OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

CT318: Human Computer Interaction

BCT3

Project Name: Medi Guardian

Due Date: November 26th, 2023

Students Involved in the Project

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Health & Wellbeing

Problem Definition

Identify a problem in the Health (physical / mental) / Security space that you would like to solve, thus improving the quality of life for the people using it.

Your solution will involve an interactive software component that will be iteratively designed and tested before a final user evaluation

Problem Statement

In our healthcare system, medication non-adherence can account for up to 50% of treatment failures. (*Medication adherence: The elephant in the room* 2018) Despite the advancements in medical science and the ever increasing availability of treatments, it all fails if the patient doesn't take their prescribed medication as instructed.
Medication non-adherence is when patients do not take their prescribed medication.

What causes Medication non-adherence?
Medication non-adherence can occur for several reasons. Some of the main ones we have identified are:

- Forgetfulness. 71% of non-adherence patients claim that forgetfulness is the main reason for missing their prescription.
- Patient perception. 20% of patients don't believe that their medication is helping them or that they are still in need of it.
- Anxiety. Some patients are afraid of some of the side effects that the medications they take can present.

(Al-Lawati Sabah, 2014)

What are some of the consequences of medication non-adherence?
Medication non-adherence carries a plethora of consequences that extend beyond immediate health impacts. Firstly, it could make pre-existing health conditions or diseases worse. When people neglect their doses the efficacy of treatment is reduced. This can lead to a worsening of symptoms, prolonged illness, or the development of drug-resistant strains of bacteria or viruses, especially critical in cases of antibiotic misuse.

Furthermore, inconsistent prescription compliance often results in increased healthcare use. Missing doses or not adhering to prescriptions can result in more frequent doctor visits, ER visits, or even hospitalizations. These frequent medical interventions put a strain on our healthcare system increasing wait times for other patients.

In certain instances, non-adherence can cause serious issues for an individual which require medical attention. For people suffering from chronic diseases like diabetes or sickle cell anaemia, irregularities with medication intake may trigger sudden complications which could endanger their lives.

In more severe cases, non-adherence to life-saving medication can have a fatal outcome. For instance, people suffering from heart conditions or severe allergies could face serious complications if non compliant.

Apart from health-related consequences, non-adherence can also impact the quality of life. It may cause decreased productivity, higher levels of anxiety amongst other behavioural deteriorations.

Defining our Users

Medication non-adherence can impact anyone reliant on regular medication, whether it's for managing a chronic condition, taking contraceptive pills, or completing a course of antibiotics.
The individuals we aim to support are those navigating demanding lifestyles—juggling school, extracurricular activities, work commitments, social events, and more. Their busy schedules often make it challenging to adhere consistently to their prescribed medications, leading to potential health complications or reduced treatment effectiveness. In response to this issue, an application tailored to their lifestyle could significantly assist in ensuring timely and proper adherence to their prescriptions, which would significantly reduce stress, fear, and forgetfulness.

Furthermore, we are prioritising users in the first world population. These people already have great access to medications, treatments, and healthcare services, hence one would expect treatment failure rates to be low.
However, ‘Drugs don't work in patients who don't take them’ (C. everett koop, MD, US Surgeon General, 1985). According to the National Library of Medicine in the US, non-adherence ranges from 35% to a staggering 72% (Lakatos, 2009), and according to an EU paper 20% to 40% don’t adhere. (EPF [Press Release], 2011). These are studies conducted in the developed world, where the individuals were given treatment, but due to lack of adherence their treatment failed.

Our Miro board can be found here.

Name: Margaret Schwalsky

Age: 76

Background: Retired Librarian

Details:

Margaret is fond of gardening and spends her leisure time reading classic literature
She values simplicity and always prefers a straight forward approach
Her grandchildren are helping her work around the phone but she gets confused at times

Needs:

Takes multiple pills daily for various health conditions.

She needs assistance in remembering the correct dosage and timing

Margaret isn't the most experienced in using technology but she is learning so she can text with her grandchildren

Desires:

Wants to manage her own medication without relying on constant reminder from family

To feel confident that she's taking the right pills at right time, reducing anxiety and stress in her life

Fears:

Fearful of missing a dose or taking the wrong medication due to memory lapse

If improper medication management could lead to worsened health

Concerned about struggling with a complicated or confusing app

Name: Emily Lee

Age: 25

Background: Business woman

Details:

Emily serves as the CEO of a 150 employee corporation, where her days are met with constant meetings.

Alongside her job, she cherishes a 4 year relationship with her boyfriend. Their stance on parenthood is postponed due to her constant work lifestyle.

Needs:

Balancing work meetings, presentations and network events leave little time for additional tasks which leaves Emily anxious

Taking birth control pills consistently amidst a busy schedule can sometimes prove challenging

Seek a convenient solution that would be able to fit into her busy schedule lifestyle

Desires:

A simple sleek way of being able to manage her work life without adding any more stress onto it

A system or idea that is able to assist her in her busy day to day life filled with different schedules and meetings each day

Emily doesn't want everyone knowing about her personal pill matters as that issue is of her concern only

Fears:

Worries about missing a pill due to a packed schedule may lead to a potential contraceptive inefficacy which she can't afford to have

Concerned about potential health consequences on irregular pill consumption

Emily won't use anything that she has to go out of her way for as she can't afford the time to do so

Name: David Thompson

Age: 52

Background: Construction Worker

Details:

David has been in the construction industry ever since his early 20s, for his years of work his back has started to feel the result of it.

He has to constantly take frequent breaks at work for his back pain and stops his overall work

Needs:

Taking pills with moderation so he can complete his work without major back pains whilst not suffering any side effects from improper usage

Easy access about dosage and reminders for prescription refills as during his work, his pills quickly run out

Desires:

Constant reminders throughout the day to cater to his fluctuating work hours and his condition

Quick access without adding complexity to his work day

Wants to build strength and flexibility outside of work to decrease a risk of injury

Fears:

The lack of effective time resulting him in being less of a team impact

Aims to remain functional and productive ensuring his ability to provide for himself and his family.

Name: Chris Stevenson

Age: 34

Background: Professional BodyBuilder

Details:

Chris has been professionally lifting for more than 18 years now and has competed in Mr. Olympia tournaments.

He has been taking legal PEDs to improve his gym benefits.

Needs:

Reliability to track his performance enhancing medication in adherence to his strict regimen as he has only been using his notes app to keep track

A way to be able to track his day to day progress and what supplements he needs for each day to cater to his different day to day workouts

Desires:

Integrates seamlessly into his daily bodybuilding routine that he can check between sets at the gym

Flexible reminders that adjust to his demanding workout and competition schedule

Fears:

Potential consequences on his workout and recovery with missing a dosage or irregular use

Fears that without proper management he might not get the best out of his workout and he might not be able to win in tournaments

Personas: Understanding Diverse User Needs

In our HCI project, our first step is to understand the core problem and real needs. We've created a spectrum of personas representing a wide range of lifestyles, challenges and motivations. Each persona gives us a different aspect of society, shedding light to many individuals which together contribute to our societies each with their aspirations and hurdles through everyday life.

Embracing Diversity

Our personas are designed to capture a wide array of human experiences, encompassing different age groups, jobs and hobbies as well as problems which they may face, from Margaret Schwalsky, a retired librarian whos likes to garden and wants a feeling of independence and not a sense of overbearing on her family members to Chris Stevenson, a professional bodybuilder who competes in nationwide tournaments and maintains a fit physique overall.

Identifying Underlying Issues

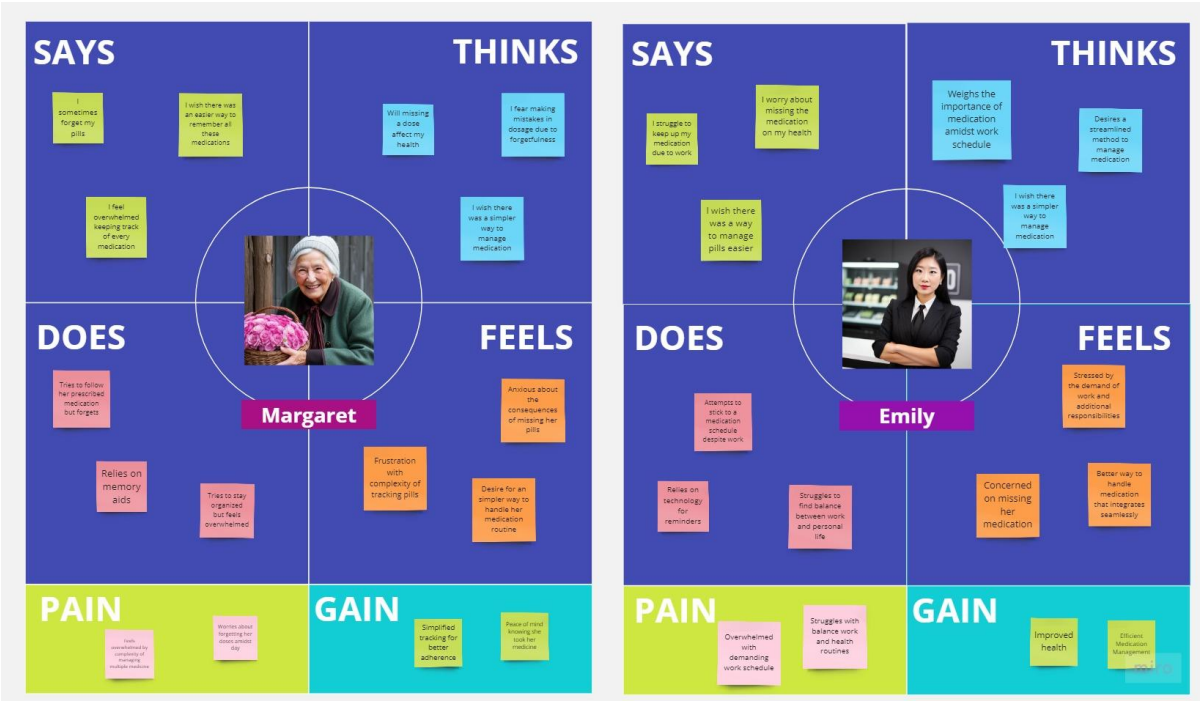
Through these personas we can dive into each persona and their life and uncovering potential issues that may arise from every unique scenario, by using personas we can immerse ourselves into the point of view of someone who we may not usually be and give us a sneak peek into their lives and discover fundamental issues that can transcend with a bigger audience

Tailoring Understanding

Personas give us insight into problems that might be underlying between many different sets of people, which by understanding personas and the issues they go through with their unique viewpoint, we can go into observing the real cause behind an issue rather than going head first without analysing the situation first. Personas guide us into understanding more about a problem than just an initial surface-level problem we might think exists and with many different perspectives, we can use that as a marking point to dive deeper to resolving a bigger issue that a community might struggle with.

Empathy

Empathy Mind Map for Personas: Understanding Perspectives



Visualising User Experience

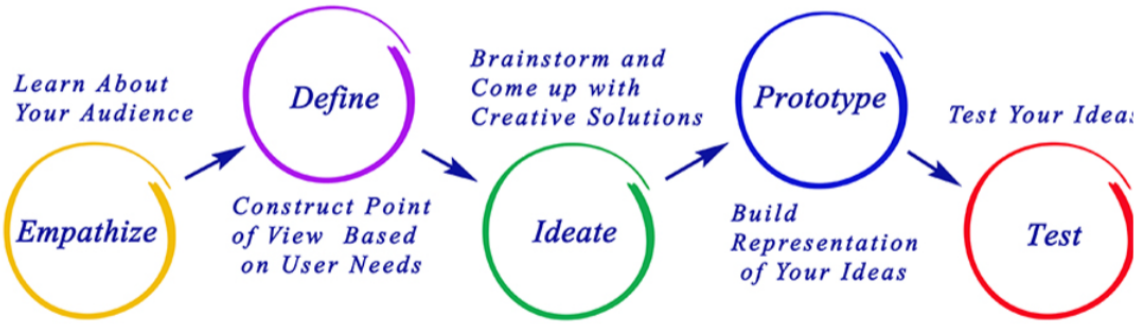
An empathy mind map is created as a view of a persona's daily life as they guide us through their "Says" and "Thinks" giving us an inside perspective of how they may feel at a given time although they might not verbalise these issues to others but keep it to themselves and through their "Do" and "Feel" we gain insight of their emotions, with "Pain" being the negative aspect of all their internal feelings with a "Gain" giving the persona a desired outcome. With these created for several personas they can give us a feel of what every persona might be dealing with and a guide into finding a bigger solution and also, a better, more thought out solution.

Guiding Design Insights

Through the breakdown of user experience into individual mind maps, we can understand perspectives of both internal and external thoughts, we can analyse their emotions and attitude, their mannerisms and attitude to a potential problem they may be facing in their lives. We refine our understanding, to which we can create a more targeted solution which is an in-depth solution to the problem we may be given, these comprehensions serve as a mechanism that we may follow to create more tailored solutions to address more understood and better defined user requirements.

Iterative Improvement

The usage of empathy mind maps is not a linear process, its usage is based on continual feedback, these empathy maps undergo refinement based on user feedback and creation of prototypes, empathy maps follow a design thinking process.



With each pass through, the cycle involves empathise, define, ideate, prototype and test, to which we use the results from our test to create the loop again and with each iteration our problem gets richer in detail and more aligned through each cycle, our solutions are never static but continuous based on the outwards changes in the landscape around us. The iterative approach of empathy maps allow us to create a solution that is finely tuned and resonant with the issue at hand

Empathy

Empathy is the ability to fully understand, mirror, then share another person's expressions, needs, and motivations. (*Sympathy vs. empathy in ux*)

Empathy can be used in UX design by setting aside assumptions and researching the users, via interviews, questionnaires etc.. This allows us to better understand the behaviours, motivations and even concerns of users. The more users that can be heard from the better of an understanding can be grasped.

We approached a person that took medications regularly and together we created an empathy design map, expressing how a person may think about themselves and how they feel about it. What they hear from friends, family, the internet. What they say and do on a daily basis and also what they see about it. We also described some pains and gains that they may experience.

Empathy Design Map

Think and Feel	The person can be fearful, and frustrated that they must constantly adhere to a medication that they may not want to take. It is their responsibility and they may be dependent on it.
Hear	They can regularly hear of “natural remedies” and constant reminders of taking the medication, as well as empty reassurances.
Say and Do	The person may forget how to take their medication. They might use a pill organiser to remind them to take it, but they may still question whether they did or not. They also may have more frequent doctor visits.
See	They may see public figures and celebrities speaking out or even having the conditions themselves. They might see fundraisers for their condition to further research or even advertisement for newer medications.
Pain	Certain conditions might deteriorate health. Treatments can fail or be painful. Some people might even fear judgement when they are seen taking their medication.
Gain	For some people it makes them healthier.

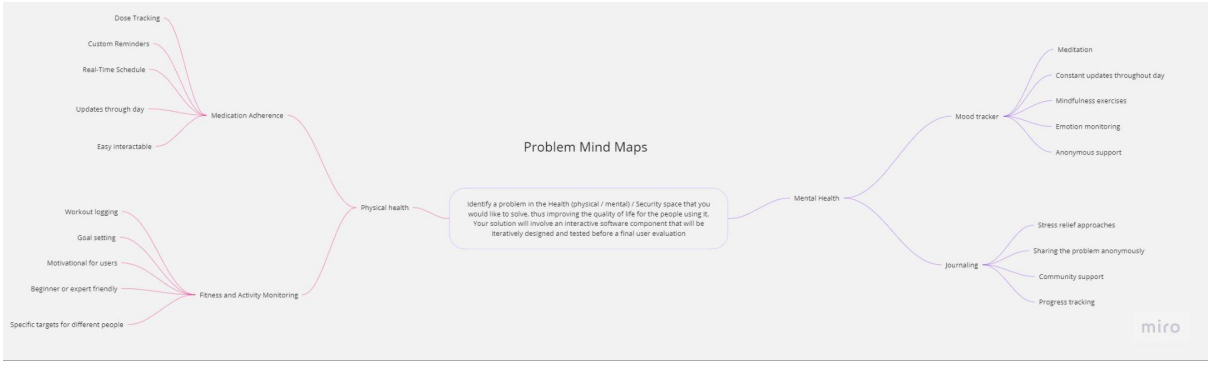
Problem Solution

Ideation

Ideation is the process of generating a broad set of ideas on a given topic, with no attempt to judge or evaluate them. (Ideation for everyday design challenges). During our first brainstorming session, we honed at the health aspect outlined in the brief, we believed this would be better as we could use that time more efficiently to dive deeper into the expansive brief of the health-related challenges presented in the brief, we split the brainstorming session into the two sections, mental and physical health and we sat together and threw keywords we associated after reading the initial brief reading.

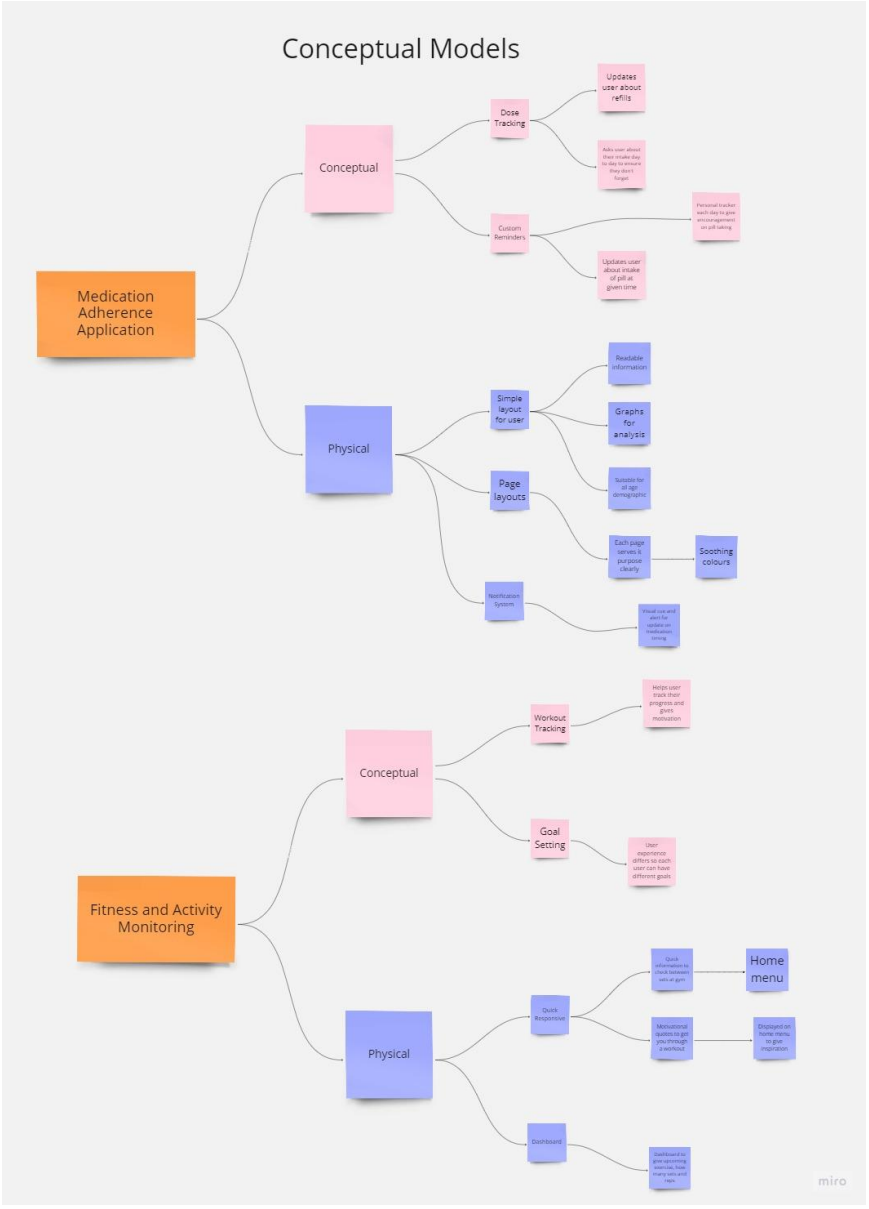
Brainstorming session result:

Post the brainstorm session, we revisited our empathy map and personas, we also revisited the design brief given and alongside everything that we've read, we gained a new perspective in this. By merging our brainstorm concepts with the empathy maps and personas, we crafted a problem mind map, this mind map splits the health sector into its respective physical and mental components, allowing for a more detailed evaluation, this approach is a stepping stone to finding a more refined solution, whilst also deepening our potential knowledge on the subject matter and a small step to finding an adaptive solution.



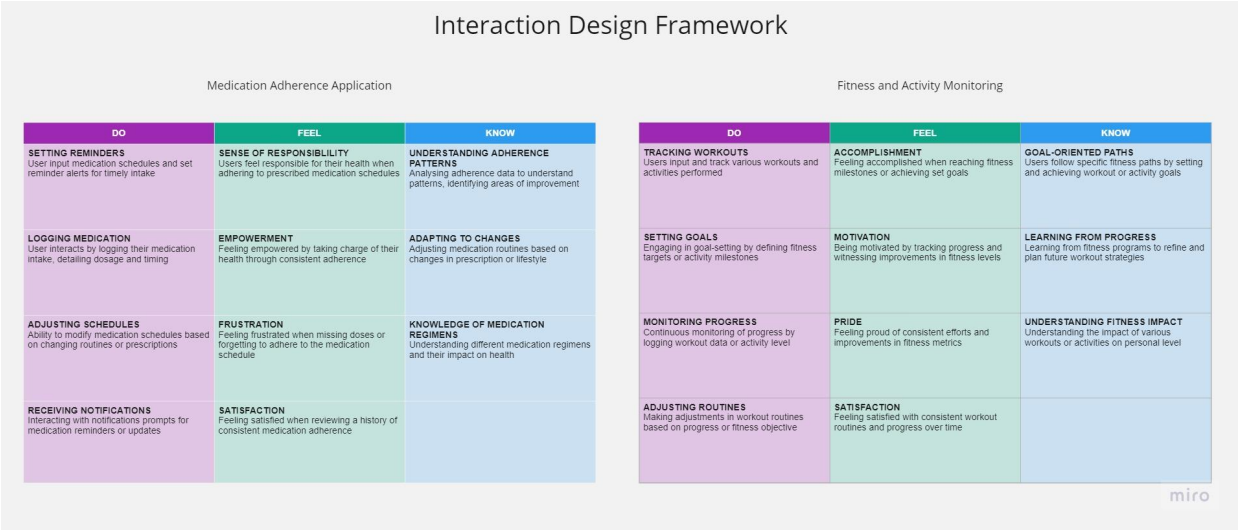
After careful consideration in this problem mind map, a collective decision was made to prioritise the physical health aspect within the project brief, this choice was further evaluated by our empathy maps and personas, as the perspective we gained from using all sources led us to believe that there is a significant relevance in exploring this specific area. We believed that our focus towards the physical health aspect would serve as another stepping stone into uncovering the most fitting and effective solution for this design brief.

As we figured that, our next step was to create a conceptual model of each of the physical health, this conceptual model would serve as a guide on what we wanted the given solution to function as, with the model split into two functionalities, the conceptual and the physical, each would represent their respective design activity: the conceptual would give us an idea of what the product will do and how it will behave for us, how the users will understand this product. The physical will tell us about how users will use this product, we sat down with the physical health aspect we had previously mentioned and with what we had created, we created this following Conceptual Model



Following the conceptualisation of both a fitness and activity monitoring and a medication adherence application conceptual model, our team encountered a decision point, we deemed both solutions to be really responsive to the previously mentioned empathy maps and the personas we had drawn out, after extensive thought, we could not decide one idea over the other.

To resolve this problem, we came about doing an interaction design framework, this approach gave us a lot of data in both respective ideas but one idea just stuck out more, an idea that through an informed decision, we decided to take, we gravitated towards the medication adherence application as our preferred choice as we deemed it fit a more complete Do Feel and Know result then the one from the fitness and activity monitoring. We also felt like the spectrum of medication extends further than those of a fitness spectrum.



Questionnaire

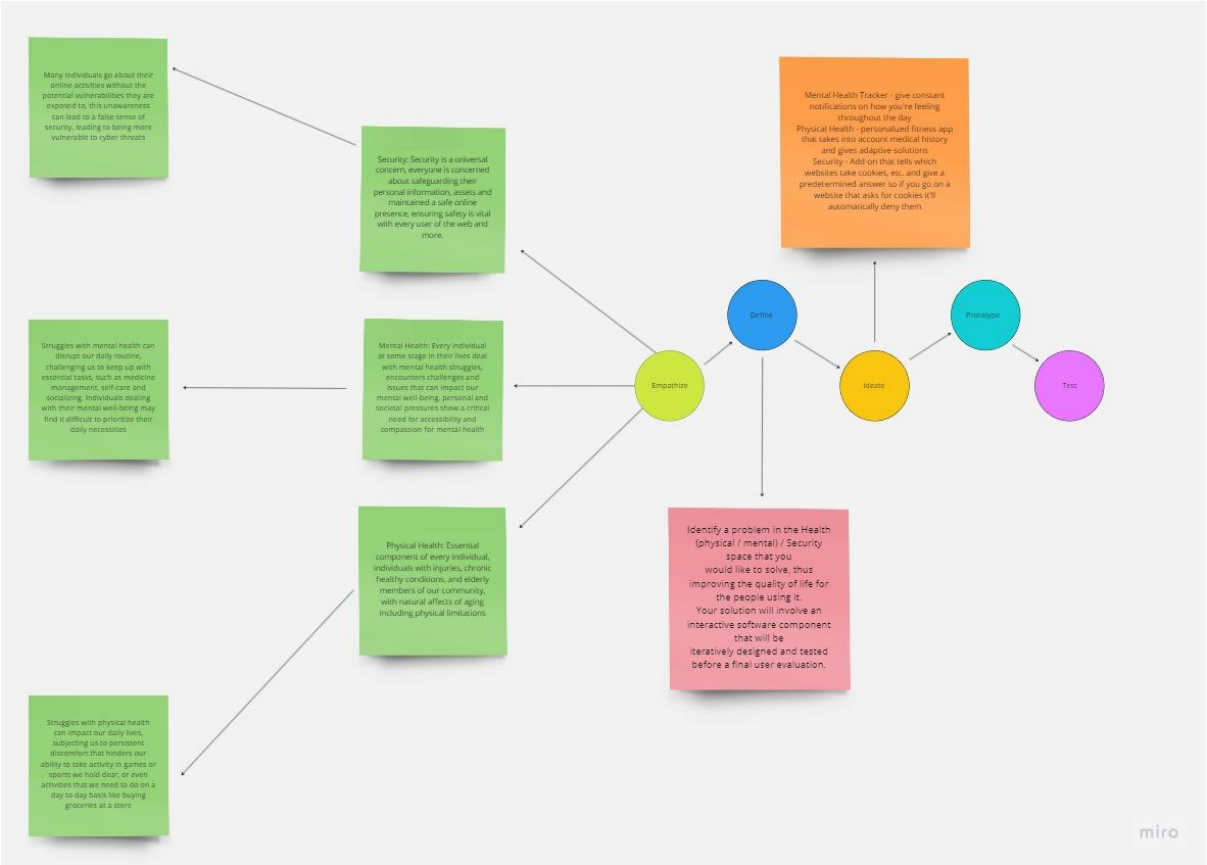
To better understand the current methods of medication adherence, and its complications we decided to launch a questionnaire asking several questions.

We wanted to find out for what reason they took their medication, and how often they missed a dosage. We also wanted to know what methods if any they used to prevent themselves from forgetting (as forgetfulness was the biggest reason for medication non-adherence in Ireland)

The below are the questions from the questionnaire, and a brief explanation of the results we received.

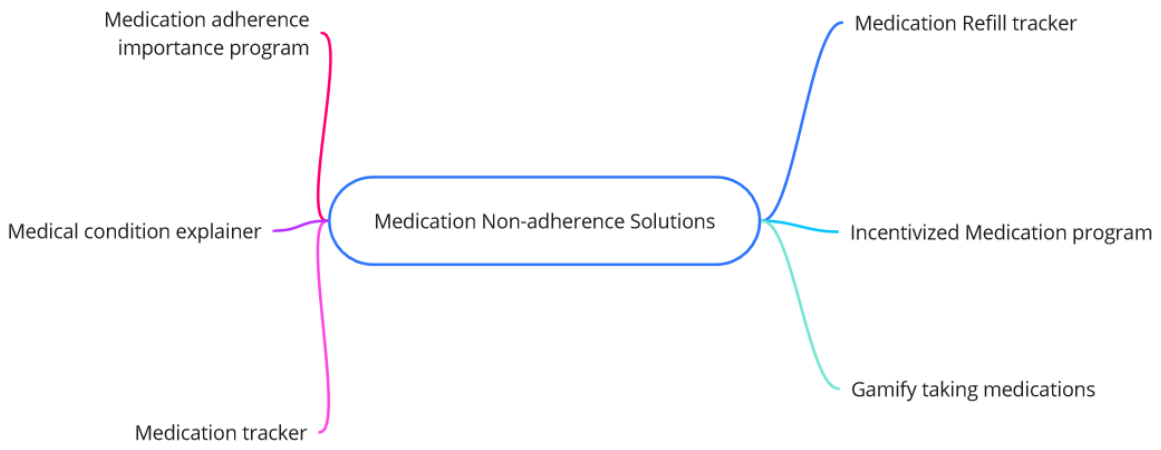
Question	Answers
Reason for Medication Use:	• Medical Condition (56.25%) • Contraception (25%) • Supplements (18.75%)
Reminders to Take Medication	• Memory(75%) • Phone Reminder (16.67%) • Partner (8.3%)
Frequency of Missing Doses	• Sometimes (54.55%) • Never (18.18%) • Often (18.18%) • Very often (9%) • Always Missing (0%)
Reminders for Specific Medication at Different Times	• Memory (88.89%) • Phone Reminder (11.11%)
Confusion about Medication Usage	• Not Confused (72.7%) • Sometimes Confused (18.2%) • Confused (9.1%)
Impact on Daily Life	• No Impact (63.6%) • Some Impact (27.3%) • Occasional Interruption (9.1%)
Fear of Missing Doses	• Not Fearful (54.55%) • Quite Fearful (27.3%) • Very Fearful (9%)
Hospital Visits due to Incorrect Dosage	• Never (100%)

The questionnaire can be found here.



This questionnaire provided invaluable real life data that revealed a prevalent issue of medication forgetfulness amongst respondents, we also noticed an over-reliability of one's memory for medication intake, which isn't always the most effective method. With these findings we wanted to explore more solutions for medication and medication intake, we had a brainstorm on medication non-adherence solutions such as making taking medication a game and an incentivized medication program.

Non-adherence Solutions Mind Map

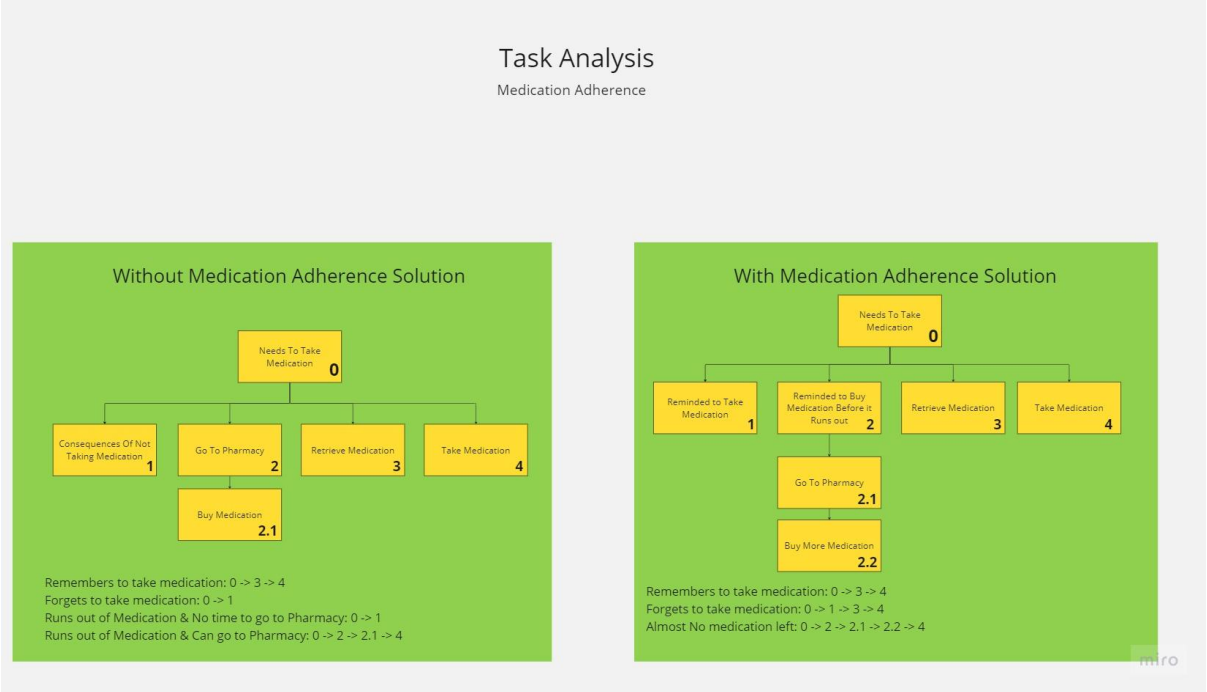


Pros and Cons of each

Name	Description	Pros & Cons
Medication adherence importance program	A web application that would explain to the user why taking their prescription is important and what non-adherence can cause depending on their condition,	**Pro**: The user would be well informed as to why they should take their medication. **Cons**: Knowing why might not be good enough for the user to take their prescription.
Medical condition explainer	A web application that would explain to a user given a condition everything the user needs to know about what they have. It would explain the different medications that they take and what one does and what kind of side effects could present.	**Pro**: Educating a user about their condition and the medication they take might encourage them to keep taking them. **Cons**: Many users already know about their conditions, and might not trust the medications regardless.
Medication tracker	A web application tracker where the user can fill in their prescription and it will remind the user to take their medications.	**Pro**: The user will be reminded to take their medications. **Cons**: The user can simply just ignore the reminder.
Medication refill tracker	An application that reminds a user when they should be due a refill for their medications	**Pro**: The user will be reminded when they have a refill due without having to count their pills. **Cons**: Can simply be ignored.
Incentivizes medication program	A program that would make it so that the user is incentivized to take their medication via a reward system.	**Pro**: Gives the user an extra reason to take their medication. **Cons**: No way of proving that the user took their medication.
Gamify taking medications	A program that would turn taking medications into a game.	**Pro**: Great for younger users, as it would keep their attention. **Cons**: Younger users might also have shorter attention spans.

Task Analysis of a Medication Adherence Application

We used a task analysis to evaluate the viability of developing the medication adherence application or exploring alternative ideas, the use of a task analysis was to create a breakdown of different stages involved in taking medication, and displaying challenges that may come along without the usage of a solution. It served as a framework to assess the feasibility and impact of creation of the medication adherence application, allowing us to get closer and closer to finding the right answer to this project brief.



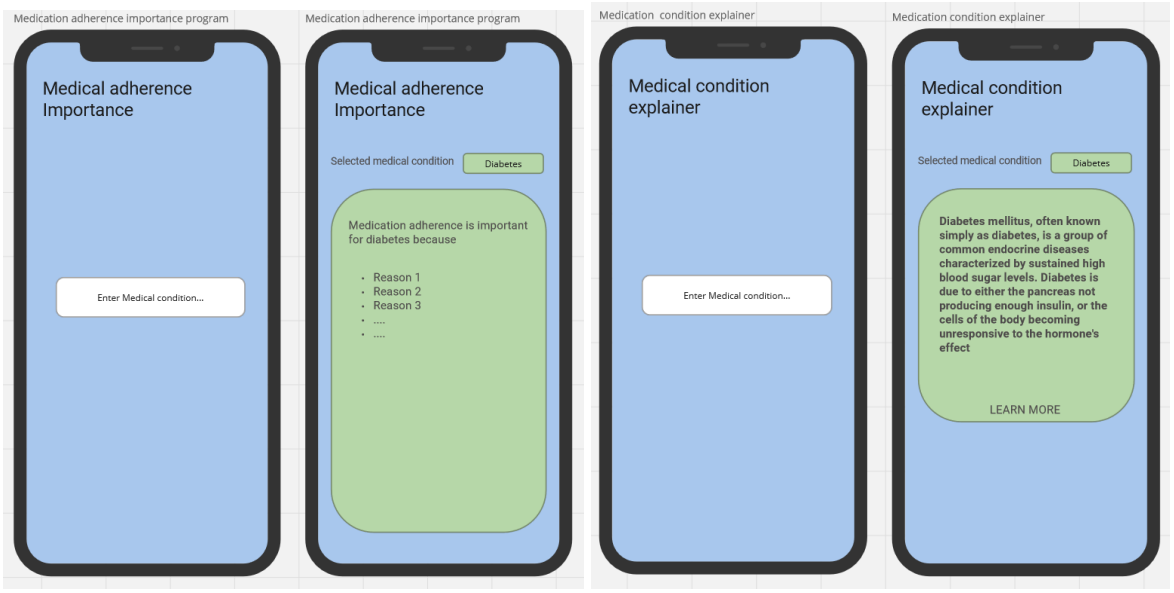
The Task Analysis of the Medication Adherence Solution showed a significant solution to challenges as dose forgetfulness or when you run out of medication in a given dosage, through proactive notifications and reminders, the solution addresses the highlighted points in the questionnaire of frequency of missing doses and reminders for medications intake, with its features, it strives to ensure individuals stay on track with their medication schedule, mitigating forgetfulness, reducing chances of missing doses and running out of medication.

The Medication Adherence Solution represents the result of careful analysis and observation with many brainstorming sessions and experimental alternatives to select what we believe is the “best” alternative for this design brief. We firmly believe this solution as the most fitting solution, showing its resonance with the needs identified across all our research and development stages.

Sample Ideation Designs

After the selection and before we engaged in the creation of a prototype, we engaged in a session of brainstorming with the ideation stage of this project, this would help us conceptualise an initial design of which we can create to make a functioning prototype, we ran through many different conceptual ideas and discussed the benefits and drawbacks of each as to fully figure out what would be the incorporated into the final idea and from there, we began the prototype creation phase, translating these ideas into a product.

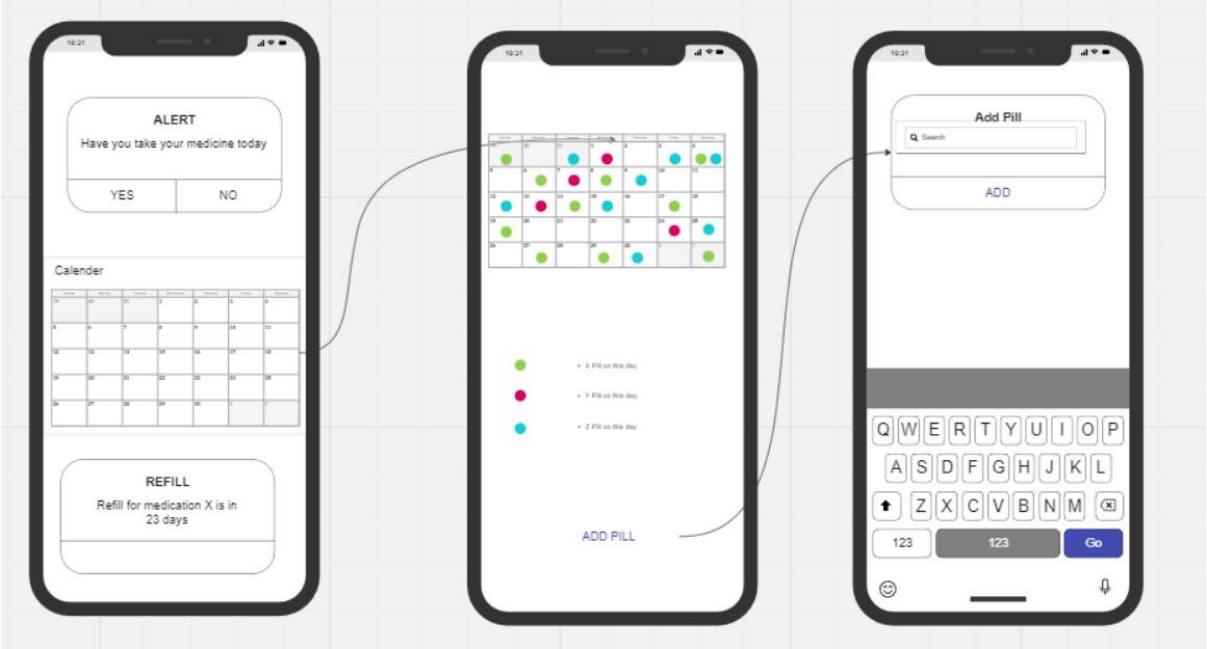
Initial Foundational Design



Our first concept was a foundational idea, it was our starting point for which we gave more and more ideas and more input for further development. This involved a page where the user could enter their medical condition and once selected the system would provide the user the importance of medication adherence for that condition. Additionally it came with a feature that would be dedicated to further details about the medical condition.

Expanding on that foundational idea, we had another brainstorm session on how we can offer solutions to the challenges surrounding medication adherence. We focused on devising ideas and plans on how we could be able to warn but also potentially stop the issues from occurring in the first place. This led us to another concept idea.

Conceptual Idea



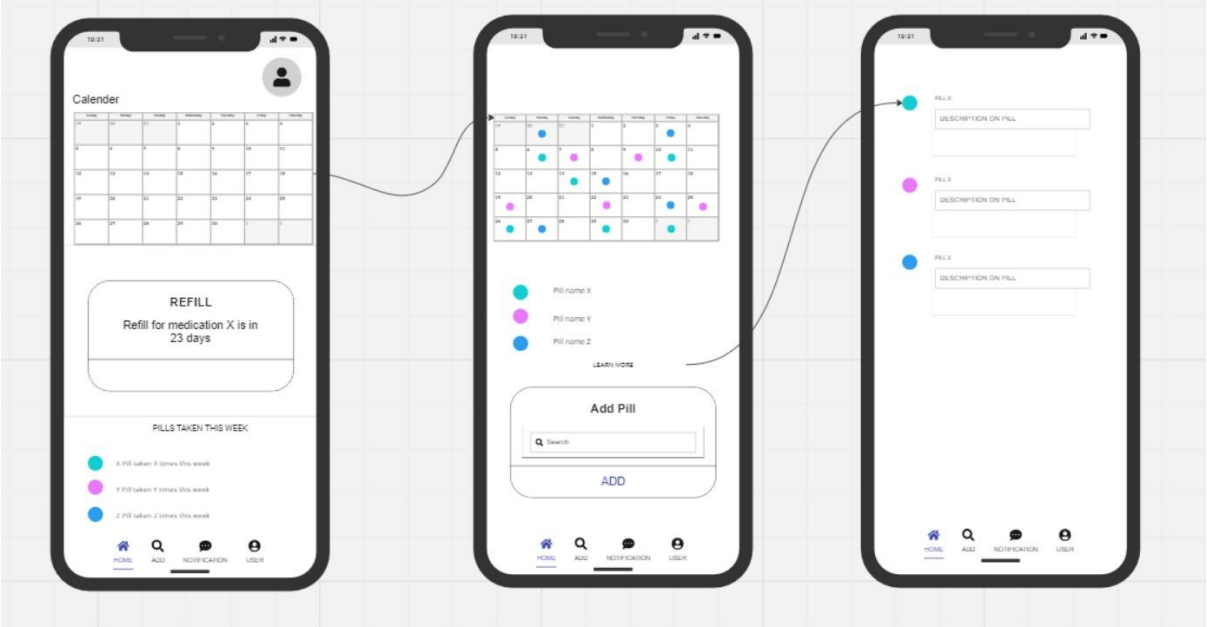
Our initial prototype encompassed a more comprehensive home menu designed for UX to deliver quick user information at the launch of the application, the main interface displayed essential features at a glance, allowing for easier navigation, including an alert prompting the user to confirm their daily pill intake, upon confirmation, it silences notifications for the day.

Additional features include a calendar highlighting upcoming schedules and a refill notification based on dosage calculation. Clicking on the calendar expands its view, revealing colour-coded pills associated with medication, users could customise the colour and icons and an add new pills button placed at the bottom of the page allowing to enter a new pill and the details regarding dosage and schedule along with which you can add.

After drawing up this initial idea, we were drawn to the simplicity and functionality of it. Each page was designed for its specific usability, ensuring a seamless transition between different sections. The fluid navigation allowed users to move effortlessly from one page to another. A smooth UI and UX is vital for catering to the needs.

However, we were determined to explore and check other different design concepts and reimagine the layout structure. We created another conceptual idea to broaden our perspective on how this application could be constructed and to introduce alternative ideas and choices. The potential of giving us another perspective would lead to us to find what we believe is right for this concept after considering different angles and user interaction scenarios.

Conceptual Idea



This alternative design aimed to enhance a user's experience by prioritising the calendar. The layout with the calendar feature, offering instant access to their schedule. Placed at the centre now is the refill status, providing a clear indication of which medication requires attention. Additionally a new section detailing pills taken during the week including each pills consumption frequency.

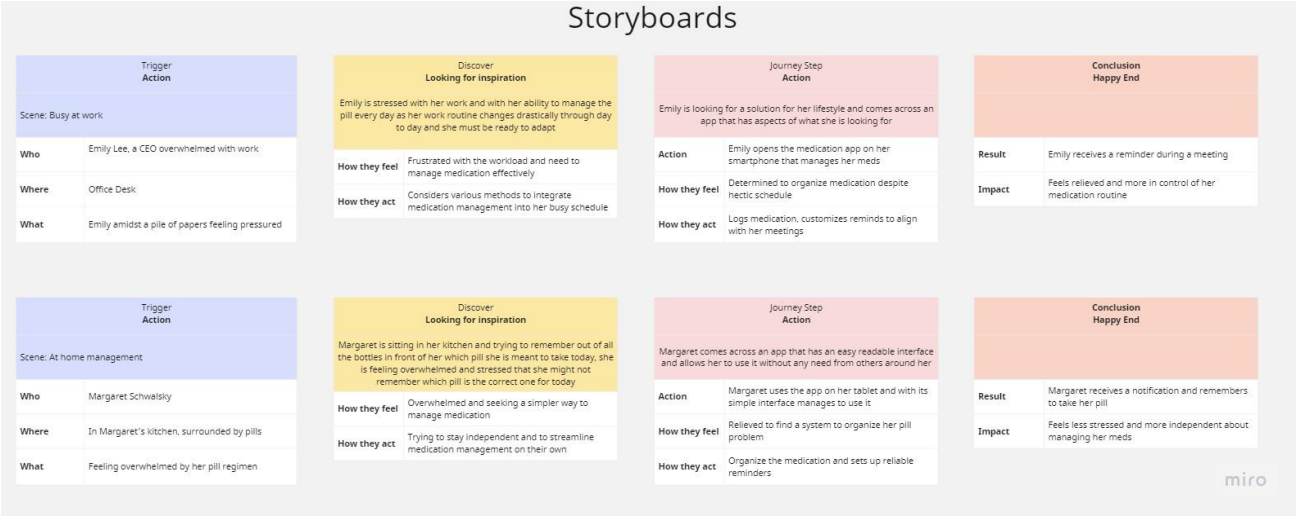
By clicking the calendar the user goes to another calendar page detailing the calendar for the full month and displaying the pills necessary to be taken each day, however the add pill design is located at the bottom of the page and not in its own separate page. Furthermore a ‘learn more’ section is included under the pills and the calendars, offering comprehensive information about each medication, this reinstates the informative element we are trying to keep in this application for medication adherence.

A new feature however is the along the bottom of the interface, interactive buttons were incorporated for “Home”, “Add Pill”, “Notification” and “User” allowing for quick navigation between different sections of the application, the “User” section is a new addition located in the top right of the home page, fostering personal accounts which will be displayed in messages and notifications, aiming to create a warmer and more personalised user experience than a conventional alert or notification system.

Upon reviewing this idea, whilst certain elements of the UI showcased excellence, we observed that adding a lot of information onto a single page, particularly the combination of the calendar and the ‘add pill’ to be overwhelming for users. Despite this, we found several other concepts we enjoyed, the user interface adding personality to an application could make it friendlier for users to use.

Following the evaluation of our UI elements, we aimed to test the design theory of our application to our previous personas. We crafted two storyboards for two characters, using their scenarios to simulate how our application could be of assistance during their day to day lives. When creating these storyboards we realised that this was a success as our storyboards showcase how our different personas can effectively engage with our application to stay on top of their medication and give them a sense of relief and empowerment.

Before delving into the storyboard, it's essential to note the diverse backgrounds of the personas involved. One persona represents a peaceful scenario of a lady in a later stage of life, whilst the other embodies a young, busy professional busy scenario. However in both examples, our app supports both of them in their medication routines as equally effective, showcasing the app's adaptability across varying lifestyles.



Prototype & Alternative Solutions

The solution that we decided to develop into a prototype was the medication tracker web application. We combined it with the medication refill tracker as well, which would allow the application to remind the user to take their medication on a given date, and also remind them of when they need to get their refill for the prescription. This prototype covers the fundamentals of our solution, ensuring that there is no reason for someone to miss their medication adherence due not remembering to take/refill the medication.
We decided to concentrate on the most important pages for our prototype.

Page	Description
Landing page	The first page a user will see when they go onto the website. They should be made aware of what the website is, and what it does. The page should be inviting and not too clustered to appear friendly.
Sign up page	The sign up page should also be pretty basic and allow the user to sign up quickly. The page contains 3 input boxes for name, email and password. As well as 2 buttons. A sign up button and a sign in instead button for if the user already has an account
Sign In page	A page similar to the sign up page. Requires the user's email address and password and signs the user in.
Home page	Page that welcomes the user back to the app, allows the user to log if they have taken their medication. It shows their frequency of taking their medication (can help in better planning and seeing where they usually miss taking their medication). It also shows their schedule for medication for the next few days and a badge system to promote reward for medication adherence. Also shows when their next refill is due, and buttons to add new medication and go to the about page.
Prompt page	A page that tells the user that they should enter in their medications. This page should only show once when the user signs up.
Add medication page	A page that allows the user to enter in their medications and when they take them. It should allow the user to enter numerous amounts of medications
Calendar Page	Shows the user their medication schedule for the month. Uses different coloured icons and a legend to let the user know which medication should be taken on which day. Also uses different icons to remind users when they are due a refill for their medication. The calendar page is useful for planning and remembering when each medication should be taken.
Stats page	Further details about their stats for taking each medication, showing their frequency for taking the medications on a weekly basis.

The prototype would be iterated, changed, approached from a different angle, from a different perspective, it would adapt and evolve until we settled with its final iteration, We encountered numerous changes through its development cycle, each change brought different elements we wanted to keep and wanted to get rid of but each cycle aimed at refining the user experience and making it the simple yet complex task that would work for every user

One of the most pivotal changes involved rethinking the layout of the application, at the beginning stages we tried incorporating the entire calendar onto the home page, however this approach, whilst convenient for the end user, led to overwhelming clutter of data and information and issues across different devices. As a result of this, we decided to dedicate a page solely for the calendar, this would not only give more clarity on the given page as it decluttered the home page, but also ensured that the calendar page would give the clarity it needs, allowing for each page being responsible for its own task and allowing a smoother experience for user.

Similarly, the statistics pages underwent a different approach, we initially had displayed a statistics snapchat on the home page, this would allow users a quick insight of their statistics of pills throughout the day, however we felt that this might be overcomplicating for some users which might not want to see this feature, as we valued all types of users that this application could be offering to help, we changed it so the deeper dive of the statistics would be displayed only on clicking on the statistics, leading to a cleaner more maintained or user-friendly interface whilst giving the opportunity for more tech savvy users to explore comprehensive statistics, allowing all users to be heard and understood in this approach.

Interactive Prototype

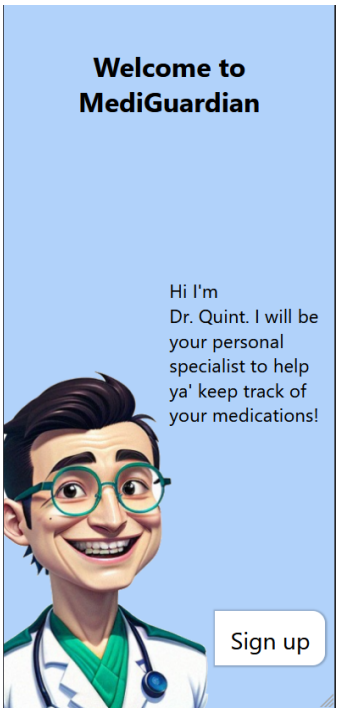
Interactive prototype available at https://hci-mediguardian.web.app/
Recommended device [iphone 13]

The final interactive prototype was created using React for the front end and Firebase for backend hosting and authentication service. The project repository can be found on github here.

The interactive prototype features an authentication system, an API to search through medications. A data structure to add medications and set a day to take them. A dashboard page to display the information.

The final prototype we developed aimed to provide a comfortable user experience while also catering to their needs. There is a good balance between user interface and user experience. There is an emphasis on not overwhelming the user with information, while also providing adequate information for the purpose of the prototype. This can be seen on the home page, where the user is provided with brief information about their schedule,stats,etc. The user is also able to view in-depth information on these topics if they choose to.We felt this would be a good middle ground between users who might not be familiar with technology to those who might want in-depth information about their day to day cycle, making it accessible to everyone.

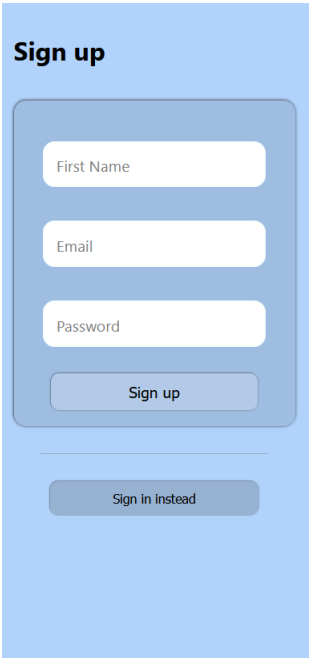
The finished model would also use notifications to remind the user to take medication when necessary. This would be a simple notification on their home/lock screen with a friendly reminder that they have not taken their medication today.

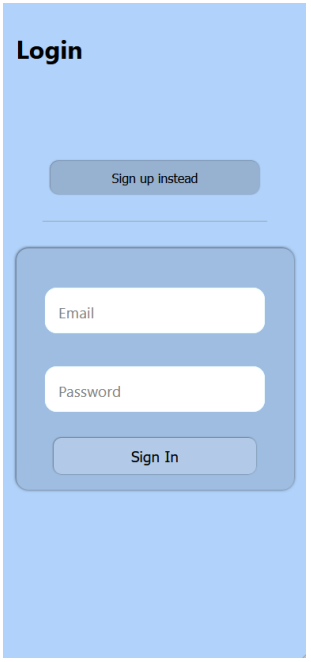


Landing Page

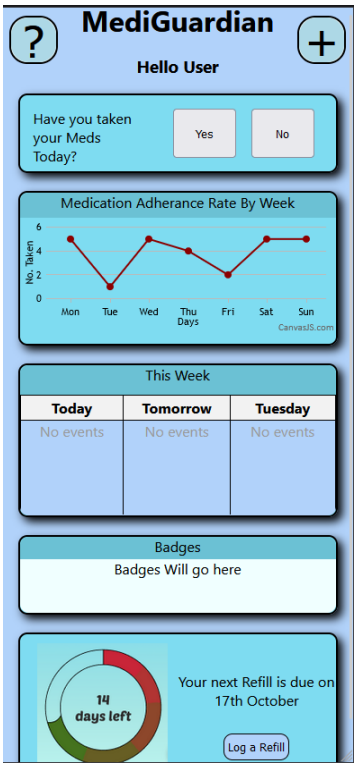
The Landing page is displayed when a user opens the app for the first time. They are greeted by “Dr. Quint”, our made up persona to give the app a more friendly feel to it.
The app is described to the user in a simple form on this page: “To help track medications”.
The user is then prompted to sign up to the app.
Cookies are used to check if the user has been on the website before, and if they have been, this landing page is not shown to them a second time.

Sign Up and Sign In Page





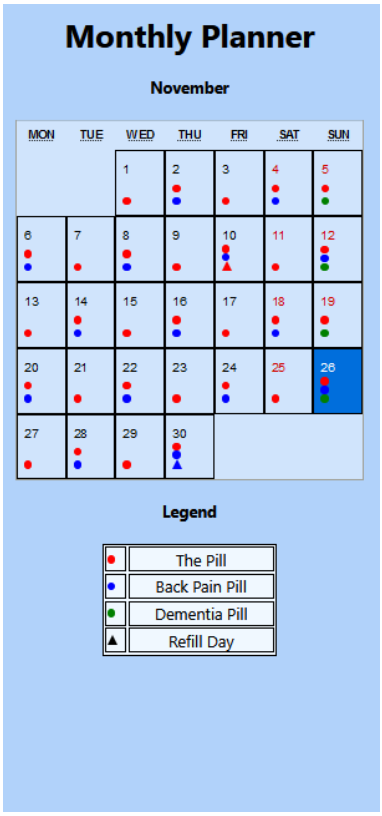
These pages are used to allow the user to sign up for the app. Using a simple login form and a database, the user can enter their name, email, and create a password.
If the user has already signed up for the app. They can choose to login instead.
The app will remember if a user has logged in on the device before, allowing them to not have to repeat the login process every time they load up the app. Instead, they will be automatically directed to the home page



Home Page

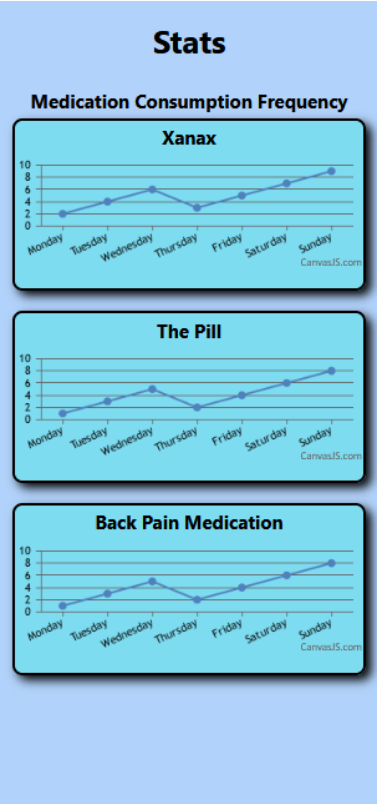
The home page is the main page the user will see. When they log in, they will be brought to this page. It is designed to provide information to the user while maintaining a balance between UX and UI. The goal is not to overwhelm the user with information, but to provide them with small detail with the option of seeing more in-depth information by clicking on the desired box.

The main aspects of this page are the stats, calendar, and tracker boxes. Asking the user if they have taken their medications, and showing them their progress with medication adherence and their schedule for the next few days forms the basis of our prototype.
To further encourage the user to take their medication on time, we provide the schedule for the next few days so that they can plan. The refill area is also present so that the user does not run out of medication without realising. Badges give the user more incentives to take their medication.



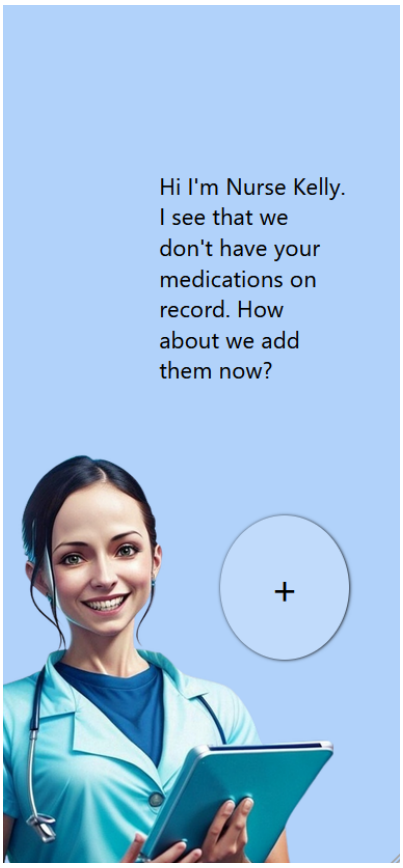
Calendar Page

The calendar page is an expansion of the weekly planner area on the home page. By using coloured icons and a legend, the user can clearly see their entire schedule for the month for their medications. They can see what days they have to take which medications and the days that those medications need to be refilled.
This page would gather data from the database and insert icons based on when the user specified when they needed to take each medication.



Stats Page

The stats page dynamically adds an area for each medication that the user has in the database. The database would also track how often the user takes their medication based on their daily input into the app. By using this, the user will clearly be able to see when they miss their medication.
This can be useful if there is a frequent pattern of medication non-adherence that the user may not notice. Tracking the user statistics of medication adherence could help to ultimately improve it.

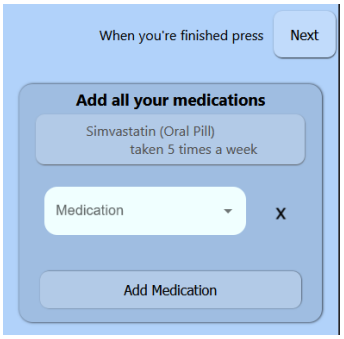


Add Medication Page

After signing up for MediGuardian, Nurse Kelly, another AI generated persona, comes up to inform the user that the next stage in setting up their application is to add their medications onto the app.

This is the main page for adding medication. It is simple in its design, allowing the user to enter their medication into an autocomplete drop down form. This allows the user to start typing in their medication and the form will show autocomplete results.

After typing in a medication, a form appears that allows the user to enter how many times on a given day they take their medication. A tick then appears on the given day that they take it.

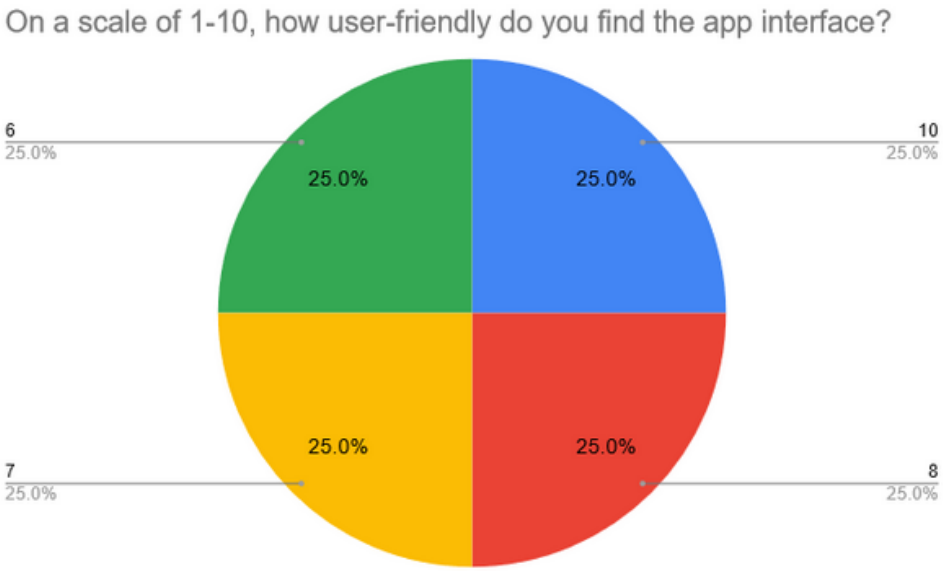


After clicking ‘Add Medication’ a summary of that medication appears on top and another autocomplete form appears to then enter another medication.

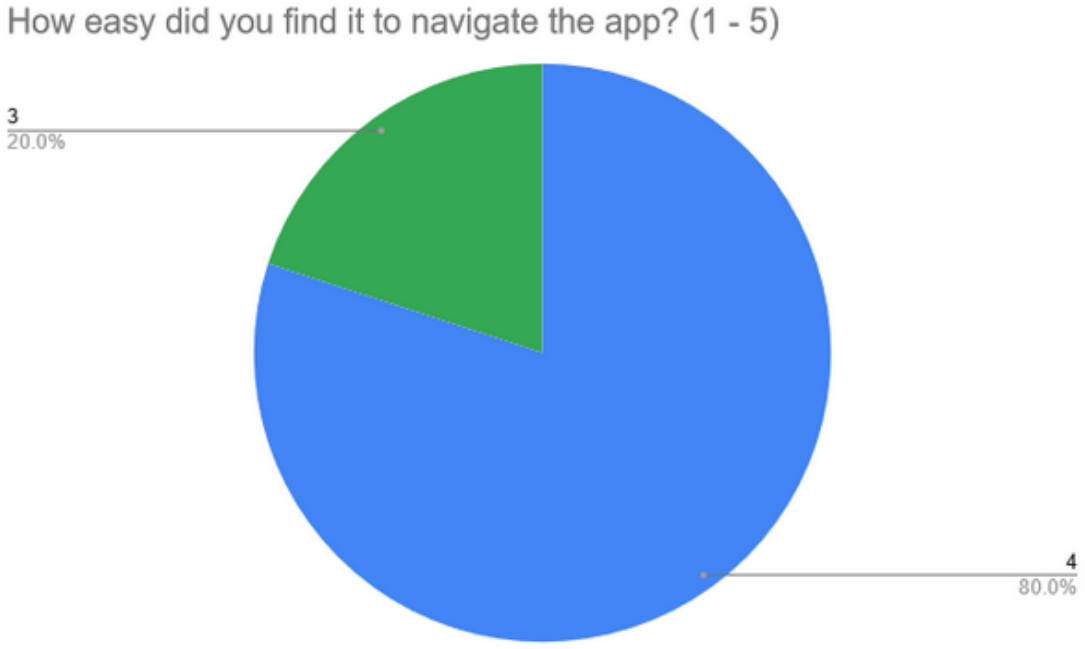
After the user is done with all their medications they can click the ‘Next’ button which will encrypt and upload all their medications onto the cloud, and then redirect the user to the home page.

Testing & Refining

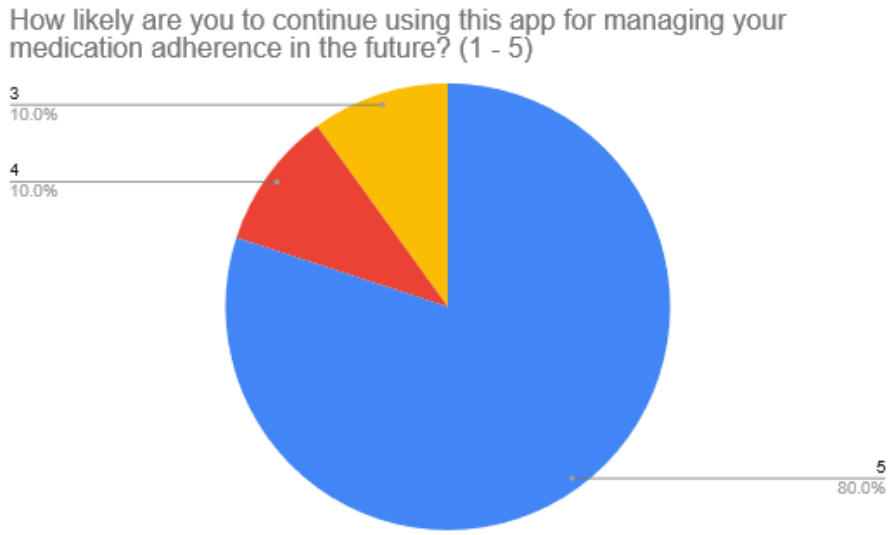
After developing the prototype, we approached people that frequently take medication and allowed them to test the prototype and evaluate it with feedback to us. We developed a questionnaire that they could also fill out.



Overall, users had positive feedback about how user friendly the prototype is. This shows our desire to maintain a good user interface and user experience was a success, understanding a clean balance of functionality and looks for user interface was one of the main goals we strived for.



Users feel the app was easy to navigate but there could be some improvements. Ensuring responsive design for all devices would be a possible improvement.



An overwhelming number of users feel the prototype had enough impact that they would continue to use the app in the future as the primary method of remembering to take their medication.

Have you experienced any difficulties in setting up medication schedules within the app?

- Not at the moment,
- No, except I couldn't find one of my medications, I had to search for it under a different name.

The minor aspects are just as important. We want users to have zero difficulty in using the app. One user had to search for their medication using an alternate name. This could be a potential future fix to ensure medication with alternate names is also identified.

<u>Pros (Provided by user feedback)</u>
Friendly colours used on pages
Easy to navigate
Predicts the medication based on what i'm typing - helps due to my dyslexia
Feel less stress knowing I don't have to worry about remembering all the time
Calendar has good layout
Friendly feeling as soon as it is opened with an AI generated doctor
Very easy to add more medication when needed

<u>Suggestions (Provided by user feedback)</u>
Allow users to choose which icons are used in the calendar
Notification system to remind me to take it
A way to check pharmacies near me to refill
A way to add friends to help remind each other
Make it more suitable for android use

Overall, testing and evaluating the prototype gave us overwhelmingly positive feedback from our prototype, proving that our solution to the medication non-adherence problem would be a success. Users that tested the prototype are people that have been, and could be affected by non-adherence and being provided feedback by those directly part of our target demographic is vital in determining if our solution is viable and effective.

The feedback received from the users, served as an initial test for the viability and the effectiveness of our solution, with the results rooted in real-world situations and circumstances, offered us an immense amount of insight into the practicality of the project and the approach taken by us. The engagement from users not only showed that this solution has passed the initial prototype stage, but it can be sent back to the drawing board to further evaluate, expand and create to make a final product which will be used in a seemingless effort by users that can include it in their daily lives.

After reviewing the positive feedback and suggestions offered by users, we felt encouraged by the application's evident positive outcome but also the recognition for potential areas for enhancement. These insights provide a clear roadmap for improvements and an iterative design thinking phase, this process will elevate the end product, striving for an even better user experience and efficiency. Embracing these suggestions will not only help our users who have gone out of their way to address them but for any upcoming user, these suggestions will ensure a more inclusive and user-centric design which is the end product that we want to strive for.

Individual Reflection on the Group Project Process

Dawid Szczesny

I believe that throughout this project, we all contributed fairly all across its different segments. From the research of the problem, the user definition, all the way through into developing the interactive prototype, and its different design decisions. Although we had a few hiccups, especially when it came to the ideas, and the questionnaires we decided to send out, it emphasised the constant reevaluation of the 5 stages of design thinking, which improved our end result.

Human Computer Interaction is something I had not considered often previously when designing and programming applications, and I always struggled to make my projects feel user friendly, especially to the users whom I tried targeting the application to. This course has forever changed my approach for future projects.

Tomasz Gruca

I feel like individually in this group we all were able to contribute to the overall project process, I felt very accomplished about the fact that as a group we were about to schedule many meetings in this semester to be able to sit down and focus on this project whether that was drawing mindmaps, brainstorming, another thing I enjoyed in this group process was that this was not a linear process, we would often argue about who's idea was better, who did what better, which approach should we follow and I believe that this helped us give us further perspective on the whole project, the ability to question ourselves in this project and step back was essential to the growth of this project as well as gathering different perspectives from this approach gave us different insights.

I found this course to be a new way of thinking, a way to step back from instantly diving into a problem, instead providing sufficient time and a way for contemplating the whys and hows of a brief statement, not just an immediate cause and effect. This course gave me a sense of how important it is to delve into the problem rather than hastily addressing the brief, it promoted a more broad topic of thought. I believe it was Kant that said 'Experience without theory is blind, but theory without experience is mere intellectual play' (Immanuel Kant). I believe that this quote captures this project, the diverse perspectives created the idea to drive this project forward however, without a good execution of the project prototype, we could not express their stories and experiences well.

Brian Moyles

Working on this project allowed me to gain a deeper insight into Human Computer Interaction. From working in a team, to having a more empathetic approach to designing, I have learned a lot in this process. Team contribution was fair and even. After having different views on the direction of the overall project, we worked together to ensure this project developed in the best possible way. Weekly meetings, brainstorming sessions, evaluations and reevaluations were vital and common throughout.

Throughout this process I maintained a mindset of "How could I make this easier for those that will use it" and "How would I feel with this solution". This is something I focused on more due to my understanding of Human Computer Interaction. To take a step back and fully understand and address the problem before rushing to a solution was pivotal in the development of this solution. Understanding Human Computer Interaction and this module has been transformative and has taught me lessons I shall continue to apply in the future.

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