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# Introduction

I have recently been tasked with planning a digital solution for Health Advice Group. They already provide users with:

* advice regarding extreme weather
* information about environmental conditions and allergies
* risk assessments for environments

The digital solution requires that:

* users are provided with a weather forecasting feature.
* users have access to a dashboard for monitoring air quality.
* users can look for advice for dealing with related health matters.

Finally, the client has requested some potential features which could be in the solution:

* health advice based on location.
* accessibility features.
* health tracking tools.

This documentation is designed to outline how I would suggest implementing the solution, the requirements and metrics which would measure the success of the project, and how we will comply with legislation and guidelines.

# Design

In this section I will be discussing several factors which will impact the design choices of our application and how we plan to comply or address these factors.

## Project Proposal

## UI/UX Designs

It is important that the website is designed with ease of use and accessibility in mind. This is because the audience which uses Health Advice Group’s current solutions are not likely to be technical, and hence they may be frustrated or seek alternative solutions if our website does not incorporate these principals. Hence, it is fundamental that the website is accessible to users of any skill level or experience with the internet.

We will base the UI off any corporate branding, colour schemes, or resources which Health Advice Group send us. However, as of right now, we have not received any

## Legalities

# Requirements

## Software Requirements

|  |  |  |
| --- | --- | --- |
| Software Name | Software Type | Reasoning |
| HTML / Razor | Markup Language | HTML is needed to insert basic content such as text, buttons, and links into web pages, which the solution will be using. |
| CSS | Styling Language | CSS is needed to edit or manipulate the layout or appearance of basic HTML elements on a webpage. As HTML is used, CSS is also important. |
| JavaScript | Programming Language | JavaScript is the language which runs any basic logic on the web page and is used to retrieve data and generate new or edit existing HTML elements and CSS properties. |
| Bootstrap | CSS Framework | Bootstrap is a framework which generates hundreds of existing CSS classes, reducing the amount of CSS that we must write ourselves. |
| jQuery | JavaScript Library | jQuery is a JavaScript library designed to make the way that JavaScript can be written more concise. This will improve the readability, scalability, and performance. |
| OpenWeatherMap Current Weather | API | The current weather API is a large set of data for the current temperature at a certain longitude and latitude. This will allow users to easily see the weather at any time. |
| OpenWeatherMap Air Pollution | API | The air pollution API is a detailed list of the concentration of all the pollutant chemicals in the air at a certain longitude and latitude. This will allow users to see if the air quality is healthy or unhealthy and allow users to take action based on the result. |
| OpenWeatherMap Geocoding | API | Whilst you can get the Latitude and Longitude of a user from their location, users may opt to see a different location. As the APIs expect a Latitude and Longitude, this API can convert a readable address to a Latitude and Longitude to be used in the other features. |
| ASP.NET MVC | Backend Framework | ASP.NET MVC is a backend tool which is used to generate HTML webpages using C# queries and code, retrieve and manipulate data from a database, and authorise current users and their permissions. |
| Microsoft SQL | Query Language | Microsoft SQL is a Query Language which is used to store, retrieve, and update data. By default, ASP.NET MVC uses Microsoft SQL and I will be using it as they are both well integrated. |

## Hardware Requirements

Whilst there are no specific hardware requirements, the host machine must be able to run all the software requirements, mainly ASP.NET MVC, which comes bundled with the majority of the other software requirements (excluding APIs).

## Functional Requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Requirement Number | Description | Priority | Reasoning |
| 1 | Everyone has access to an accounts system. | HIGH | For data protection purposes, it is important that each user signs up with their individual information and do not have access to other’s information without their consent. |
| 1.1 | Individuals can sign up for their own account using their name, email, and a password. | HIGH | For similar data protection reasons, the user must be able to make an account on their own behalf. |
| 1.2 | Individuals can log in using the email and password that they used to register. | HIGH | To avoid confusion and improve user experience, users will be able to use the same password to log in as they used to register. |
| 1.3 | Individuals can reset their password by themselves. | MEDIUM | To reduce the need for staff intervention, users will have an email with a password reset link sent to them. |
| 1.4 | Users will have a role of management or user | HIGH | As the use case will vary differently between trustees and users, it is important that there is a role system to differentiate between them. |
| 2. | Management role will have features relevant to their role. | HIGH | It is important that management have access to appropriate features so databases which hold advice can be interacted with without our intervention. |
| 2.1 | Management will have the ability to add new advice for users to see. | HIGH | This will make it easy for advice to be quickly added without the intervention of our staff. This improves user experience and means that appropriate information can be published quicker. |
| 2.2 | Management will have the ability to see, update or delete existing advice. | HIGH | For similar reason, this will allow staff to quickly correct or remove inappropriate or inaccurate advice, reducing misinformation. |
| 2.3 | Management will be able to see a dashboard containing information related to the solution. | LOW | Should we get time, we may be able to create a dashboard which will display user’s interactions with advice and the website in general. This can allow management to make decisions about the solution and the advice they offer. |
| 3. | User role will have features relevant to their role. | HIGH | For security reasons, users should not have the ability to update advice or create new advice. This is to reduce misinformation and inappropriate content being spread. |
| 3.1 | Users will be able to see a forecast of the current weather at their location. | HIGH | This is one of the main factors which influence environmental conditions, hence it is important users can see this quickly to make health decisions. |
| 3.2 | Users will be able to see a forecast of the current weather at a location they enter. | MEDIUM | In some situations, users may be headed to another location and hence may need to see the temperature elsewhere to decide or to inform family. |
| 3.3 | Health advice for conditions within a certain range of the current temperature will be outputted on the forecast page. | MEDIUM | Whilst users can see the advice by accessing its respective page, displaying advice with the weather may quickly remind the user of any conditions they may have overlooked. |
| 3.4 | Users will be able to see a forecast of the air pollution at their current location | HIGH | The air pollution can affect conditions such as asthma, hence it is important that users can also access this quickly to make health decisions. |
| 3.5 | Users will be able to see a forecast of the air pollution at a location they enter. | MEDIUM | In some situations, users may be headed to another location and hence may need to see the air quality elsewhere to decide or to inform family. |
| 3.6 | Users will be able to see and access details about advice for health conditions. | HIGH | As the charity offers advice about health conditions, it is important that users can access this remotely to reduce travel and business at branches. |
| 3.7 | Users can search for condition advice by the name or temperature | MEDIUM | This will make it easier to navigate the sight and find relevant advice. |
| 3.8 | Users can save advice and access all their advice on a page | MEDIUM | This will reduce time spent trying to find advice, which will improve usability and accessibility. |
| 3.9 | Users can access a health tracker and input their calories, steps, and water | HIGH | This will allow users to make better health choices. |
| 3.10 | Users can see what they inputted into the tracker on previous days. | MEDIUM | This will allow users to see their health choices and progress over a longer period. |
|  |  |  |  |
|  |  |  |  |

## Non-Functional Requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Requirement Number | Description | Priority | Reasoning |
| 1. | Accessibility | HIGH | About 10% of people have a disability, hence it is important that we have features to accommodate such conditions. |
| 1.1 | Theme switcher | MEDIUM | Having a theme switcher can help to reduce eye strain when viewing in light or dark environments. |
| 1.2 | High contrast | MEDIUM | High contrast is one of the simplest ways to add accessibility to a website. By adding a bright background colour to important items such as navigation links, people with visual impairments can quickly see what parts are important. |
| 1.3 | Additional accessibility options | LOW | Due to the harsh time constraints, it is unlikely that we will be able to add more accessibility features for now. However, we will design the application with third-party accessibility extensions in consideration. |
| 2. | Security | HIGH | Due to data protection laws and to ensure the integrity of the system, it is important that we keep |
| 2.1 | Passwords and sensitive information are encrypted or hashed accordingly | HIGH | Due to data protection laws, appropriate measure such as one way encryption (hashing) must be taken to ensure sensitive information cannot be accessed if intercepted. |
| 2.2 | Inputs are safe from cross site scripting attacks | HIGH | To stop users being able to input malicious scripts which may lead to sensitive data being disclosed or making parts of the website inaccessible, it is important to validate against any inputs. |
| 2.3 | Inputs are safe from SQL injections | HIGH | It is important that we validate against and limit any “search” options which interact with a database. This is to stop users from performing malicious queries to obtain sensitive data or to cause strain on the database. |
| 3. | Scalability | MEDIUM | It is important that the solution is scalable in case Health Advice Group wants us to add to the solution in the future. |
| 3.1 | Modular approach | MEDIUM | It is somewhat important that we take a modular approach whenever possible in case we need to add upon, update, or remove a part of the system. |
| 4. | Maintainability | HIGH | It is important that should someone else need to edit the code in the solution, it is easy to understand. |
| 4.1 | Comments | HIGH | In order to improve maintainability, it is important we annotate complex sections or sections which need extra context. |

# Project

## Project Methodology

The project methodology is an influential part of the project as it will dictate the order in which we develop the solution’s features. To decide on an effective methodology, I had to consider both the number of staff / resources and the amount of time we had to build this prototype.

As of right now, one singular developer will be creating the prototype, in a 30-hour window. Due to these harsh time constraints, I will be using an adapted waterfall model. In this version, I will be focusing on the high priority requirements for each module, and then the medium priority requirements for each module, and then the low medium priority requirements for each module, as demonstrated by the Gantt Chart below.

A screenshot of a computer

Description automatically generated

## Project Risks

Cybersecurity – one of the biggest risks is cybersecurity risks. This is where a malicious actor is able to gain access to restricted parts of the system which or data it stores by any means.

* Interception of details
* Access to database
* SQL injection
* Keyloggers and spyware

Scope / Constraints

* Incorrect displays / bugs
* Incomplete features

Uptime Issues

* Dependence on third party services

Human Risks

* Phishing
* Insider threats
* Weak passwords

# Business Context

## Key Performance Indicators (KPIs)

The key performance indicators are a vital part of the project. This is because they will dictate and measure the success of the proposed project. I have written these indicators with the proposed format of the solution and Health Advice Group’s existing solution in mind. The name, measurement, and reasoning of each KPI I have chosen can be seen listed below.

|  |  |  |  |
| --- | --- | --- | --- |
| KPI name | KPI metric | KPI Description | Reasoning |
| Uptime | Percentage / 100 | The percentage of the time that the solution is accessible to the user. | The uptime is a necessary metric to prioritise as users are likely to seek alternative resources or solutions if ours is not available for long periods of time. |
| Average load time | Milliseconds | How long it takes to receive a view or response from the server. | The load time must be low to ensure user retention, this is because users may also seek alternatives if it takes a long time to load necessary resources. |
| Advice interactions | Total number | The number of times that a user clicks on the “details” page of an advice object. | The number of interactions with a piece of advice can be used to determine how common certain issues or conditions are, allowing management to post more relevant content and reach a wider audience. |
| Number of logins | Number / {time frame} | The number of users which log in to our solution in a certain period of time. | Number of logins can be a way to directly measure how many users our solution has reached and interested. |

It is worth noting that some of the KPIs such as number of logins and average load time cannot be accurately tracked during the development phase. This is because the solution will be hosted locally whereas it would be hosted elsewhere in the world by a third-party service provider should the solution be deployed. This means that we will not be testing for these KPIs during the development phase to avoid inaccuracies or confusion.

## User Acceptance Criteria

* The layout of the solution must be clear and concise.
* The website should allow users to access resources related to conditions through the “advice” system.
* The website should provide features which allow users to inform their health decisions.
* The website should allow users to save advice and resources which help them to inform health decisions.
* The website should allow management to add new advice and update existing advice.

# Data

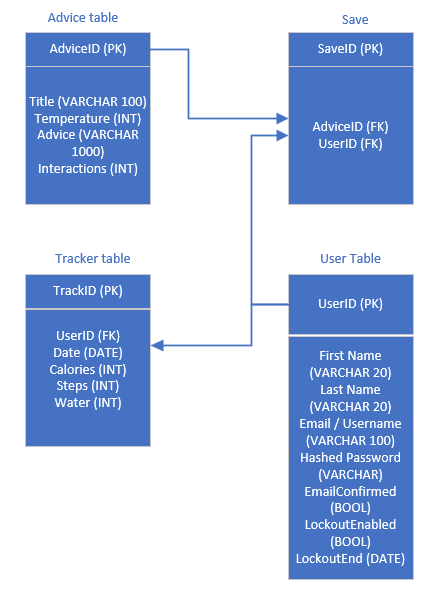
In order to comply with data protection laws, it is explicit that we state what data we are collecting and storing from this prototype. For the benefit of Health Advice Group, I have listed any annotations which may be used in sections regarding data below:

|  |  |  |
| --- | --- | --- |
| Abbreviation | Purpose | Example |
| PK / Primary Key | The main property or value which can be used to uniquely identify an entry in a table. | AdviceID: 5  UserID: 43fa119e-e98f-4d5e-9541-335954d8cebd |
| FK / Foreign Key | An identifier which is used as the primary key in another table. | AdviceID: 5  UserID: 43fa119e-e98f-4d5e-9541-335954d8cebd |
| CHAR NUMBER / Characters | A string of characters which is the length specified by NUMBER | Abcde: CHAR 5  ABCDEFGH CHAR 8 |
| VARCHAR NUMBER / Variable Characters | A string of characters which can be any length up to the length specified by NUMBER | Dave: VARCHAR 10  ABCDEFGHIJ: VARCHAR 10 |
| INT / Integer | A whole number which can be used to perform calculations or ordering | 1234  5432875309123290  2 |
| BOOL / Boolean | A data type which can be in one of 2 states, true or false. | True  False |
| DATE / Date | A data format designed to indicate the date of an entry or event | 27/01/2024  01/27/2024  2024/01/27 |

## Data Map

In order to comply with Data Protection laws, we need to state how we collect data and what data is collected. To easily visualise what data we collect, how it will be stored, and how data is linked across the service, I have attached a visualisation below.

The first most value refers to the “primary key” of the table and it is used to identify any entry in a table. Additionally, I have made use of arrows wherever necessary to indicate data which is used in another table, and where it derives from.



## Data Requirements

Mapped below are all the variables which our database will store, an example of a variable, why it is needed in the database and any validation which must be applied to it. This is intended to explain why each piece of data is needed for the app to work and how it must be implemented in regards to security and limitations.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Field Name | Data Type | Format | Constraints | Purpose | Example |
| User ID | VARCHAR | N/A | N/A | Used to uniquely identify any user regardless of similar First Names, Second Names, emails, etc. | 43fa119e-e98f-4d5e-9541-335954d8cebd |
| First Name | VARCHAR | N/A | Minimum length 2  Maximum length 20 | Used to greet the user upon logging in | Jamie |
| Last Name | VARCHAR | N/A | Minimum length 2  Maximum length 20 | Used to greet the user upon logging in | Jamie |
| Email / Username | VARCHAR | email@site.com | Contains @  Contains . | Used to register and log in to an account and can be used to reset / confirm account | [example@gmail.com](mailto:example@gmail.com) |
| HashedPassword | VARCHAR | N/A | N/A | Used to store user passwords in a “scrambled” format which cannot be unencrypted | AQAAAAEAACcQAAAAEFCqbaXbSmBXZO3xTNYNTJiD7VmX1rJ3L8uzOhhU4SluohAPQf1uf1Pg7TuFQdQMRA== |
| EmailConfirmed | BOOL | N/A | N/A | Used to check if the user has clicked the activation link on their account. Cannot sign in if it is False. | True |
| LockoutEnabled | BOOL | N/A | N/A | Used to check if the user can sign into their account. Cannot sign in if it is True. | False |
| LockoutEnd | DATE | YYYY/MM/DD | N/A | If LockoutEnabled is True, this is the date it will return to false. | 2024/01/29 |
| TrackID | INT | N/A | N/A | Used to uniquely identify a health diary entry submitted by a user. | 45 |
| Date | DATE | YYYY/MM/DD | N/A | Used to identify when a user made an entry to the health tracker. | 2024/01/27 |
| Calories | INT | N/A | N/A | One of the main metrics used for users to track their health and habits. | 1980 |
| Steps | INT | N/A | N/A | A metric used to track the activity of the user | 19000 |
| Water | INT | N/A | N/A | The cups of water a user has had. Metric used to track if the user is drinking healthily. | 13 |
| AdviceID | INT | N/A | N/A | Used to uniquely identify any advice added. | 12 |
| Title | VARCHAR 100 | N/A | Minimum length 5  Maximum length 100 | This is used to quickly indicate what a piece of advice is about. | Hypothermia |
| Temperature | INT | N/A | Minimum number -90 (degrees)  Maximum number 60 (degrees) | The temperature that a specific condition starts to occur at, used to offer advice when forecast is near this value. | -2C |
| Advice | VARCHAR 1000 | N/A | N/A | The actual advice or article which is offered upon viewing the “details” page. | Lorem ipsum sit dolor amit conneticut adiscping elit |
| Interactions | INT | N/A | N/A | The amount of times the “details” button has been clicked on a piece of advice. | 456 |

# Testing

## Testing Strategy

In order to ensure consistent testing, it is important that we understand what components need to be tested and what must be completed before this can be done. As of right now, Health Advice Group have not provided a concrete window for testing, hence it will needed to be included in the development process. Due to prerequisites and dependencies, it is not clear as to when these tests can be completed, hence the date of test will remain as “undecided” until we have more information or until the development process starts.

|  |  |  |  |
| --- | --- | --- | --- |
| Date of test | Component to be tested | Type of test to be carried out | Prerequisites and dependencies |
| Undecided | Register system | Range testing | Users database must be set up. Relevant validation systems must be implemented. |
| Undecided | Register system | Value testing | Users database must be set up. Relevant validation systems must be implemented. |
| Undecided | Login system | Value testing | Users database must be set up and user must be registered. |
| Undecided | APIs | Accuracy testing | APIs must be set up and pull data. Alternative sources must be available to compare values. |
| Undecided | Advice system | Range testing | Advice system and display must be set up. |

## Testing Log

Whilst the testing strategy identifies the main components we need to test, it does not explain how we plan to test these components and what we are checking for. For Health Advice Group’s benefit, I have attached a copy of the test plan, which will be used in the development phase of the prototype, below.

|  |  |  |  |
| --- | --- | --- | --- |
| Description | Data | Valid? | Reason |
| Value test for email in register action | jamieh | N | No @ symbol – email is invalid |
| Value test for email in register action | jamieh@gmail | N | No top-level domain, for example, .com – email is invalid. |
| Value test for email in register action | jamieh@gmail.com | Y | N/A |
| Range test for first name in register action | J | N | The first name is 1 character, which is less than the minimum length of 2 characters. |
| Range test for first name in register action | Ja | Y | The first name is 2 characters, which is the minimum length of 2 characters. |
| Range test for first name in register action | JamieLoremIpsumDolor | Y | The first name is 20 characters, which is the maximum length of 20 characters. |
| Range test for first name in register action | JamieLoremIpsumDolore | N | The first name is 21 characters, which is more than the maximum of 20 characters. |
| Range test for last name in register action | H | N | The last name is 1 character, which is less than the minimum length of 2 characters. |
| Range test for last name in register action | Ho | Y | The last name is 2 characters, which is the minimum length of 2 characters. |
| Range test for last name in register action | HodgsonLoremIpsumDol | Y | The last name is 20 characters, which is the maximum length of 20 characters. |
| Range test for last name in register action | HodgsonLoremIpsumDolo | N | The last name is 21 characters, which is more than the maximum of 20 characters. |
| Range test for password in register action | pass | N | The password is 4 characters, which is less than the minimum length of 6 characters. |
| Value test for password in register action | password | N | The password doesn’t contain special characters, uppercase or numbers |
| Value test for password in register action | Passw0rd | N | The password doesn’t contain special characters |
| Value and range test for password in register action | P@ssw0rd | Y | The password is more than minimum length and has a lowercase, uppercase, numbers, and symbols. |
| Value test for confirm password in register action | P@SSw0rd! | N | Does not match original valid password |
| Value test for confirm password in register action | P@ssw0rd | Y | The password matches the valid password which we inputted in the first password field. |
| Presence test for email address in log in action |  | N | The email address is blank – a user cannot have a blank email address, hence it is not valid. |
| Value test for email address in log in action | hodgsonj@gmail.com | N | This email address does not match the email we signed up with. Assuming that no other user has registered with this email, it is not valid. |
| Value test for email address in log in action | jamieh@gmail.com | Y | This email address matches the email we signed up with. Assuming the registration was successful and the email was confirmed, this email would be valid. |
| Presence test for password in log in action |  | N | Due to earlier constraints and validation which we have defined, a password cannot be blank, hence this is invalid. |
|  |  |  |  |
| Value test for password in log in action | P4ssw@rd | N | This does not match the password we originally signed up with. Assuming that password has not changed, this is invalid. |
| Value test for email address in log in action | P@ssw0rd | Y | This matches the original password which we signed up. Assuming that this hasn’t changed, the password would be valid. |
| Accuracy test for weather API | Latitude: 52.040623  Longitude: -0.759417 | N/A | We will need to test if the weather API is accurate for our location by comparing against other reliable services and sources before we begin to use it. |
| Accuracy test for air pollution API | Latitude: 52.040623  Longitude: -0.759417 | N/A | We will need to test if the air pollution API is accurate for our location by comparing against other reliable services and sources before we begin to use it. |
| Accuracy test for geocoding API | City Name:  Milton Keynes  State:  England  Country Code: UK | N/A | We will need to test if the geocoding API is accurately converting our location by comparing and making use of mapping tools and other sources or tools.. |
| Range test for calories in track health action | -1 | N | Users cannot enter negative calories as there is no such thing. |
| Range test for calories in track health action. | 0 | N | The calories system will add to the calories which have already been logged, meaning adding 0 calories will not do anything. |
| Range test for calories in track health action | 1 | Y | As the number is positive, the number of calories is valid. This would then be added onto the calories total for the day, |
| Range test for steps in track health action | -1 | N | Users cannot enter negative steps as there is no such thing. |
| Range test for calories in track health action. | 0 | N | The steps system will add the input to the steps which have already been logged, meaning adding 0 steps will not do anything. |
| Range test for steps in track health action | 1 | Y | As the number is positive, the number of calories is valid. This would then be added onto the steps total for the day, |
| Functionality check for water in track health action | 1 | Y | This test simply ensures functionality as clicking the “add water” button will simply increment it by 1. |
| Range test for title in add advice action | Lore | N | The title is 4 characters, which is less than the minimum length of 5 characters. |
| Range test for title in add advice action | Lorem | Y | The title is 5 characters, which is the minimum length of 5 characters. |
| Range test for title in add advice action. | Lorem ipsum dolor sit amet, consectetur adipiscing elit. In tempus lorem sit amet pharetra tincidunt | Y | The title is 100 characters, which is the maximum length of 100 characters. |
| Range test for title in add advice action. | Lorem ipsum dolor sit amet, consectetur adipiscing elit. In tempus lorem sit amet pharetra tincidunt. | N | The title is 101 characters, which is more than the maximum length of 100 characters. |
| Range test for temperature in add advice section | -91C | N | The minimum temperature which can be entered is -90C as the coldest temperature recorded is roughly this. |
| Range test for temperature in add advice section | -90C | Y | The temperature is -90C, which is the minimum temperature. |
| Range test for temperature in add advice section | 60C | Y | The temperature is 60C, which is the maximum temperature. |
| Range test for temperature in add advice section | 61C | N | The maximum temperature which can be entered is 60C as the hottest temperature recorded is roughly this. |

## Feedback Approaches

Whilst methods such as range, functionality, and value testing can help determine whether a website is functional, it cannot help to measure factors such as usability, practicality, design, and security, hence it is important to incorporate user testing for feedback and improvements into our strategy.

During and after the development process, I will be employing the use of white box testing. This means that users with an understanding for how the system or similar systems work will be testing the prototype. In order to carry out white box testing effectively, I will be employing methods listed below:

* Video observation – I am intending to record videos of the prototype, in which I will showcase the functionality of a feature and then the code / logic behind it. After showcasing each appropriate feature, I will ask for feedback regarding metrics such as the ease of implementation, security, and code readability. This will likely be in the format of a Microsoft Form.

After the development process, I will also be employing the use of black box testing. This will involve users with limited or no understanding behind how the system works to test and provide feedback on the prototype. In order to carry out black box testing effectively, I will utilise the following methods:

* Design survey – I intend to capture feedback from a non-technical audience. This will be by a Microsoft Form and will ask questions regarding the intuitiveness, cleanliness, and layout of the solution by providing snippets such as short videos or screenshots.