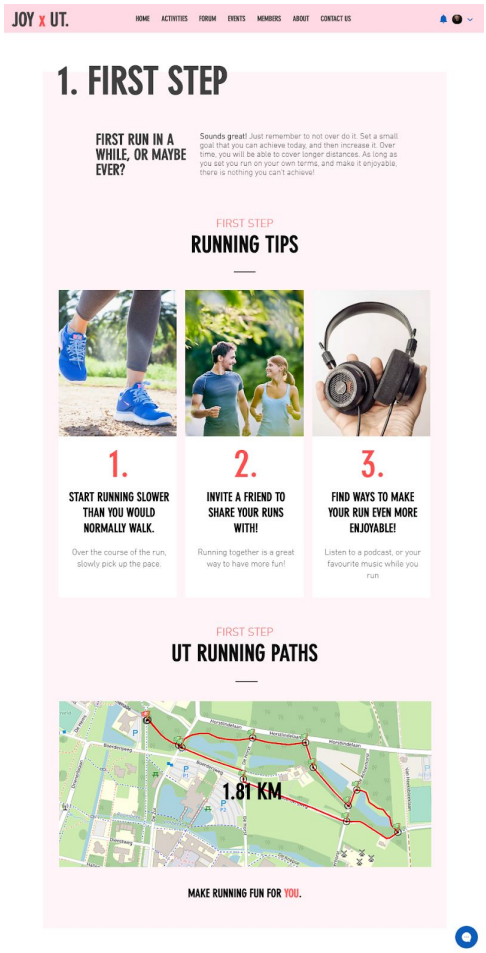


Figure H4. 'Step Up' section of 'Running Page' targeted at beginners

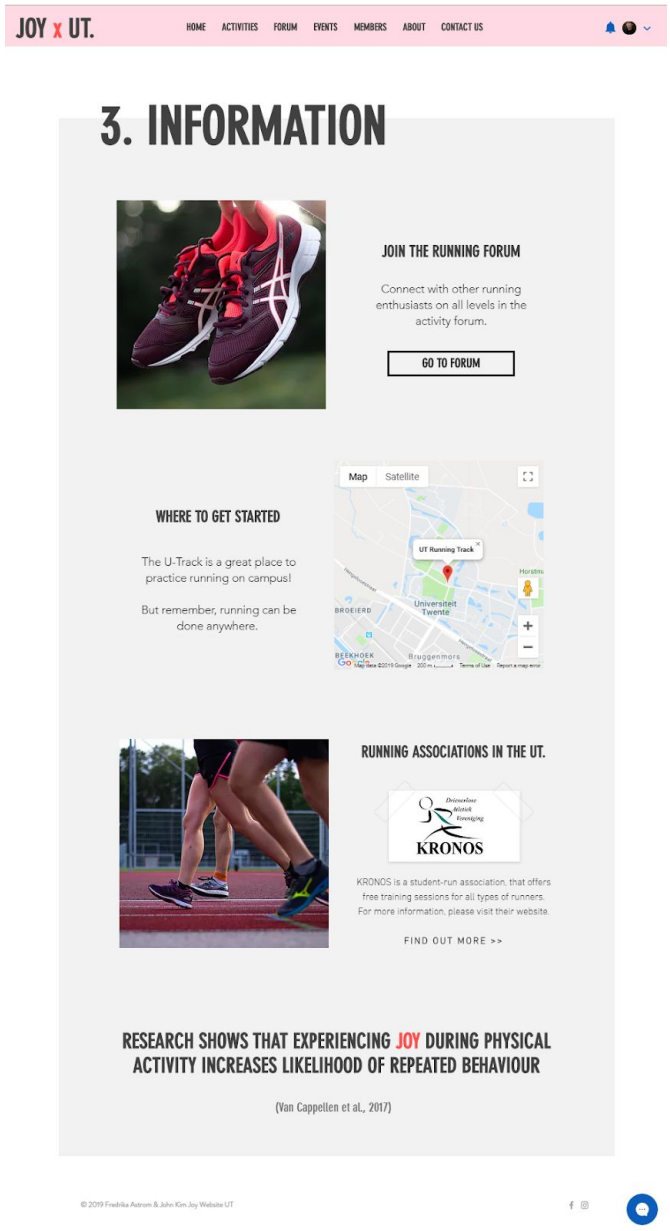


Figure H5. 'Information' section of 'Running Page' targeted at beginners

Appendix I. Future Improvements

Table I1

List of Future Improvements

Website Feature	**Suggestions for Improvement**
Home page	● Test if users prefer a landing page with more explanatory information, as compared to a more minimalistic, inspiring home page (A/B-testing) ● Test if users prefers the landing page to be directly on the activity overview, as compared to the current separate home page (A/B-testing)
Activities Overview	● Add a search bar ● Add links to all of the specific activity pages ● Test if users prefer a more 'tunneled' information flow, where they can choose e.g. which user type they are (beginner, intermediate or advanced) and then receive information relevant to this user type (A/B-testing)
Specific Activities (Running Page)	● Add a group to each activity, which the users can join. By joining, the users would receive updates and invitations about the specific activity, and be directly connected to a group of like-minded others. ● Test if users prefer a more 'tunneled' or filtered information flow, where they can choose e.g. which user type they are (beginner, intermediate or advanced) and then receive information relevant to this user type (A/B-testing) ● Add interactive or downloadable route maps for the running page, as well as other activities where it is relevant ● Add podcast suggestions ● Add challenge functionalities where users can create new challenges, or join existing ones ● Add functionality where the user can create their own events of when they want to partake in an activity, and simply add it to their calendar.
Forum	● Optimize layout, and graphic design, to enhance the clarity and

	user experience
Events	● Include a calendar overview of the upcoming events ● Add information about who is going to an event ● Add organized, external events ● Make events searchable ● Add more events
Members	● Organize the members according to department ● Make it easier to connect with people that share your interests
Personal Profile Page	● Add friendship invitation button on the user profile, or a way to connect with them ● Add a feed of activities they have engaged in, and make it optional to share it or hide it to the public ● Add a way to evaluate or quantify how much joy each activity elicited
Chat	● Test if users prefer to have the chat icon in the bottom right corner, or in the top menu (A/B-testing)
Security	● Include privacy policy ● Include more information to the user before they sign up to the website, what signing up entials
General Design	● Test if users prefer other color scheme (A/B-testing) ● Test if users would prefer a more compact design with smaller fonts and content, as compared to the current large design which forces the users to scroll frequently