CFG Final Project Report: Happy Bodies Anywhere - Group 2

Authors

Danielle Blackburn, Nicole Brobbey, Eleanor Cottrell, Frances Garnsey, Emma Hewlett, Helen May

1. INTRODUCTION:

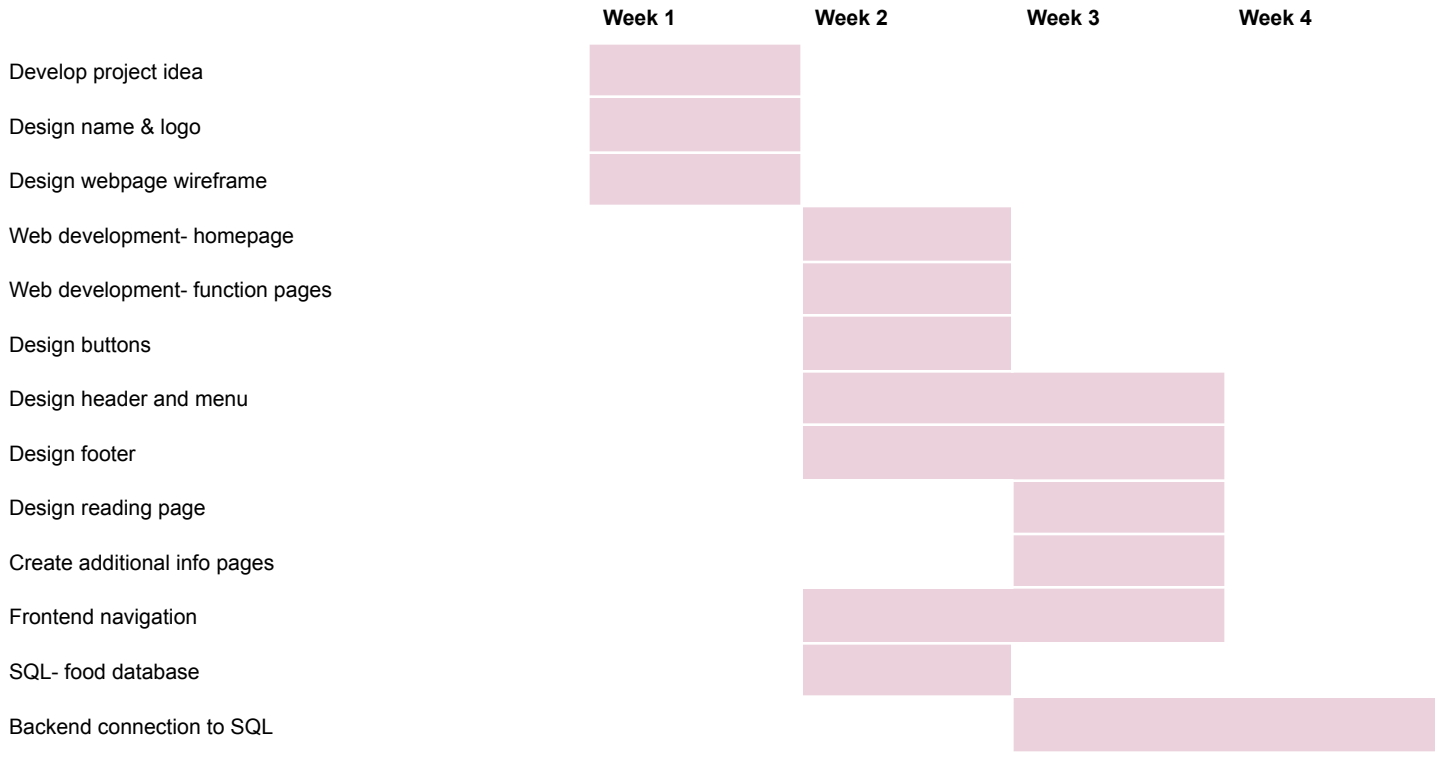
1.1 Aims and objectives of the project

Diabetes is an increasingly common long-term illness with more children being diagnosed in 2019 than in previous years. The vast majority (90%) of children with diabetes suffer with Type 1 as opposed to Type 2 and are therefore insulin-dependent. If poorly controlled, diabetes can have vast and severe health implications including eye and kidney disease, heart disease and stroke.

We are seeking to create a website, aimed at children aged 10-15, who may be gaining more independence in their everyday lives and therefore need to take greater responsibility for their sugar/insulin levels. They may be going to friends' houses, on school residential trips or simply to town with their friends for lunch. All of these can be tricky things to navigate for children with diabetes and so we are aiming to create a website that will not only signpost reliable information on their Diabetes, but also act as a resource for children who are learning to gain good control over their diabetes with useful interactive tools such as carb and sugar calculators. We also understand that parents of children with diabetes may want insight into their children's levels and so ultimately, we would like people to be able to create accounts in which they can log in to and store their data.

1.2 Roadmap of the report

The table below shows our indicative roadmap plan for the work.



Insulin calculations

Connect insulin backend code

Testing

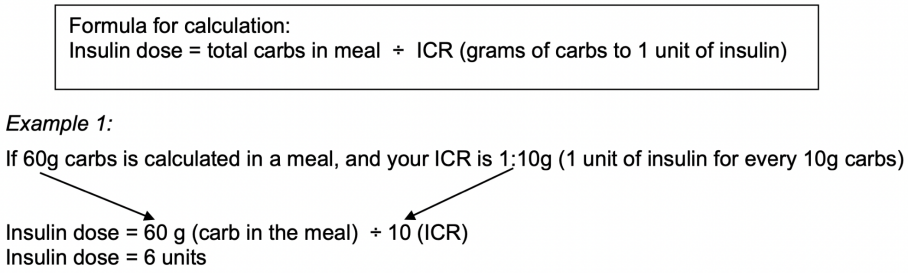
Project Documentation

2. BACKGROUND

Given the number of children who continue to be diagnosed with Diabetes Type 1 every year, we wanted to create something that could be helpful to them as they reach their teenage years and hopefully give them the ability to be more independent in managing their illness. The HBA project is therefore a web app designed to be used independently by children with diabetes to find out and log their food calorie consumption and necessary insulin levels. We developed HBA with mobile access in-mind above all for the best user experience and for use from anywhere - something that is essential for our end-users when they are out and about.

On HBA, users will be able to calculate the carb levels in specific food items. For the purpose of the project we have used dummy data, but the hope would be to find or develop an API that we could link up to the site - unfortunately during the project phase, we could only find paid-for APIs and therefore opted for dummy data to ensure our logic worked. For this, users are required to enter the name of the food they eat and it will return the carb content in grams

Obviously a large part of our project is the hope that users will be able to calculate the insulin dose required at various points in the day. For this aspect of the site, we used the calculation currently used most widely by people with diabetes. [1]



As you can see, users need to know the total carbs in a meal to calculate their insulin dose and this is one of the main reasons why we also chose to include a carb calculator on the website. So that we could offer an end-to-end calculator for users, i.e. they could work out the carbs in their meal, then use this with their ICR (that a health professional will give to them) to calculate their insulin dose required.

As the app is aimed at older children/teenagers, we designed it to be as self-explanatory as possible with clear instructions on any input/buttons that the user is required to use. We want there to be little to no ambiguity as to how to use the site. However, given that we have aimed the site at children/teenagers, we did feel that it was imperative to have further information on the site that parents could read so that they knew their children were using a safe, reliable and credible source to get their health information from. This is why we have created a “For Parents” and a ‘Recommended Reading’ page. On the first of these pages, we state how the website

[1] Westherts hospital - patient information

works, how the calculations are made and also how any data is stored. On the second, we will link to trusted sites that can offer further info. We have also included links in the footer to ‘Privacy Policy’, ‘Cookies Policy’, ‘Terms and Conditions’ and ‘About’ pages so that we are compliant.

We had also aimed to have a separate parents login page that would allow parents to track insulin levels (whilst keeping the child’s food private). However due to time constraints we were unable to initiate this.

3. SPECIFICATIONS AND DESIGN

3.1 Requirements: technical and non-technical

Technical Requirements:

- Back-end code that calculates the amount of insulin that is required based on the user’s inputs for their current sugar level and amount of carbohydrates they are planning to eat.
- API that connects to a database containing information on the amount of carbohydrates in different foods. It should accept a user input for different food types and output the carbohydrate level. (We used a dummy database created on MySQL)
- API that connects to a database (Google Firestore) allowing users to create an account they can sign into and record sugar levels over time.
- A sign-in for parents to be able to oversee users history as a way for them to keep an eye on their insulin levels, whilst leaving the child with some independence.

Non-technical requirements:

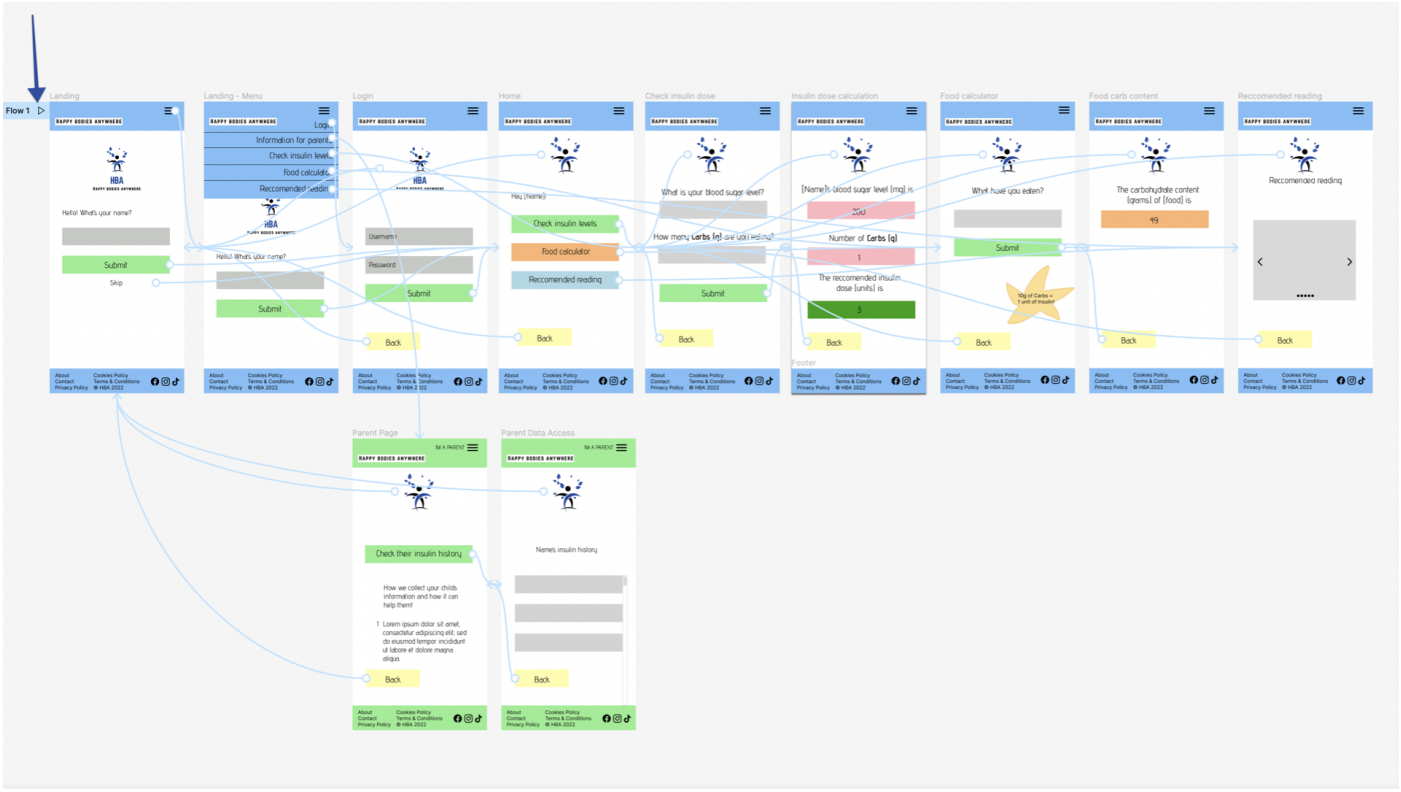
- Child-friendly interface for diabetics to find out and keep a record of their calories and insulin.
- Provide pointers to external information on diabetes from trusted sources - NHS, Diabetes UK etc
- A website that follows best practice in design principles.

3.2 Design and Architecture

Our project has been designed taking into consideration the key requirements and design principles:
Layout: We utilised a minimalist design using white backgrounds and limiting each page to having one key function making clear what is the page’s purpose. The use of bold colours for the buttons then attracts attention without creating a busy or overly complex page. We use our logo and company name (Happy Bodies Anywhere) to make the site recognisable.
Eye Scanning: We have maximised our knowledge of the Z pattern eye scanning by placing the webpage name on the top left, the menu for easy accessibility on the top right so that key information is seen first. The logo and the key functionality of each page are then in the middle. The final part of each page at the bottom then contains the least important information in the footer.
Designing for use on a mobile: HBA is designed for use when out and about so it is designed primarily to be used on a mobile phone.
Big Buttons: The webpage uses big buttons for easy functionality- it is clear what is being asked from the button labels and being bigger makes it easy to use (i.e. they are not so small that people have to zoom in and out to use). The size and style of the buttons on each page are also consistent for ease of use. At all times the logo can be pressed as an alternate home button too as with lots of other websites.

Typefaces: Fonts have been chosen that are bold, clear and easy to read - especially on small screens. On mobile, type defaults to no smaller than 13pt (legibility).
Links in the footer: Commonly found information on websites is included in the footer so they don't take away from the key focus but also maintain the credibility of the site and ensure that important legal information which is required is available on site. We also included social media links because our target audience are teenagers, the majority of whom are on social media.

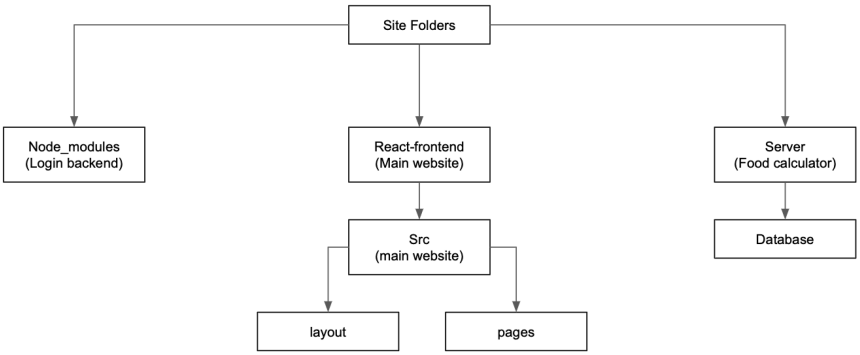
A wireframe of the project can be seen below.



In addition we also factored Nielson's 10 design principles into the design of the project, see homework 2.

Architecture

The folder structure of the project is show below:



4. IMPLEMENTATION AND EXECUTION

4.1 Development approach and team member roles

Scope and design setting:	Whole project team
Frontend Development:	Danni, Emma, Ellie, Frances, Nicole, Helen
Backend Development:	Nicole, Helen, Frances
Testing:	Emma, Frances
Documentation:	Whole project team

Weekly team meetings and ongoing communication via Slack to flag any issues. Use of a Trello/GitHub board to help keep track of the project backlog. The code was managed on GitHub with tasks tracked and new code being shared via separate branches so that pairs and the wider team can test the new code before any final merging. Code is tested using unit tests for backend code and manually testing the completed website, sharing this with friends and family to get feedback and ensure there are no errors.

4.2 Tools and libraries

- Coding languages: React, CSS, Node.js (inc. express).
- Databases: Firebase (for user accounts), MySQL for Food Calculator database
- Dummy Login: test user- harrypotter@gmail.com; password: abc123!
- Example foods from the Food calculator database includes: ‘Sandwich’, ‘Apple’, ‘Chips’
- Packages- This project requires the following packages which can be installed by running `npm install`:
    - react bootstrap
    - @reduxjs/toolkit react-redux
    - @fortawesome/fontawesome-svg-core
    - @fortawesome/free-solid-svg-icons
    - @fortawesome/react-fontawesome
    - @fortawesome/free-brands-svg-icons
    - react-test-renderer
    - firebase
    - react-firebase-hooks
- External hosting: We used netlify to host our website for free. This works with the frontend and login database, however not the food calculator which only works locally. It can be found here (for a free trial period): https://happy-bodies-anywhere.netlify.app

4.3 Implementation process

Achievements:

- Teamwork: we quickly decided on our project objectives due to personal interest and experience. One of our team works within the pharmaceuticals industry and spoke to us about the need for such a website, and two members of the team both have experience leading educational trips for children

where they have previously encountered the need for this. Because of the experience within the team, we were able to create a task-list that considered both the technical and non-technical requirements and also we were able to build our site with our stakeholders in mind.

- Back-end logic: despite a few challenges along the way, we have fundamentally created what we set out to achieve with regards to the back-end logic of our site - a calculator for insulin dosage, a carb calculator and a login page.
- Front-end: We have achieved most of what we wished and have a functional and aesthetically pleasing website that works on various size screens.

4.4 Agile Development

The team drew upon several key features of agile development, however tailored for the fact that this project was conducted around work and family life. As such we had a weekly meeting that started with a 'stand-up approach' before moving onto a weekly planning session. These meetings also provided an opportunity to merge code together and view our progress. We also used a KANBAN style board on github projects that was reviewed by the team to aid planning. In addition the team remained in touch via Slack throughout the week.

4.5 Implementation Challenges & Changes to decisions

- API calls: We found it hard to find a usable API. On the one with the best compatibility for what we needed, we got 50 pages of results. The same keywords were used over and over and it was challenging to filter for a UK audience as the data names were American-brand focussed. It also didn't indicate portion size or if the carb/sugar/calorie information is per 100g or larger/smaller. Because of this, and because ultimately we wanted to make sure that our logic would work on the insulin calculator (the main function of our website), we took the decision as a team to build a dummy database on MySQL. We did find a better potential API but it required an application process to be used by developers and it wouldn't have been available to use within the time constraints that we had.
- Steep learning curve with using new languages/tools: We all took a lot of initiative and did further research in our own time - whether that was considering what made large websites compliant, research of Diabetes, Firebase or more. Because we all had clear set-out tasks to achieve, we were able to get traction on the project and create our finished result.
- Github knowledge: Some people in the team were far more confident than others in using GitHub and so in our weekly calls, we made sure that we helped each other use GitHub properly. We also made sure that there was one main person who would be in charge of merging branches after code reviews rather than everyone merging as we went.
- Time constraints: We all had varied amounts of hours that we were able to commit to the project outside of work/parenting/the rest of the course requirements. We ensured that we communicated efficiently both on Slack and GitHub and in our weekly calls so that expectations between members of the team were clearly managed. Some people wanted to expand their learning within areas they felt less confident in and some people wanted to further practise things that they already feel are becoming their preferred area/niche and therefore we all took on a variety of roles within the team to try and make the most progress as possible. These roles were clearly defined in our project Trello/GitHub task board.
- React: After deciding to use React to create our site it did take us longer than anticipated to achieve what seemed like simple things in traditional HTML/CSS/JS sites like hyperlinking versus routing.

5. TESTING AND EVALUATION

5.1 Testing strategy:
Code is tested using unit tests for backend code and manually testing the completed website, sharing this with friends and family to get feedback and ensure there are no errors. In hindsight, writing the tests whilst writing the code (test-driven development) would have made for easier testing of the product. However, as lots of the elements were new to us as we were writing the code, lots of it was tested informally as we went and formally in our weekly meetings and following new branch merges.

5.2 Functional and user testing: Functional tests were done e.g. with button.test.js to demonstrate an approach to testing a React component and this can be done using the 'npm test'. If time permitted then further tests would have been done on all components and to test their behaviours in greater detail. Backend tests are also included
User testing was done with friends and family.

5.3 System limitations: Due to React being completely new to all members of the team the construction of the website took longer than anticipated and we did not make maximal use of its ability to alter component states. This left us with limited time for conducting automated testing and so only limited testing is included. Future work would have sought to test the component behaviours in the frontend and ensure appropriate exception handling in the backend.

6. CONCLUSION

The idea of HBA came around very quickly - we knew roughly what we wanted to create within the first thirty minutes of meeting. However, what we didn't know is how much our site/app would develop as a concept. One of our best attributes as a team has been our ability to communicate clearly and effectively despite all working on very different schedules in our personal and professional lives. We feel that this has led us to create a clear, concise product that, had we been given more time, would be even more polished and complete than it is now. Our biggest setback was that we couldn't find an API that was free and open-source and therefore the site feels less complete - you can't simply type in what you've eaten unless it happens to be on our dummy database. However, in principle, the logic works, the product works and ultimately we feel that we have achieved everything else that we set out to achieve, creating a credible website that would help children/teenagers at a time where they are wanting to be more independent in managing their Diabetes Type 1 and something that parents would feel confident allowing their children to use.

Given more resources we could further improve this project by implementing a direct link between the user's personal blood glucose checker and our app. This would allow the logged-in user to sync their tracker with our app for real-time advice on insulin levels and give further food / diet requirements.
Given more time, we could further improve the Food Calculator page by changing the input box to a live search text box so food items are suggested when the user starts typing.