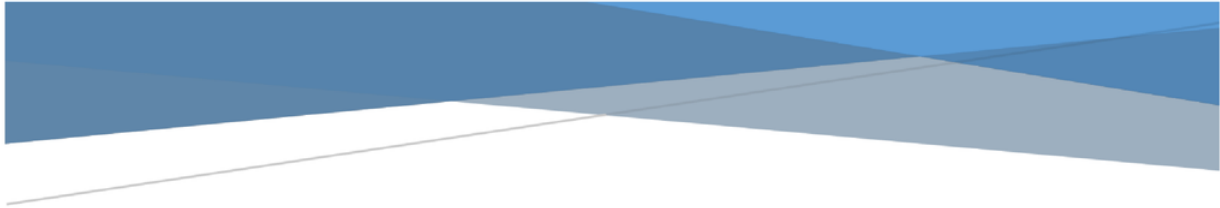


Ben Green - Usability Engineering

by Ben Green

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FITNESS APP PROTOTYPING

Usability Engineering

Sue Maw

B Green
P124549

TABLE OF CONTENTS

TABLE OF FIGURES	2
1. INTRODUCTION.....	3
1.1. MOST POPULAR FITNESS APPS	3
1.2. HOW FITNESS APPS WORK	3
1.2.1. WEARABLE TECH	3
1.2.2. APPS	4
2. TARGET USER GROUP'S.....	4
2.1. TASK ANALYSIS	4
2.2. HIERARCHIAL TASK ANALYSIS	4
3. PAPER PROTOTYPE.....	5
4. HUMAN FACTORS	7
4.1. VISUAL PERCEPTION.....	7
4.1.1. GESTALT PRINCIPLES.....	9
4.2. HUMAN MEMORY	9
4.2.1. SENSORY MEMORY	9
4.2.2. SHORT-TERM MEMORY	10
4.2.3. LONG TERM MEMORY	10
4.3. HUMAN REASONING.....	10
4.4. INTERFACE METAPHORS	10
4.5. AFFORDANCE	11
5. REVIEW OF PROTOTYPE	11
6. EVALUATION OF CLASS MATES DESIGN.....	11
6.1. HOW DOES THE APP WORK?	11
6.2. ASPECTS THAT WORKED	12
6.3. SUGGESTED IMPROVEMENTS.....	12
7. SOFTWARE PROTOTYPE	13
7.1. APP THUMBNAIL	13
7.2. APP CREATE ACCOUNT PAGE.....	13
7.3. APP HOME PAGE	14
7.4. APP SEARCH PAGE.....	15
7.5. APP PROFILE PAGE	16
7.6. APP SHOP	17
7.7. RECORD TRAIL	18
8. EVALUATION OF USABILITY ENGINEERING TECHNIQUES	19
9. REFERENCES.....	20

TABLE OF FIGURES

Figure 1- Number of mobile app downloads worldwide in 2016, 2017 and 2021	3
Figure 2- Hierarchical task analysis for recording a mountain bike cycle	5
Figure 3 - Prototype drawing. Thumbnail & News Feed	5
Figure 4 - Prototype Drawing. Search page & Profile Page.	6
Figure 5 - Prototype Drawing. Shop page & Recording a cycle page.....	7
Figure 6- The Human Eye	8
Figure 7- length of cone type	8
Figure 8 - Human Memory	9
Figure 9 - Class mates hand draw prototype design	12
Figure 10 - App Thumbnail	13
Figure 11 - App Log in Screen.....	14
Figure 12 - App home page	14
Figure 13 - App Search page	15
Figure 14 - App Profile Page.....	16
Figure 15 - App Shop	17
Figure 16 - Record Cycle Page	18

1. INTRODUCTION

The purpose of this report is to design and prototype a fitness app. An app is short for application, applications are software that can be used on computers but are more commonly associated with mobile phones now. (1) So a health and fitness application are software, usually on your mobile device that aids with the process of exercising and keeping fit. This could be anything from calorie counting to tracking the mileage done on a run/cycle.

The mobile app market is huge and has been growing for many years and is projected to keep growing, according to statistics from App Annie shown in the figure below. With that being said new research from Flurry claim that health and fitness app usage in the US has seen an exponential rise, growing as much as 330% from 2014 to 2017. (2) So there is massive potential in the development of a good health and fitness app.

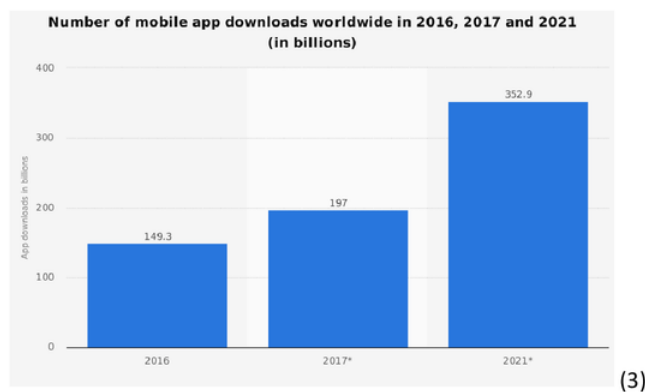


Figure 1- Number of mobile app downloads worldwide in 2016, 2017 and 2021

1.1. MOST POPULAR FITNESS APPS

- Strava – Strava lets you track your runs and cycles and lets you connect with friends to share times and records creating competition between users. Strava gives you the option of turning the beacon on, sharing your location in real time for safety. (4)
- Run Keeper – tracks run, walks, or hikes, gives encouragement to get out there and exercise. Can set yourself goals, follow a plan and see your progress. (5)
- Cycle meter – tracks cycles giving you graphs on your performance. Can use splits, intervals, and laps. Comes with training plans.
- My Fitness Pal – calorie counting app with a database of over 5 millions foods. (6)
- Nike Run – run tracking app that provides coaching tuned to you. Allows you to connect to your friends. (7)

1.2. HOW FITNESS APPS WORK

1.2.1. WEARABLE TECH

Wearable fitness tech such as fit bits work by measuring motion. Wearable.com state that most wearables these days come with a 3-axis accelerometer to track movement in every direction and

some could even come with a gyroscope to measure orientation and rotation. The data that is collected is then converted into steps and activity. Acceleration, frequency, duration, intensity and patterns of movement are all measured. (8)

1.2.2. APPS

Health and fitness apps such as Strava, Nike Run and other work by using GPS to track your movement and the speed of movement.

2. TARGET USER GROUP'S

This section is to discover the target user group's requirements. This will be done through a task analysis.

2.1. TASK ANALYSIS

"A task analysis is the process of learning about ordinary users by observing the, in action to understand in detail how they perform their tasks and achieve their intended goals." (9)

In summary the objective of a task analysis is to find out who your users are and what tasks they need to perform. To determine user requirements a survey was devised and given to friends and family.

The questions asked were:

- What is your occupation?
- How old are you?
- Where do you live?
- Employment Status?
- Do you like mountain biking?
- If yes to the above, how often do you mountain bike?
- Do you currently use any apps related to mountain biking? If yes please state.
- If yes to the above, what could improve these apps? Please write below
- What are the must have features if you were to use a new mountain bike app?
- Do you use social media? If yes please state what
- Is being able to share trial times to social media important to you?

As stated above, the user group consisted of friends and family. The survey identified that the group would really benefit from a new app that they could search bike trails on. It also identified that potential users would not only want to be able to search bike trails but record cycles to evaluate progress.

The survey also identified that it was important for users to be able to see what their friends are doing on the app to compare and compete. Being able to share routes and trail times to social media was another important aspect the survey discovered.

2.2. HIERARCHIAL TASK ANALYSIS

A hierarchical task analysis provides an understanding of the tasks users need to perform to achieve certain goals. (10)

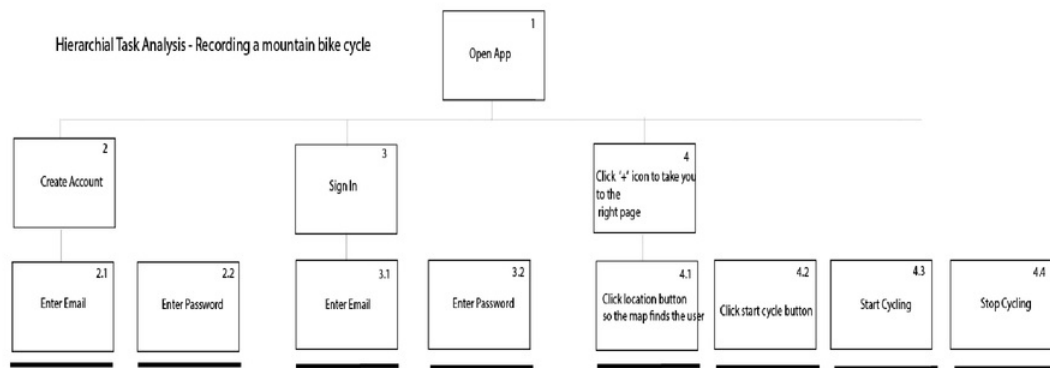


Figure 2- Hierarchical task analysis for recording a mountain bike cycle

3. PAPER PROTOTYPE

This section will provide a paper prototype for the fitness app being produced. The fitness app is an application to provide users with the local mountain bike trails.

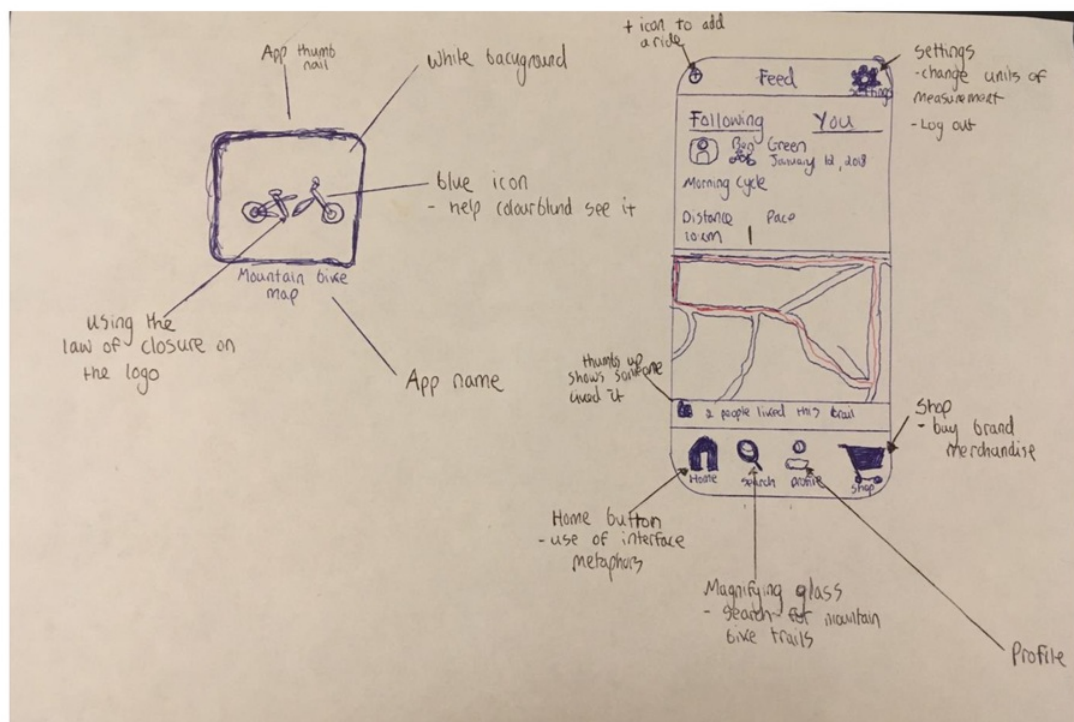


Figure 3 - Prototype drawing. Thumbnail & News Feed

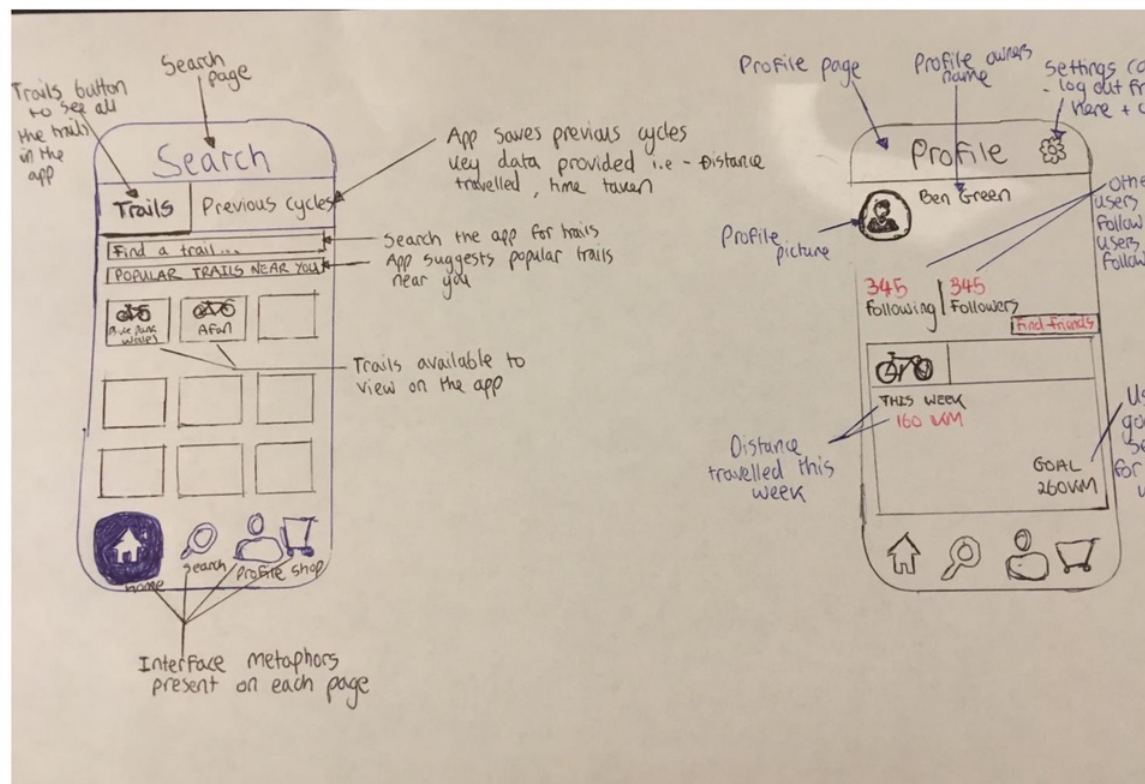


Figure 4 - Prototype Drawing. Search page & Profile Page.

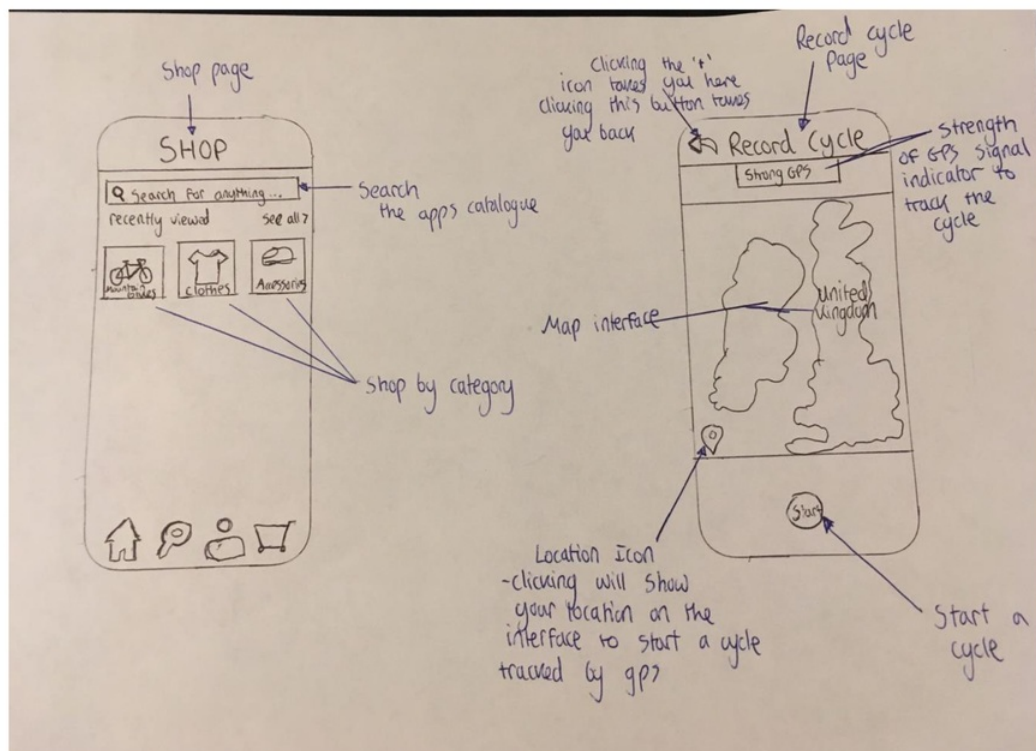


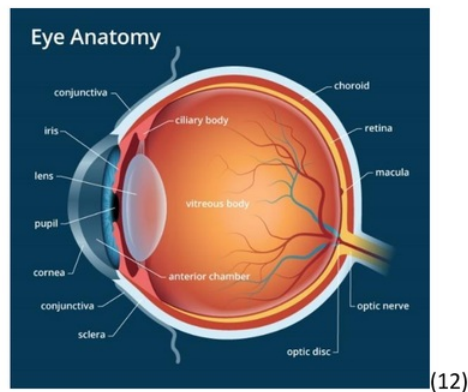
Figure 5 - Prototype Drawing. Shop page & Recording a cycle page.

4. HUMAN FACTORS

This section will look at the human factors considered when creating the paper prototype. The human factors considered are visual perception, human memory, human reasoning, interface metaphors and affordance.

4.1. VISUAL PERCEPTION

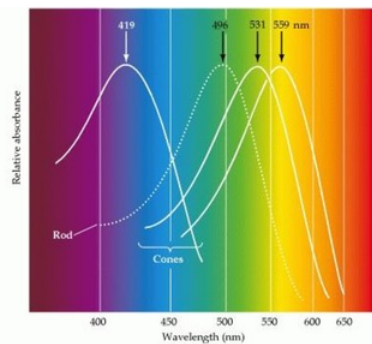
When designing the application, it was important to consider visual perception. Visual perception is the ability to see and interpret the visual information that surrounds us. (11)



(12)

Figure 6- The Human Eye

The above figure is of the human eye. The human eye works by allowing light to enter through the cornea. (12) The iris controls the amount of light that reaches the eye by adjusting the size of the pupil. (13) The light then travels through a jelly like tissue called the vitreous body. (14) After this the light then reaches the retina, the retina contain millions of light sensitive cells, which come in two different types: rods and cones. (15) Rods help us see in low level light, detect motion, and provide us with peripheral vision whereas cones help us see in bright light and they detect colours and fine details. (15) As stated cones are responsible for colour vision



(16)

Figure 7- length of cone type

Figure 3 shows the types of cones, each cone has a different sensitivity to light and are often referred to as 'blue', 'green', and 'red' this allows us to see in colour. (16)

There are two main theories proposed with visual perception, these are Gregory's bottom up and Gibson's top down. Gregory argues that visual perception is based on prior knowledge, stating humans are actively creating our perception of reality based on the environment around us and stored information. (17) On the other hand Gibson's bottom up theory argues that perception is direct and there is no need for processing, what you see is what you get. (17)

4.1.1. GESTALT PRINCIPLES

The gestalt principles are important when designing an app to make the interfaces usable and easier to understand. (18) They are split into five categories these are proximity, similarity, continuity, closure and connectedness. (19)

The app has considered several gestalt principles when in the design process.

4.1.1.1. CLOSURE

Gestalt psychologists believe that the brain interprets forms and figures in their whole form even if part of it is not there or hidden. A good example of this is a circle that is not completely drawn full circle is still interpreted by the brain as a circle – this is the law of closure. (20)

The law of closure has been used in the design of the logo. The logo appears on the thumbnail icon for mobile phone use. See figure 9.

4.1.1.2. SIMILARITY

The law of similarity suggests that humans can recognize stimuli that are physically similar. (20)

The law of similarity has been used also in the design of the logo. The shapes that make up the frame of the bike are the same shape and of similar sizes.

4.2. HUMAN MEMORY

The human memory is also important when designing an application.

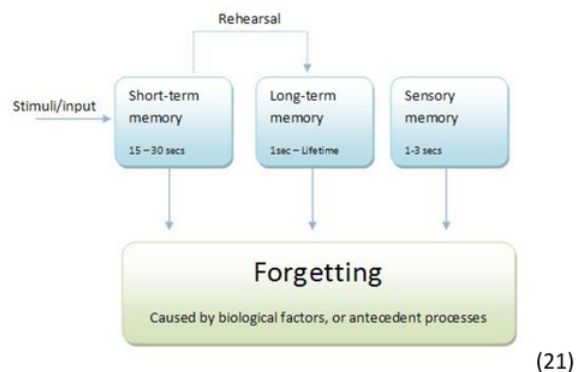


Figure 8 - Human Memory

As figure 5 shows, there are three main types of memory. These are short term, long term, and sensory memory.

4.2.1. SENSORY MEMORY

Sensory memory is kept for very short amount of time between $\frac{1}{4}$ to $\frac{1}{2}$ a second and it is aptly named because it comes from our senses. (22) Sensory memory does not try and process the whole image being received but small sets of features such as colours, shapes, tilt, curvature and contrast. (23)

4.2.2. SHORT-TERM MEMORY

The duration of short term memory is longer than sensory, usually between 0-18 seconds. (24) The short term memory is considered the smallest as it cannot hold much information – most humans if asked could only recite 5 to 9 numbers immediately without any mistakes, this was shown by psychologist George A Miller in his paper “The Magical Number Seven” (25) Although humans deal with this through a process called “chunking” (21) Memories that we find interesting are transferred to the short term from our sensory memory and stay for a minute unless they are repeated. (21)

It is important when designing the app to consider short term memory by not grouping more than 9 bits of data together as humans can't remember all this information using George A Miller's research as a guide, grouping no more than 5 bits of information together would be ideal.

4.2.3. LONG TERM MEMORY

A long term memory is anything you remember that has happened more than a few minutes ago. (26) Humans must make conscious effort for memories to transfer from short term to long term.

Using icons that are easily recognisable, so they can be found and are easily remembered will help with memory. As well as commonly known names for things that are already subliminally in your mind oppose to making new terminology for the app. Icons that represent what they're portraying

4.3. HUMAN REASONING

Human reasoning is the use of knowledge we already have to draw conclusions or infer new facts. There are three types of reasoning these include. It is a cognitive activity that decides how humans respond to situations. (27)

- Deductive – is the inference of a result from a rule and a case. (28)
- Inductive – is the inference of a rule from a case and effect. (28)
- Abduction – the use of a known principle, law or theory for the purpose of a causal explanation. (28)

4.4. INTERFACE METAPHORS

Interface metaphors are another human factor needed to be considered when designing the fitness app. An interface metaphor is a set of user interface visuals, actions and procedures that exploit specific knowledge that users already have of other domains. (29)

An example interface metaphor in the fitness app would be the following:

- Home button – Home button with a picture of a house and the words 'Home' underneath shows the user that action takes you back to the home screen.
- A cog – A cog with the words 'setting' on underneath shows the user that action will take them to the settings
- Shopping Cart – Picture of a trolley with the word 'Shop' underneath shows the user that action will take them to the shop
- Person Icon – This icon with the word 'profile' underneath shows the end user that's where their profile is
- A magnifying glass – shows the action of searching, user can search for mountain bike trails near them

4.5. AFFORDANCE

Affordance is the last human factor considered when designing the app. *"Affordances are an objects properties that show the possible actions users can take with it, thereby suggesting how they may interact with that object."* (30) In its simplest the object 'affords' what the object is intended to be used for. An example of affordance is a chair, humans know what that object is intended for, to be sat on. The chair 'affords' to be sat on.

An example of affordance within the app would be the home screen button. The house icon with the word 'Home' underneath 'affords' the action of returning to the home screen without any previous use.

5. REVIEW OF PROTOTYPE

This section is a review of the paper prototype by a class member, it was reviewed by Paige Harris.

This evaluation will highlight the aspects of the proposed application that did work, aspects that didn't work and any suggested improvements to improve the overall application. Should consider using the applications name on the thumbnail, however, the artwork on the thumbnail is clever. Upon opening the application, there should be a log on screen where the user can create an account using their emails and generating a password, or use their Facebook details to log in. If the account is linked to Facebook, there should be the ability to share the progression and any trails completed. When generating the account, the user should be able to set goals, for example, 15k a week, to help achieve fitness goals. This goal should then be edited as the user progresses with their fitness, by using the settings page. There is no settings screen, so adding one will allow the user to change personal details and goals. The app, for some people, might be used as a weight loss app, so it could be an option to include the user's current weight and their target weight. There is a Record cycle screen which allows the user to start recording at the start of a cycle, however there is no stop recording button, this should appear when the trail recording has begun, in place of the start button.

6. EVALUATION OF CLASS MATES DESIGN

This section provides and evaluation of a class mates design to help in their design process. This is intended to help

6.1. HOW DOES THE APP WORK?

The classmates app reviewed in this section is an app to remind you to take your medication. The prototype drawings contains a thumbnail and five screens. Upon opening the app you are prompted to enter your personal details including any medical conditions. The following screen allows you to add your medication needed to be taken for the day which then leads onto the screen to allow users to set reminders to take their medication. The app includes a help screen shows users what each icon on the home screen is for. The final screen is the home screen.

Below is the paper walkthrough for the app. The app contains some use of interface metaphors on the home screen – Home button to take you home, medication bottle to take you to medication input, clock to take you to the reminder page and a cog for settings.

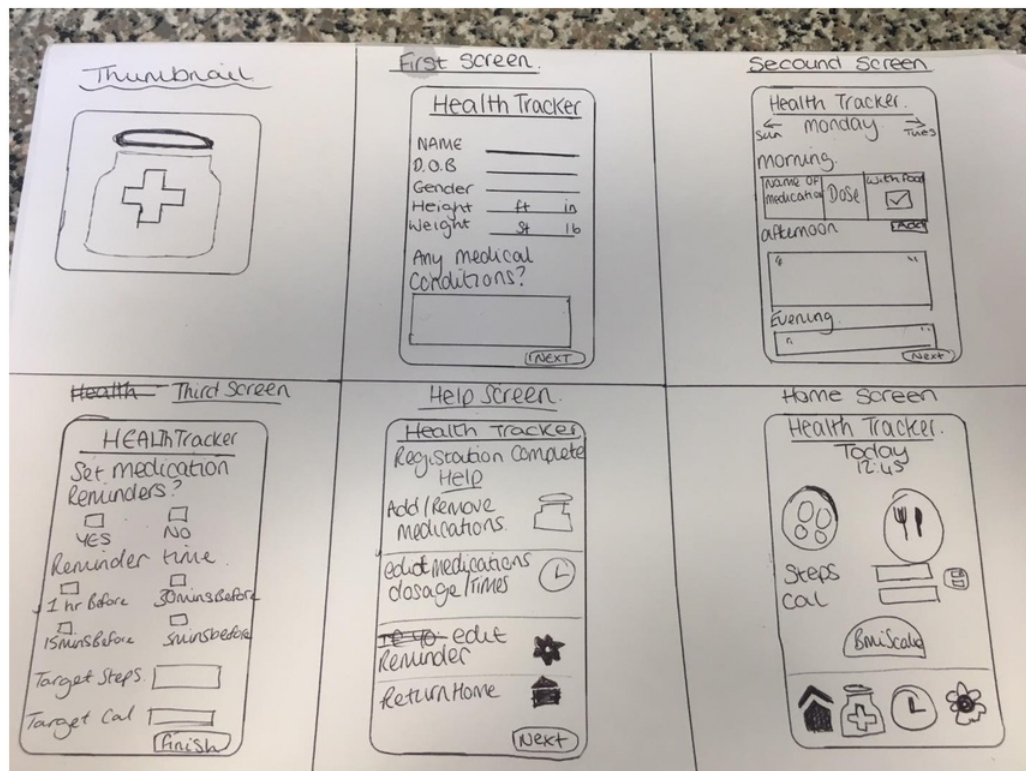


Figure 9 - Class mates hand draw prototype design

6.2. ASPECTS THAT WORKED

Aspects that worked included:

- Simple thumbnail design related to what the app does
- Easy layout and walk through, wouldn't take the end user long to become acquainted with the app
- Help screen to assist user with what the buttons are used for

6.3. SUGGESTED IMPROVEMENTS

After a walkthrough guide of the above prototype a few suggestions were made. These included:

- Add medications in and use a drop down list then adding to the timetable.
- Add a return button during registration process
- App makes users enter medication details everyday – could use a calendar interface, enter details once and put on repeat.
- Have navigation buttons on each page to help with navigating around the app
- Labelling the navigation buttons

7. SOFTWARE PROTOTYPE

This section provides a software prototype of the proposed fitness application. It contains a thumbnail and six screens. The software has been designed to work on an iPhone. The software prototype has been created in Adobe Illustrator.

7.1. APP THUMBNAIL

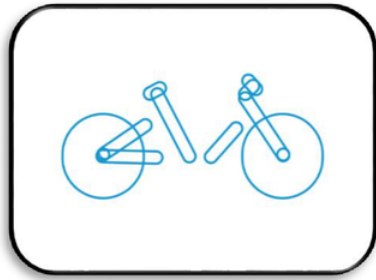


Figure 10 - App Thumbnail

Figure 10 shows the app thumbnail with the logo. It shows the use of Gestalts principles of both closure and similarities.

7.2. APP CREATE ACCOUNT PAGE

Log In

Email

Password

[Forgot Password](#)

Sign Up Here

Email

Password

[Forgot Password](#)

Sign Up Here

Figure 11 - App Log in Screen

Figure 11 shows the log in screen. Existing users can enter their email address and password to login while new users can press the 'Sign Up Here' button.

7.3. APP HOME PAGE



Figure 12 - App home page

Figure 12 shows the users news feed; this is the first screen user's encounter from logging in. From here you can use the plus button in the top right corner to record a new cycle. The settings cog in the top left corner will take you to the settings menu where users can change the units of measurements from km to miles as well as log out.

The news feed shows users the activity of other users who they have chosen to follow. This page give you the option to like other user's activities and achievements.

The bottom navigation buttons show use of interface metaphors in the software prototype. They each have their own job. Home takes you back to the news feed, search allows you to search for other users and mountain bike trails in the area, profile takes you to your profile and shop takes you to the shop where users can purchase merchandise.

7.4. APP SEARCH PAGE



Figure 13 - App Search page

Figure 13 is the applications search page. It allows users to search for trails near them and suggests popular trails that may be close. It also permits users to look back on their history of trails, with recorded information distance covered and time taken.

The navigation buttons are again present like they are on most pages to help users navigate the app easily.

7.5. APP PROFILE PAGE

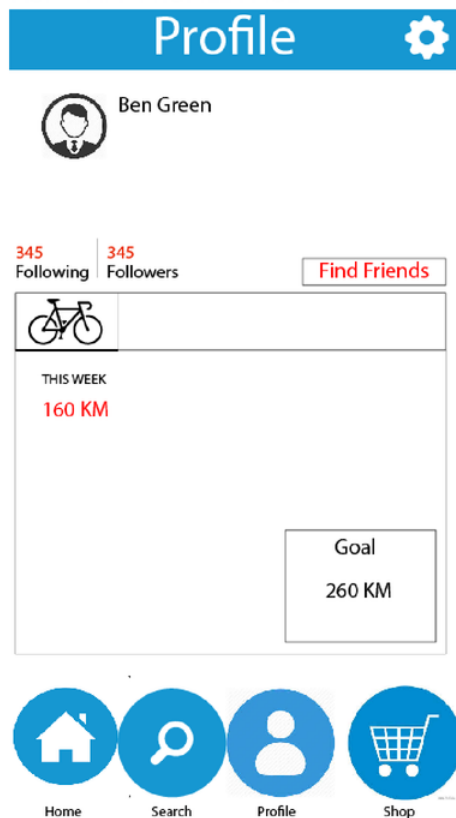


Figure 14 - App Profile Page

Figure 14 shows users profile. From here users can follow their friends who also use the application, see how many people they follow and who is following them. There is also a visual representation of useful data such as the distance covered this week by the user and a goal that has been set, encouraging users to get out there and be active to try and reach the goal.

7.6. APP SHOP

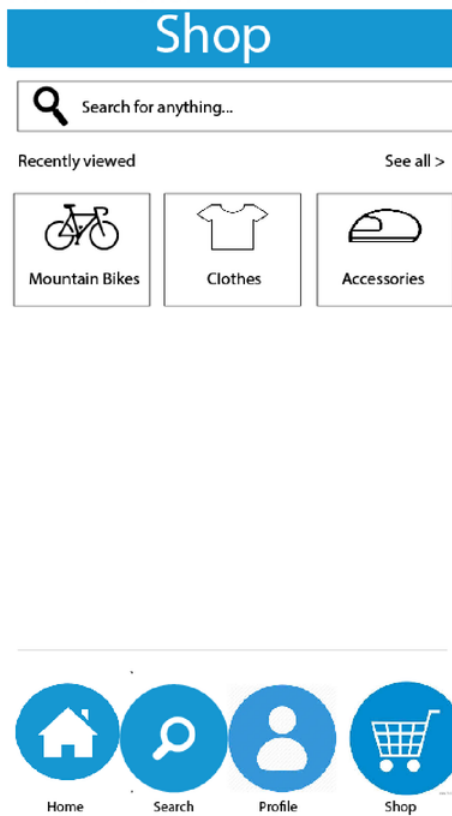


Figure 15 - App Shop

Figure 15 is of the shop page. From here users can search for anything in the range as well as search via category of products.

7.7. RECORD TRAIL



Figure 16 - Record Cycle Page

Figure 16 is the record cycle page. Users reach this page by clicking the '+' icon in the top right-hand side of the news feed. This page allows the app to track users cycle via GPS then save it to look evaluate progress. Clicking the red location button, the map interface will zoom in on your location and time your cycle.

8. EVALUATION OF USABILITY ENGINEERING TECHNIQUES

Conducting a task analysis when designing the prototype was fundamental in the outcome of the designs, without the task analysis important aspects of the design would not have been included, such as searching for mountain bike trails.

The walkthrough paper prototype also proved to be helpful, suggestions from class mates resulted in the adding of a log in page.

The prototype struggles to follow Millers “Magic Seven” rule for human memory as there is a lot going on, on each page. However, interface metaphors are used in abundance throughout the prototype and made for a better design – a magnifying glass is used to navigate to the search page and a trolley is used to navigate to the shop for example. Affordance has been used in the app for navigation back to the news feed, a home icon affords the action of navigating back to the home screen. All the human factors considered have contributed to a better prototype design, they enable the end user to be able to use the app with competence from the first use.

Feedback from the peer review suggested that the prototype needed a stop button once a cycle trial has been completed also a button that saves the trail. Although the prototype shows the trails save and can be searched it doesn’t show how. Another suggestion was to add an incentives page, offer medals and achievements for completing certain milestones. All these suggestions help improve the app for the end user.

It was also pointed out that although the app shows you can log in and create an account, there is no page to add any personal details. It was suggested that the app needs to include this for users that want create a profile with the app. Another idea was to incorporate making an account through Facebook to streamline the process for the end user.

Overall the techniques implemented are good and work well, but the prototype could be better. Use of colour in visual perception to draw the end users’ attention could be used better. Blue was chosen for the app as it can be seen by users with colour blindness.

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 25. MILLER, George A. The Magical Number Seven, Plus or Minus Two Some Limits on Our Capacity for Processing Information. [online]. Vol. 101, no. 2, p. 343–352. [Accessed 29 January 2018]. Available from: [http://www.psych.utoronto.ca/users/peterson/psy430s2001/Miller GA Magical Seven Psych Review 1955.pdf](http://www.psych.utoronto.ca/users/peterson/psy430s2001/Miller%20GA%20Magical%20Seven%20Psych%20Review%201955.pdf)My problem is that I have been persecuted by an integer. For seven years this number has followed me around, has intruded in my most private data, and has assaulted me from the pages of our most public journals. This number assumes a variety of disguises, being sometimes a little larger and sometimes a little smaller than usual, but never changing so much as to be unrecognizable. The persistence with which this number plagues me is far more than a random accident. There is, to quote a famous senator, a design behind it, some pattern governing its appearances. Either there really is something unusual about the number or else I am suffering from delusions of persecution. I shall begin my case history by telling you about some experiments that tested how accurately people can assign numbers to the magnitudes of various aspects of a stimulus. In the traditional language of psychology these would be called experiments in absolute judgment. Historical accident, however, has decreed that they should have another name. We now call them experiments on the capacity of people to transmit information. Since these experiments would not have been done without the appearance of information theory on the psychological scene, and since the results are analyzed in terms of the concepts of information theory, I shall have to preface my discussion with a few remarks about this theory.
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Ben Green - Usability Engineering

GRADEMARK REPORT

FINAL GRADE

/100

GENERAL COMMENTS

Instructor

Introduction

A nicely structured introduction with good referencing setting the scene well and demonstrating good research.

Task Analysis

Evidence of good user involvement and customised Task Analysis questions – a good feature. A Hierarchical Task Analysis is provided with the correct format but it strays into features of the app which are not to be included here.

Paper Prototype

Good design work and use of the required hand drawn format. Well structured and includes a range of useful features showing careful consideration of user needs and selection of design components.

Human Factors

A good and well referenced discussion of Human Factors. You correctly describe the concepts and discuss their application very well it would have been an improvement to show me examples from your own prototype designs as I could clearly see the application there!

Review of Classmate Design

A good review with useful and constructive suggestions for improvement. You also provided a good and thoughtful response to the classmate review.

Software Prototype

This is an attractive prototype with good design work and application of usability techniques. Also good discussion of design features. A full range of features are implemented and explained.

Evaluation

Very good discussion which contained included good analysis of the techniques used with many specific application in your work discussed.

Referencing and Format

Good referencing, appropriate and attractive format.

69%

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13

PAGE 14

PAGE 15

PAGE 16

PAGE 17

PAGE 18

PAGE 19

PAGE 20

PAGE 21

PAGE 22

PAGE 23
