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RTPatient - Platform for Managing Reminiscence Therapy Sessions and Patients

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Abstract

Dementia is an overall term that describes a group of symptoms associated with a decline in memory or other thinking skills severe enough to reduce a person's ability to perform everyday activities. Reminiscence therapy is used to counsel and support older people with dementia. It shows results in an initial stage and is a treatment that tries to use all five senses — sight, touch, taste, smell and hearing, but most of the time is focused on sight (images) and hearing (music) — to help individuals with dementia remember events, people and places from their lives. The few existing technological platforms that support reminiscence therapy produce a collection of data that remains unchanged throughout time, sometimes only based on a set of generic pictures, where their acquisition is made in a non dynamic way. Our goal with this work is to build a digital platform that will help with the reminiscence therapy. It will allow caregivers to upload pictures to be used in sessions, gather generic pictures based on patients personal information, keep track of the patients evolution, as well as of their emotional reactions over time. It is important to keep track of those emotions to improve a session, since different images have different effects on the patient. Preventing from showing an image that provokes a bad reaction will not only help the person with dementia but the caregiver, by reducing the chance of irritability or even aggressiveness from the patient with dementia towards the caregiver.

In this project we developed a digital platform, called RTPatient, to support PwD and their caregivers. With RTPatient we are able to insert or edit patients information, share the responsibility of gathering information, start a reminiscence therapy session or consult previous sessions. The platform has a login for each Caregiver, where they can see their list of patients and their details. The Caregiver can be a family member or a formal carer.

After finishing our platform we did Usability tests, used the System Usability Scale (SUS) to measure the overall usability of the solution and asked for feedback to help us understand if the platform was easy to use and if it had all the needed functionalities. After analysing all the data and checking our SUS average score of 91.4, we can conclude that our platform was considered easy to use. Regarding the feedback we identified some small improvements to be done in future work, like a better positioning of some buttons. Another suggestion was the addition of a new functionality to add a list for the caregiver to see all the patients he used to take care of.

Keywords: Dementia; Reminiscence Therapy; Session; Personal Images; Caregiver;

Resumo

A Demência é um termo utilizado para descrever um grupo de sintomas associados com a perda de memória ou de raciocínio que afetam as tarefas diárias. À medida que a esperança média de vida aumenta, o número de pessoas com demência tende a aumentar e infelizmente não existe uma cura para esta doença assim como se tem mostrado muito difícil encontrar uma maneira de a prevenir. A demência é uma das maiores causas de dependência entre os idosos, pois esta pode afetar a compreensão, orientação, memória e comportamento social, fazendo com que os pacientes afetados por esta se tornem depressivos, inseguros e se isolem.

A terapia da reminiscência é uma terapia, que não recorre a medicação, sendo utilizada para melhorar não só a qualidade de vida do paciente, mas também a qualidade de vida do seu cuidador. Esta tem-se provado uma verdadeira ferramenta de estimulação de memória, ajudando a manter as habilidades sociais dos pacientes. Esta terapia utiliza os cinco sentidos: visão, toque, sabor, cheiro e audição, sendo o mais utilizado a visão (imagens), e a audição (música), para estimular a memória do paciente. Infelizmente esta apenas mostra resultados se o paciente se encontrar num estado inicial. Para identificar em que estado da doença é que o paciente se encontra, normalmente usa-se o teste Mini Mental State Examination (MMSE), [3].

Atualmente existem algumas soluções para a realização da Terapia da Reminiscência. Durante a recolha de dados que fizemos no início deste projeto, encontrámos seis soluções onde nos decidimos focar. Durante a leitura percebemos que optar por uma Terapia da Reminiscência mais tradicional, como mostrar fotografia em álbuns, música ou até mesmo atividades práticas como tricô podem não só tomar bastante tempo ao cuidador, mas também colocar este sob pressão, uma vez que é este que tem o papel de estimular a conversa, deixando o paciente com um papel mais passivo. Concluimos então que a terapia mais tradicional pode provocar desconforto para ambas as partes, anulando os efeitos pretendidos da terapia, [5]. Como sabemos as pessoas com demência tendem a esquecer-se da tarefa que estão a fazer, e por isso Freeman E. et al. [3], sugere apenas mostrar a informação necessária que caiba num ecrã de computador, combinar texto com imagens e evitar ícones como casas para redirecionar o utilizador para a página principal. Também sabemos que uma pessoa com demência tem mais dificuldade em concentrar-se em mais de que uma tarefa ao mesmo tempo, por isso, e para tornar a experiência ao

utilizar a plataforma bem-sucedida opta-se por um design simples e igual ao longo da plataforma. Os botões estão sempre no mesmo sítio e deverão ser dados comentários após a execução de tarefas, como por exemplo a adição de um paciente com sucesso. Uma das soluções encontradas foi a de Gary L et al. [4], que fala na aplicação DARE (Dementia Assistance and Recall Engine). Esta aplicação foca-se nas ondas cerebrais do paciente ao ver imagens e vídeos pessoais. Tem como objetivo estimular o paciente e ver em que estado da doença este se encontra. Yamagata C. et al. [9], apresentou duas soluções diferentes, Smartbrain, que tem jogos para estimular a memória e a resolução de problemas e Candoo, que utiliza o reconhecimento de voz do Google e o seu sistema de pesquisa para dar informações sobre o tempo, lembretes para tomar a medicação e também permitir aos familiares enviarem vídeos, fotos e músicas. Anis Hashmin et al. [6] apresentou a solução myBook, que consiste num livro de memórias, lembretes diários e jogos de raciocínio. Por último temos a solução de Dan Cosley et al., Pensieve, [2], que não é necessariamente focada em pessoas com demência, mas pratica o poder da reminiscência, reenviando imagens e textos publicados no passado pelo utilizador. Após revermos as soluções apresentadas, percebemos que uma sessão de terapia da reminiscência bem-sucedida é uma sessão onde o paciente não fica sozinho durante um longo período de tempo, o paciente diverte-se durante a sessão e é utilizado conteúdo personalizado, [5]. Para garantir uma sessão bem-sucedida decidimos focar-nos em nove parâmetros que consideramos essenciais existirem numa plataforma para a realização de terapia de reminiscência: carregamento de fotos pessoais e de fotos genéricas, criação de uma sessão dinâmica e personalizada, geração automática de um relatório após cada sessão, recolher comentários do cuidador após cada sessão, possibilidade de consultar o histórico do paciente e por último promover uma atividade sem falhas, ou seja, garantir que o paciente não acaba a sessão frustrado ou stressado. Com base nos nove parâmetros que utilizamos, ficamos a perceber que nenhuma das soluções apresentadas anteriormente oferece a possibilidade do carregamento de imagens genéricas, e que todas oferecem um ambiente não imersivo e promovem uma atividade sem falhas. Apenas a solução de Gary L et al. [4], oferece a opção de gerar um relatório, de fazer comentários e de consultar a evolução do paciente. A solução de Anis Hashmin et al. [6], apenas permite a possibilidade de dar comentários e de consultar a evolução do paciente. Freeman E. et al. [3], foi a única solução das encontradas que não permite ter conteúdo personalizado. Apesar da solução apresentada por Gary L et al. ser a mais completa das seis, e por isso a mais próxima daquela que nós criamos, continua a faltar-lhe duas das características que nós consideramos essenciais, que são o carregamento de fotos pessoais e a recolha de fotos genéricas. O objetivo da nossa plataforma foi preencher as lacunas existentes tornando possível a recolha de imagens genéricas, o carregamento de imagens pessoais e garantir que o paciente não é deixado sozinho durante muito tempo enquanto a sessão decorre.

O objetivo deste projeto foi criar uma plataforma digital, chamada RTPatient, que

ajude na terapia da reminiscência, tanto ao nível do cuidador como do paciente. Antes de criarmos a plataforma começámos por desenhar protótipos de baixa fidelidade, para termos uma ideia de como queríamos que a plataforma ficasse, e só depois passámos para os protótipos funcionais. A nossa plataforma permite ao cuidador criar um livro de memórias, através da adição de fotografias e de informação pessoal do paciente, tal como a sua idade, estado civil, filhos, favoritos, se teve algum animal de estimação. Como sabemos ter o cargo de cuidador de um paciente com demência pode ser bastante consumidor, e por isso quisemos dar a oportunidade ao cuidador para partilhar esta função. Apenas existe um cuidador principal, mas cada paciente pode ter um ou mais cuidadores. Este convite é feito com o email do novo cuidador, através da plataforma, na página do paciente, e apenas é possível enviar para outro cuidador que esteja registado na plataforma. O cuidador também pode decidir parar de tomar conta de um paciente. Cada cuidador tem um registo, e cada cuidador pode ter um ou mais pacientes. O cuidador só pode ver a sua lista de pacientes e consultar a sua informação depois do Login ser feito.

Depois de concluir a plataforma realizamos testes de usabilidade, usamos a Escala de Usabilidade do Sistema e pedimos aos utilizadores para fazerem comentários sobre alguma tarefa que gostassem de ver implementada, algo que não tenham gostado ou algo que tenham gostado em particular. Depois de realizarmos todos os testes, analisamos os resultados e observamos que todos os utilizadores conseguiram executar as tarefas pedidas nos cenários apresentados. Embora uns tenham demorado mais que outros, nenhum demorou demasiado tempo que o deixasse desconfortável e a sentir que a plataforma não é fácil de utilizar e navegar. A prova disso é a média obtida nos cálculos feitos com a Escala de Usabilidade do Sistema, onde obtivemos uma pontuação de 91,4, o que representa que a média dos utilizadores considera a plataforma de fácil utilização e com uma boa usabilidade.

Em relação aos comentários que os utilizadores fizeram, iremos ter em consideração num trabalho futuro, aspetos como o posicionamento de alguns botões, que podem ajudar a melhorar a interação entre o utilizador e a nossa plataforma.

Em termos de funcionalidades foi-nos sugerida uma, que nós gostaríamos de ver implementada no futuro, que é a criação de uma lista com os pacientes que um cuidador tenha deixado de cuidar.

Palavras-chave: Demência, terapia da Reminiscência, Sessão, Imagens Pessoais, Cuidador

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Chapter 1

Introduction

In this chapter, we present the motivation to start this project, the goals, the solution implemented and finally the structure of the document.

1.1 Motivation

As the average life expectancy increases, the number of people with dementia also increases. Every 3 seconds someone in the world develops dementia. There were an estimated 46.8 million people worldwide living with dementia in 2015. This number will almost double every 20 years, reaching 75 million in 2030 and 131.5 million in 2050^[1]. There is not a cure for dementia and it has been proven hard to find a way of prevent it.

Dementia is one of the major causes of dependency and disability among older people. Cognitive impairments in dementia affect comprehension, judgment, language, memory, orientation, thinking, emotional control, social behaviour, and motivation. Patients moving through the phases of the disease become increasingly depressed, insecure, and isolated^[7]. According to the literature reminiscence therapy is the most used non-pharmacological therapy to improve and enhance a person's self and also the quality of life for people with dementia, as well as their caretakers^[6]. This therapy has been proven to be an efficient treatment that stimulates patients memories helping them maintain their social abilities.

Some technological solutions emerged in the hope to help caregivers, family and clinical staff to deal with People with Dementia (PwD) and support reminiscence therapy. Computer Interactive Reminiscence and Conversation Aid (CIRCA) is a solution that relies on exploiting the combined skills of design, computer science and psychology and its aim is to create a computer-based tool that can stimulate and support communication

¹<https://www.alz.co.uk/research/statistics>

[5]. Quicktime Virtual Reality (QTVR) is the combination between CIRCA and virtual environments using photographic references [5]. Living in the moment (LIM) uses 3D modelling software to create any kind, and number, of navigable virtual environments into which a diverse range of on-screen activities can be programmed [5]. Dementia Assistance and Recall Engine (DARE) uses personal artefacts like photos and videos and it is focused on PwD brainwave signals during the session. Its main goal is to provide medical professionals and their caregivers insights on the patient's dementia condition [4]. We also have platforms that want to make the PwD life more easy and stressed free, like Candoo that utilizes Google's voice recognition and synthesis engine to navigate the web, provide weather and supply pill reminder alerts [9], and Smartbrain that is used to stimulate cognition through memory and problem-solving games [9].

However, these few existing technological solutions that support reminiscence therapy depend exclusively on caregivers to gather all the data necessary for the therapy. Not all of them create a report after each session to help keep track, or give the caregiver opportunity to give their feedback after each session.

1.2 Objectives

The main goal of this work was the development of a digital platform, which goal is to support PwD and their caregivers, in performing reminiscence therapy.

To achieve this, we need to collect information about the patient, be able to save this information, display it and create a session with it, and finally being able to check the sessions later. In order to do it, we focused on the Data Base, to store all the needed information, and on a simple and clean user interface, to allow the interaction with the platform.

1.3 Solution

The developed platform, named RTPatient, was thought after some papers research and also from requirements identified by Alarcão et al. [11], in Figure 1.1.

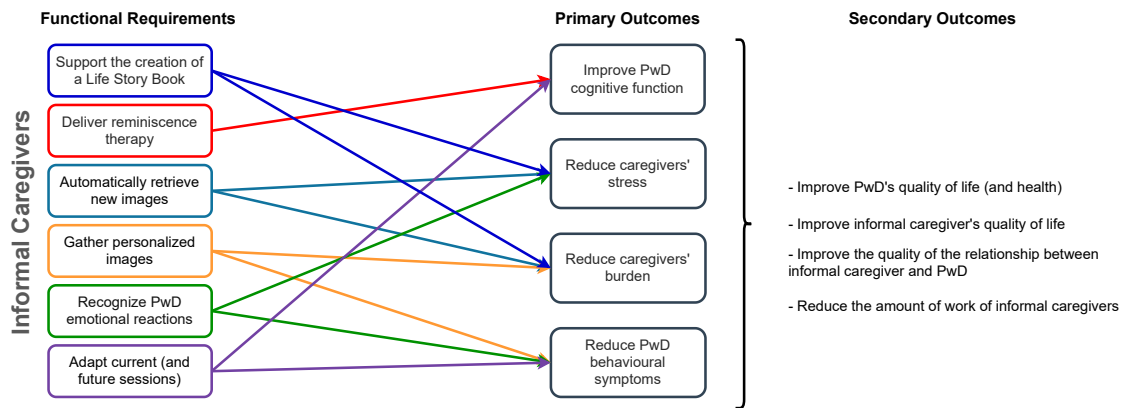


Figure 1.1: Functional requirements and expected primary and secondary outcomes for the informal caregivers identified by Alarcão et al. for their solution [11]

RTPatient was designed to support two types of users: formal caregiver, who could be a doctor/nurse, and informal caregiver, who could be a family member/friend.

Even there are two types of users, they can both do and see the same. The caregiver can add and remove patients, send invites to other caregivers to become carers of a patient, check their personal information, start or consult a session. On the caregiver account details like email and password can be edited. On the main page we have the list of people the caregiver is responsible for. At the top of this page, it will be displayed any pending invites to take care of a new patient. The caregiver can either accept or reject this request.

We kept a simple design along the platform, with the minimum clicks possible to interact between pages. We wanted to keep it easy and practical to use, since most caregivers could be elderly.

The experimental evaluation revealed that most users considered the platform easy to use and would recommend it, this can be seen in more detail in [chapter 5](#).

1.4 Document Structure

The remainder of this document is divided in six chapters. In Chapter 2, we describe the background and related work. In Chapter 3, we describe our functional requirements, architecture, model and technology used. In Chapter 4, we have the prototypes we designed and final solution. In Chapter 5 we describe the tests we did. Finally, in Chapter 6, we present a summary of this document and future work.


Chapter 2

Background and Related Work

In this chapter, we start by providing some background about dementia and reminiscence therapy. Then, we present the current platforms and what they have to offer. Finally, we compare the platforms among them, highlighting their limitations and advantages.

2.1 Dementia and Reminiscence Therapy

Our brains store our memories and control almost everything we think, feel, say and do. However, there are some illnesses that prevent a person's brain from working properly. When a person has one of these illnesses, they may have problems remembering, thinking and speaking. They might say or do things that seem strange to others, and find it harder to do everyday things. They may not seem like the person they used to be. Dementia is the word that doctors use to describe these different problems, and to describe a group of symptoms including memory loss, confusion, mood changes and difficulty with day-to-day tasks.

Dementia is not something that just happens to everyone as they get older. It is caused by different diseases that affect different parts of the brain, affecting people in different ways. At the moment we do not know why one person may get one of these diseases while another person may not. Doctors and scientists are working hard to find out more about dementia.  At the moment there is no cure for dementia. Thus, once a person has dementia, they will have it for the rest of their life.

Reminiscence therapy is an effective and enjoyable way to connect with a person who has dementia and to help manage some of the more distressing symptoms of the illness. As we age, we have an increased tendency to remember things that happened to us between the ages of 10 and 30 years, with events from the late teens and early twenties remaining most prominent. Reminiscence therapy uses this ability to recall events that happened long ago, even when short term memory is failing. It can also help to boost PwD mood and stimulate wider conversation, reducing the patients' isolation. Anecdotal evidence

¹<https://www.alzheimersresearchuk.org/about-dementia>

suggests that stimulating long-term memory can also improve short-term memory and increase the self-worth and engagement of someone with dementia. Reminiscence therapy allows someone with dementia to enjoy a good conversation and the benefits it brings, although it is probably less beneficial to people with frontotemporal dementia (sometimes called Pick's disease) or those in the later stages of dementia. Recalling positive memories makes everyone feel happy, turning good memories into a powerful way to boost the mood. Which means Reminiscence therapy can turn a 'bad' day into a 'good' day – or even a good week. ²

2.2 Related Work

In this section, we describe some of the existing technologies to help with reminiscence therapy. We have three different sub sections where we specify how a platform should look like, the existing technological solutions and for last a discussion about what we think is most important on a platform to support RT.

2.2.1 Overall

It is proved that we can get better results during therapy if the patient is in an early stage of dementia [4]. Mini Mental State Examination (MMSE) is one of the tests that can be done to diagnose the level the patients are in [3]. We can also say that having a more traditional reminiscence therapy, showing photographs albums, music, and having tactile activities like knitting can become very time-consuming and places the pressure of stimulating a conversation upon the caregiver leaving the patient with a more passive role, which can be stressful for both parts defeating one of the therapy purposes [5]. We want to create a session where the PwD does not have a passive role, where both patient and caregiver interact when watching the images, we want to promote a "non-immersive" engagement to get the best results out of the therapy. We also want to make the caregiver life easier by not putting all the pressure on him by getting some of the pictures from the patient information, as well as adjusting sessions content based on how the patient is emotionally reacting to each visualized image.

2.2.2 Web Page Design for People with Dementia

Freeman E. et al. presented the rules to follow to create a user friendly web page design for people in an early stage of dementia to be able to work with it [3]. As we already know people with dementia tend to forget the task they have in hand, and that is why limiting the size of web pages to the amount of information that can be displayed on a computer

²<https://www.unforgettable.org/blog/what-is-reminiscence-therapy>

screen, having hints in the shape of images or text combined with some text and avoiding metaphorical language like the customary use of “home” as a link to the home page can help them navigate through a web page by reducing the level of difficulty to do so. As we also know people with dementia have less capacity to coordinate more than one cognitive activity at the same time and that is why in this study they focus on cutting down the number of items on the page competing for attention by only displaying what is crucial. Yamagata C. et al. claims that tablets are simpler and more accessible to use than computers because touchscreens can be more user friendly. To make interaction easier the screen size should not be smaller than 10.2”, it should come with a stand to prop the tablet and a cover with grips [9].

Anis Hashmin et al. affirm that to produce a successful interactive experience, the platform design needs to be attractive and engaging. It also needs to have the ability to provide satisfaction to the user, give clear directions by not confusing the user with many instructions, give response from the application on user’s performance such as praising the user upon successful management tasks or giving motivation if unable to accomplish them. They also affirm the design needs to be the same throughout the application to provide a familiar interface, like the buttons being always in the same place. They also need to be arranged properly to be easily recognized and handle by the user, like having different colours and different icons [6].

We used some of these, like the simple language, the amount of information per page and single clicks to navigate through the application.

2.2.3 Technological Solutions for RT

Over the past few years some technological solutions were created to help PwD perform everyday activities, improve the therapeutic treatment of dementia to stimulate memories, communication, social engagement, and to diagnose and evaluate the progression of the disease. In this section, we present some technological solutions for supporting the reminiscence therapy.

Gowans et al. presented three solutions, CIRCA (Computer Interactive Reminiscence and Conversation Aid), QTVR (Quicktime VR) and LIM (Living in the moment) [5]. CIRCA relays on exploiting the combined skills of design, computer science and psychology and its aim is to create a computer-based tool that can stimulate and support communication. It employs generic and non-personalized media to stimulate conversation in reminiscent therapy sessions. QTVR is the combination between CIRCA and virtual environments. It allows us to create on-screen, ‘scrollable’, 360-degree environments using photographic references. Finally based on the results from testing the second solution the authors created LIM, where the main idea was to give more than a failure-free experience but to bring a positive experience. LIM uses 3D modelling software (Maya) because

it offers the possibility to create any kind, and number, of navigable virtual environments into which a diverse range of on-screen activities can be programmed. LIM has two different types of interactions real-time and pre-rendered animations. With this project they made sure the patient was having a good time, but by using a VR environment they forgot to promote a "non-immersive" engagement, since the patient would spend some time by it self, emerged in a different reality.

Gary L et al. presented DARE (Dementia Assistance and Recall Engine) [4]. DARE uses personal artefacts like photos and videos and is focused on PwD brainwave signals during the session. They wanted to stimulate recall of past memories through photographs to remind people with dementia who they are. They use NeuroSky Brain Sensing Hardware to capture the user's brainwave signals, to help analyse and make sense of their cognitive and mental abilities which will help during sessions. Its main goal is to provide medical professionals and their caregivers insights on the patient's dementia condition so they can know what is the best and more appropriate way of treatment by transmitting all the data collected during a session by NeuroSky Mindset wirelessly. DARE uses a customized digital scrapbook created by categories to make references easier, external links including sound and video, Skype connection and taking leverage of the multi-touch capabilities of tablets to reveal people's names or more detailed information. Authors also suggested recording voices and adding them to the digital scrapbook. However, according to the literature, PwD should focus in just one task, otherwise it can become an "immersive" experience which we are trying to prevent.

Yamagata C. et al. presented different applications that can help improve the quality of life of a PwD [9]. One of the applications the authors implemented was Candoo this utilizes Google's voice recognition and synthesis engine to navigate the web, provide weather and supply pill reminder alerts and an app that allows families to electronically send photos, videos and favourite music from anywhere to loved ones. Smartbrain is used to stimulate cognition through memory and problem-solving games. This stimulation not only focuses on the symptoms but it also helps relieve the stress on the patient and on the caregivers. Another application was "Sundown" which purpose is to calm the patients during their most agitated and disorientated period. And the third application presented by the authors was Busy-Boards, which is a mobile application designed to catch the attention of the user by prompting them to complete a simple task, for example including a collage of touch interactive animals and by interacting and touching the right icon, a sound is played and/or a description is displayed.

Anis Hashmin et al. presented a mobile application, myBook [6]. It is a personalized digital memory book that is designed and developed with the elements that can help users

enhance their reminiscence of the past and stimulate the cognitive function. It consists of daily routine reminders, photographs and cognitive games. The content is collected by the caregiver, but is the patient who chooses the pictures that will be used. The application was tested in the patient living room house in order to provide him/her with familiar and comfortable feelings. For this platform they took in consideration the cognitive limitation issues of the user by creating a platform with simple commands, readable texts, recognizable icons and choice of colours suitable for the target user. They had two activities options related to reminiscence, "Family Tree" and "Gallery". Family Tree contains the picture of the immediate family members of the patient, where details of each member will be displayed and the name of the member will be heard when clicked on it. A gallery that contains photos of past events, photos of family day, family gatherings and vacations and a small description of the event to try and help the user to remember them. One of the problems found by the authors was the size of the smartphone screen as the user can have problems with her eyesight and an advantage found was the Book of Life being personalized, that we are also implementing in our application, since it is proved to bring better results for the therapy. A problem we identify is even if in this case study the results have been positive, we consider that in order to be more accurate it should have been tested among more PwD.

Dan Cosley et al. presented a system prototype called Pensieve whose the goal is to support people's reminiscing practices [2]. It is based on reusing memory-laden content people already created in social media services. It randomly chooses a memory trigger either from one of a user's services or the impersonal prompts, then sends the trigger through email. Their application architecture has three parts: a server, an email interface to deliver memory triggers, and a web interface to control Pensieve, record memories, and provide limited social support for reminiscence. With this system people create accounts using the web interface, that allows the user to control how often they receive triggers as well as which services they want to receive triggers from (eg Blogger, Twitter). The main aspect of the website is a diary page, that shows memory triggers Pensieve has sent. People answers will be showed in the diary. The website also provides a feedback page to help improve the platform. Even if this platform isn't necessarily focused in PwD it is focused in the power of reminiscing. With this article, we can see how useful it can be to collect personal information from social media, if authorized, to use it later on during therapy, and how we can stimulate our brain by reminding our memories.

2.2.4 Discussion

In order to create our platform and based on literature, we found out that one of the main concerns about reminiscence therapy is how time consuming it can be for the caregiver to

collect all the information needed to supply the best sessions. By best session, we mean a session where the patient is not left alone for a long period of time, and it has a good time during it [5] by using personalized content. For all of these to be possible, we decided that our platform needed to support the upload of personal pictures and allow the collection of generic ones based on the patient biographic information. We know these are important features that will make possible the creation of dynamic sessions with customized content. In our project we also find it is very important to keep track of the patient therapy, not just to improve the following sessions, but also to keep track of the patient evolution and understand how the therapy is helping and how can help even more [4]. And we also want to generate a report after each session about the patient interaction with each picture and to collect feedback from the caregiver that the report might not be able to pick up.

In order to produce a successful interactive Book of Life the following features need to be considered: the photos used need to be clear and large, the interactive area should be simple and clearly show every function and it should not present group photos with more than 5 people, because their faces become smaller making the identification trickier [8].

In table 2.1, we present a comparison among the presented technological solutions to support the reminiscence therapy. To compare them we used nine parameters that we considered to be essential, such as the possibility to:

- upload personal pictures,
- collect generic pictures,
- create a customized and dynamic session,
- generate a report,
- collect feedback,
- consult the patient evolution
- promote a "failure-free" activity

In this context, 'failure' refers to both technical and emotional 'failures' such as frustration due to poor technical performance and emotional distress caused by, for example, inappropriate/distressing data content, and a "non-immersive" engagement, ie the system should work as a communication prompt, not a purely sedentary pastime [5].

What has to offer Work	Work					
	Gowans et al. [5]	Gary L et al. [4]	Freeman E. et al. [3]	Yamagata C. et al. [9]	Anis Hashmin et al. [6]	Dan Cosley et al. [2]
Upload Pictures		✓		✓		
Collection of generic pictures						
Customize Content	✓	✓		✓	✓	✓
Dynamic session	✓	✓			✓	
Report		✓				
Feedback		✓			✓	✓
Patient evolution		✓			✓	
"failure-free" activity	✓	✓	✓	✓	✓	✓
"non-immersive" engagement	✓		✓		✓	✓

Table 2.1: Comparison among the technological solutions for reminiscence therapy

As we can see in 2.1, all of the solutions try to promote a "failure-free" activity and three out of six try to promote a "non-immersive" engagement. Unfortunately none of the technological solutions support the collection of generic pictures to enrich the initial set of images. Only Gary L et al. [4] offers the possibility of having a Report. Both Gary L et al. [4] and Anis Hashmin et al. [6] offer the choice to collect feedback or consult the patient evolution. Freeman E. et al. [3] is the only one not being able to have customized content.

The solutions offered from Gowans et al.[5] even having a customized and dynamic session are lacking some of the characteristics we propose to implement, like the upload of personal pictures and collection of generics ones. The project mentioned in Gary L et al [4] paper is the closest to the one we created, but is missing the possibility to collect generic pictures to help making the session more dynamic. Our project makes sure the evolution of the patient can be followed, and this is something Yamagata C. et al. [9] did not consider in any of their projects. One of the problems found by Anis Hashmin et al. [6] was the size of the smartphone screen as the user can have problems with her eyesight and that is where ours differs, our platform is made to be used in any screen size, tablets or laptop. An advantage of this application, is the Book of Life being personalized, that we also implemented in our application, since it is proved to bring better results for the therapy. With that we can conclude that [3] is the less complete solution, while [4] is the most complete one, according to the features we think are the best to promote a better reminiscence therapy.

With our platform we are trying to fill the existing gaps by making it possible to collect generic pictures and make sure the session have a "non-immersive" engagement and by that we mean the patient is not left alone looking at the same picture for too long.

Chapter 3

Digital Platform for Supporting RT

In this chapter, we start by presenting and explaining the functional requirements of our platform. Then, we present the platform architecture, followed by the Entity Association model of the database to be used in our platform. Finally, we present the technology we used.

3.1 Functional Requirements

The following requirements were identified based on our research of the current platforms and also from the literature.

To make it easier to follow, we split the requirements in three different categories. Firstly we have all the patient information and everything related with him. Secondly we have all the material needed to create the sessions. And finally, we have the feedback and reports after each session.

3.1.1 Pwd Information

Pwd Information means all the information our digital platform needs to save regarding the PwD. For that, we decided it will be better if each caregiver have their own login, and they will be responsible for inserting and managing the Pwd information. The caregiver will need to register the patient, where he needs to give some information such as his name, age, gender, NIF, civil status, name of the partner, number of children and their names, grandchildren and if it had any pet. This registration will also require a user name and a password for the caregiver to Login into the patient session and get access to the personal information later on.

We also want to give the possibility for the caregiver to upload and manage the patient pictures. The login is also important in case the caregiver is not a member of the family and has more than one patient. Each caregiver can be associated with one or more patients,

and a patient can have one or more caregivers, but one of them has to be the main one and responsible to accept the others.

3.1.2 Session

We want to make sure our sessions are personal and dynamic for each patient. So we will create them based on the patient information and also based on the pictures emotional information (polarity). In this case the polarity can be positive, negative or neutral. The idea is to assign negative points to a picture the patient does not like instead of removing the picture immediately. We would like to give each picture a second chance in case the emotions of the patient have been affected by something else. The pictures with a lower score will be displayed in last. We want to save the history of the emotions for each picture, and the images presented on each session.

3.1.3 Report and Feedback

To make sure the evolution of the patient is being saved we create a report after each session. We also want to give the caregivers the opportunity to give their feedback. To help create the final report, we will collect metrics at the end of each session. Some can be automatic, like the emotions of the patient for each picture and the session duration. Others can be asked in a questionnaire for the caregiver about the patient communication and excitement.

In summary, we have the functional requirements below:

- Registration and Login for the caregiver
- Insertion of a patient
- Upload of personal information, life details, like date of birth, gender, name between others.
- Upload of personal pictures
- Share patients between caregivers
- Check list of patients
- Check sessions history
- Creation of a session according to the polarity of each image
- Produce a report after each session. That will include the emotions of the patient and how long it spent in each picture. The total duration of the session.

- Check the patient evolution

Considering that each patient can have more than one caregiver, we want to implement the ability for them to share the patient information. We also want to keep track on the patient evolution, so for that we thought about having graphs with the duration of the sessions, check if the favourite pictures are still the same, and if they still keep the patients attention.

3.2 Architecture

In Figure 3.1, we present the overall architecture for the reminiscence therapy platform, created by Alarcão [1], for the PwD and the corresponding caregiver.

To best represent our system we created six blocks. We have *Dyad performing therapy*, *Portal and Session*, *Automatic Content Selection (IDSS)*, *Knowledge Base*, *Image-based Emotion Extraction* and *Physiological-based Emotion Extraction*. For the *Dyad performing therapy* we have:

- *PwD* this is the patient we are creating the sessions for;
- *Caregiver* is the person who takes care of the session, adds informations about the patient and checks the patient evolution.

For the *Portal and Session* we have:

- *Show Images* these are the images being displayed during the session;
- *Feedback* these is the feedback the caregiver can give after each session;
- *Caregivers' Portal* this is where we can find all the relevant information about the patient, like personal images and personal information.

For the *Automatic Content Selection (IDSS)* we have:

- *Session Manager* this is how we will automatically create a session, based on the patient information and emotional polarity of the images;
- *Retrieved Images* these are the images we gather from the patient Book of life.

For the *Knowledge Base* we have:

- *Book of Life* is where we save the patient information, like the date of birth, gender, name, family member;
- *Images + Info* is where we keep all the images imported by the caregiver;

- *Sessions' History* is where we can find the session history, like how much it lasted, how long a picture was visualized for the emotional polarity of a picture, the emotional reaction of the patient.

For the *Image-based Emotion Extraction* we have:

- It is responsible for identifying which emotion and emotion polarity an image will have when a patient visualizes it.

For the *Physiological-based Emotion Extraction* we have:

- It is responsible to identify what a patient is feeling in real time

From these six blocks the presented work will be developed on *Portal and Session* and *Knowledge Base*.

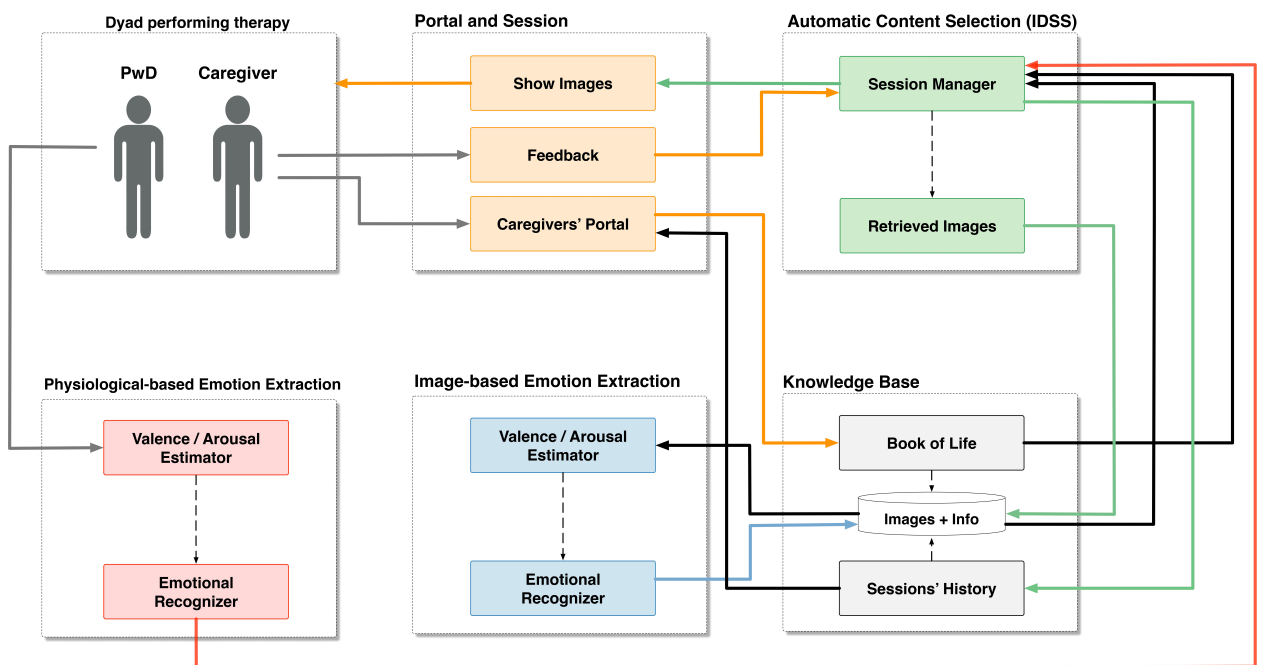


Figure 3.1: System Architecture of the overall system, proposed by Ana Alarcão, [11]

3.3 Entity Association model

In this section, we describe the main entities and associations from the model for our database, see Figure 3.2.

- Patient - stores all the information about PwD to create the best possible session.
- Place - patients can have one or more, like for instance where they lived or live or maybe where they spend the holidays, Type of Place. We added two dates to the association between Place and Type of Place, to store the starting and ending date that the person stayed there.

- Nickname, Job, Pets, Car, Football Team, Grandchildren, Children and Partner - are all considered entities because each patient can have more than one in different times of their lives and they are all essential to gather information for the session.
- Personal Image - is related with the entities Grandchildren, Children and Partner because as the name implies this is personal information that can not be displayed to other patients, it will not make part of their lives.
- General Images - are used for all patients. It could be a picture of a cat, dog or a nice landscape. They are used as neutral or positive images, they can not be negative.
- Image - this one is created from the personal and generic images and used during the session;
- Session - needs to be connected with the patient and with the image;
- Feedback - report of each session to help keep track of the patient evolution;
- Polarity - to attribute emotional information to the images.

3.4 Technology

To develop our digital platform, we used a set of Open Source components that together, provide an end-to-end framework for building dynamic web applications; starting from the top (code running in the browser) to the bottom (database). The stack is made up of:

- Angular: Front-end web app framework - runs JavaScript code in the user's browser, allowing the application UI to be dynamic;
- Spring: Framework - is an application framework and inversion of control container for the Java platform;
- JSON (JavaScript Object Notation) to exchange data between Java and Angular
- PostgreSQL : Database – used by the back-end application to store its data;

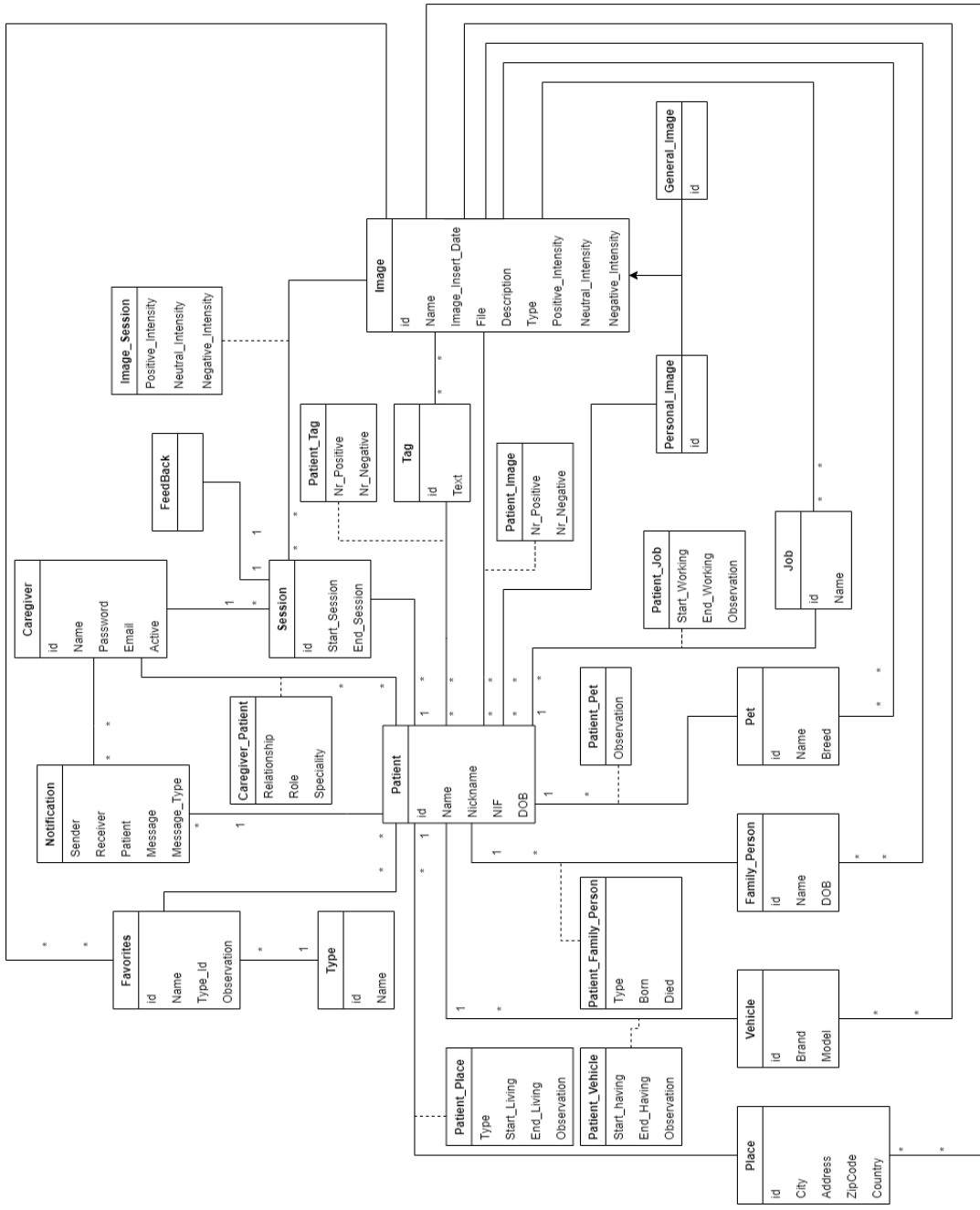


Figure 3.2: Entity Association Model

Chapter 4

Front End

In this chapter, we start by describing the initial thoughts for our platform, the decisions we took about the user interface. After that we show the mock-ups we created, the base for our platform, and why we made those decisions. And lastly we present the developed platform, explaining each functionality and why we designed it that way and what has changed from the mock-ups.

4.1 User Interface Design Decisions

Before we started the mock-ups we decided we should follow some guidelines, according to the literature.

Those decisions were:

- Each screen will only have the relevant functionality and information, as we said before a patient with dementia has more difficulty in focusing in more than one task at a time, the less information we have the better it will be. With that we also try to avoid scrolling.
- We used button colour coding, meaning if it is, for example, a cancel button this one will be red and if it is a save button it will be green.
- We also used colour coding, meaning if the caregiver successfully adds a patient a successful message is displayed with a green background, while if something wrong happens a message will be displayed with the problem encountered with a red background.
- Since the target client are elderly people, we tried to make the elements in the platform as big and spaced as possible to help make it clear.
- In every single page of the platform we have the title of the page and an arrow behind it so the caregiver can navigate to the previous page. We want to make sure it is possible to move from page to page with the minimum number of clicks.

- Every button in our platform has a confirmation message, we want to make sure no patient is deleted by accident, always giving the caregiver the chance to make sure that is the action he wants to go with.
- There will be no limit time for each session, we don't want to put the pressure on either caregiver or patient.

4.2 Platform Prototype

Platform prototypes are good because they enable a designer to weave visuals, to get navigational elements, and interactions together to give a solid representation of how a design will behave and feel.

In our platform each Caregiver has its own login, so for that we created a Register page, displayed in Figure 4.1. The only information necessary is the email, name and password. After the registration being complete the Caregiver can Login, Figure 4.2.

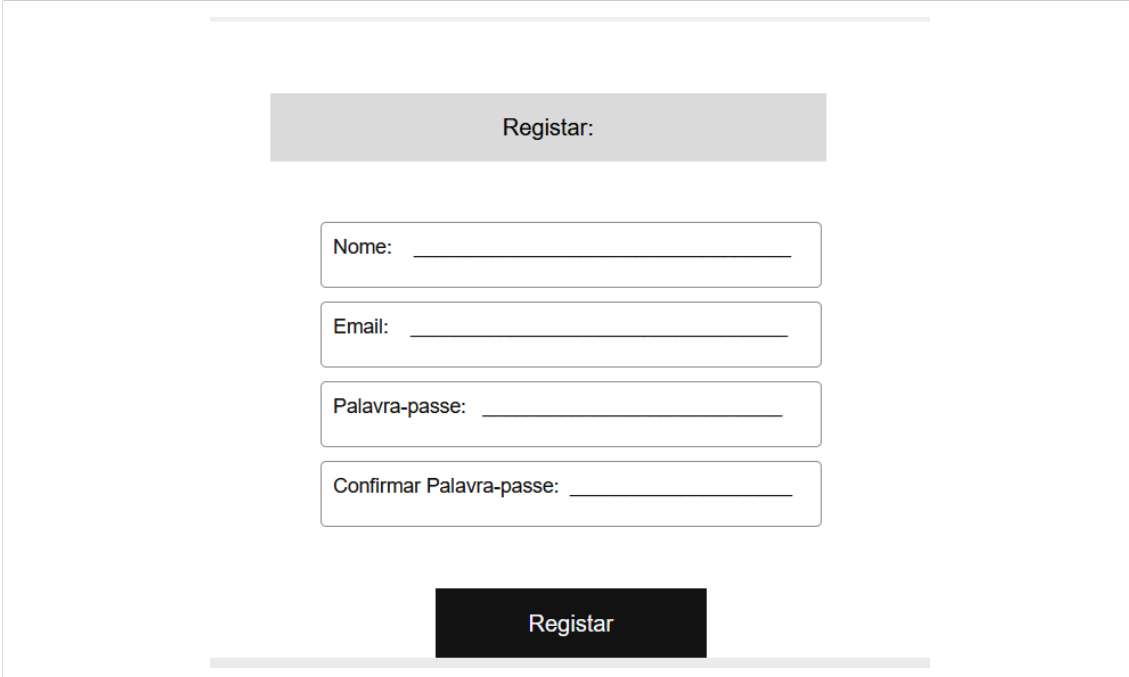


Figure 4.1: Caregiver Register Prototype Page



Figure 4.2: Caregiver Login Prototype Page

After a successful Login, the Caregiver will be redirect to a page, Figure 4.3, where a list of the Caregiver Patients and any pendent request to care for a new Patient will be displayed. When we created this page, we decided to have the pendent request and the list of the Caregiver patients in the same page, to avoid any more unnecessary clicks between pages. We also decided to have the pendent request at the top of the page, and in green to get the Caregiver attention to a new information.

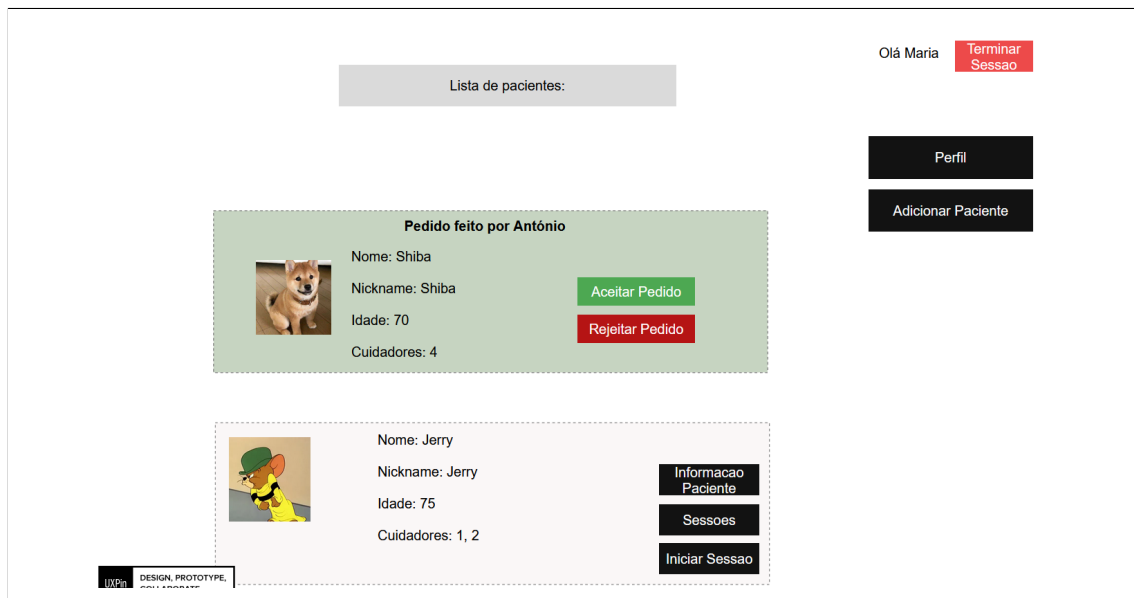


Figure 4.3: Caregiver Patients List Prototype Page

As we can see on the Patient List page, Figure 4.3, the Caregiver can either accept or deny a pending Patient, if the Caregiver decides to cancel the request a pop up message will appear to make sure that the Caregiver really wants to deny the request. If the Patient is already part of the Caregiver list of Patients, then this one will be able to check the Patient information, start a new session or consult previous sessions. Since each Caregiver can have more than one Patient we thought the best and clear way of doing it would be having each Patient inside a box, with the main information and a picture of this one as the main focus, on the left side, where we start reading, and the Patient information, Sessions and Start a new Session buttons next to it.

In this page, on the right side of the page, again, the main focus of this page is the list of Patients and any pending requests, we have a button for the Caregiver to add a new Patient and another button to check its personal details.

In Figures, 4.4 and 4.5, we have the add Patient page. Where we have the main information of the Patient, name, nickname, the identification number and date of birth. We then have a section for the connection between Caregiver and Patient. And lastly we have

different tabs for the book of life, like pets, family members and jobs. As we can see in the prototype we have all the information shown at once. As we can see later on that was something that changed when we build the platform.

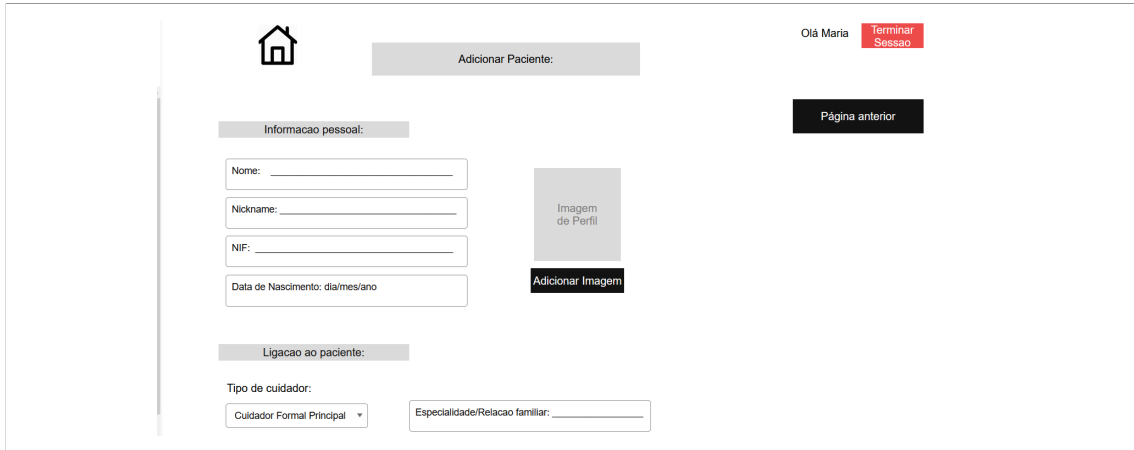


Figure 4.4: Add Patient Prototype Page 1

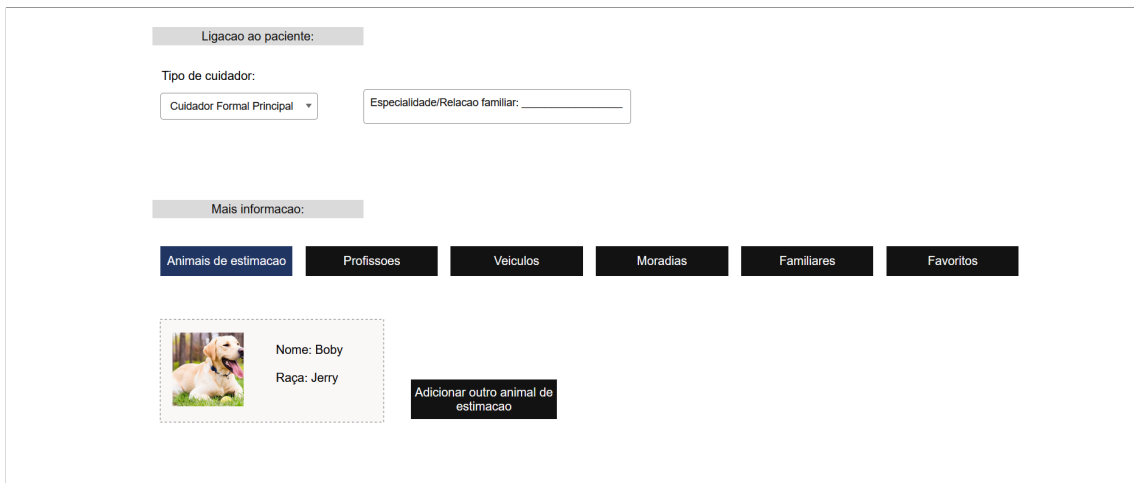


Figure 4.5: Add Patient Prototype Page 2

After adding a Patient we can consult his information, edit or remove the connection between Caregiver and Patient. We wanted to make the functionality of removing the connection between Patient and Caregiver possible, since as we saw before this can be a very overwhelming role to have or the circumstances might change. When we remove a connection between the two, we do not delete the Patient or the Caregiver from the Database, we just delete the connection between the two. Still on this page, a Caregiver can request for another person to become a Caregiver of the Patient, this person will have

to have an account on the application. We can see this on the page in Figure 4.6.

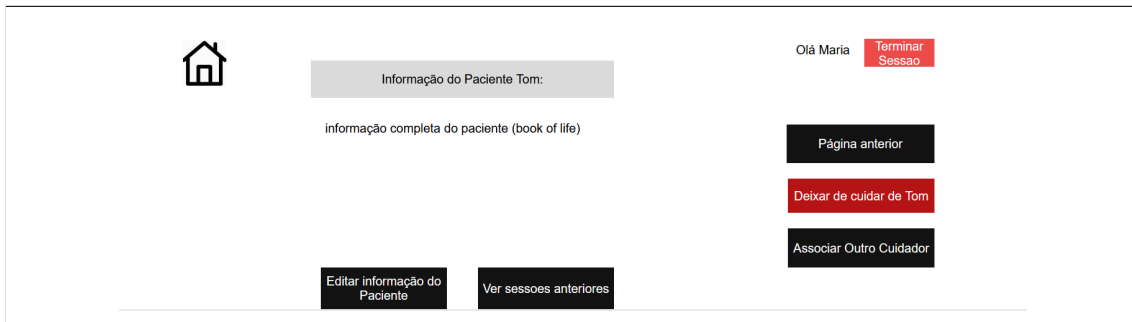


Figure 4.6: Patient Information Prototype Page

Lastly we have the page, in Figure 4.7, where the Caregiver can edit its personal information. The information we need from the Caregiver isn't much, so we don't have much to edit, but the password, email address, or nickname can be edited.

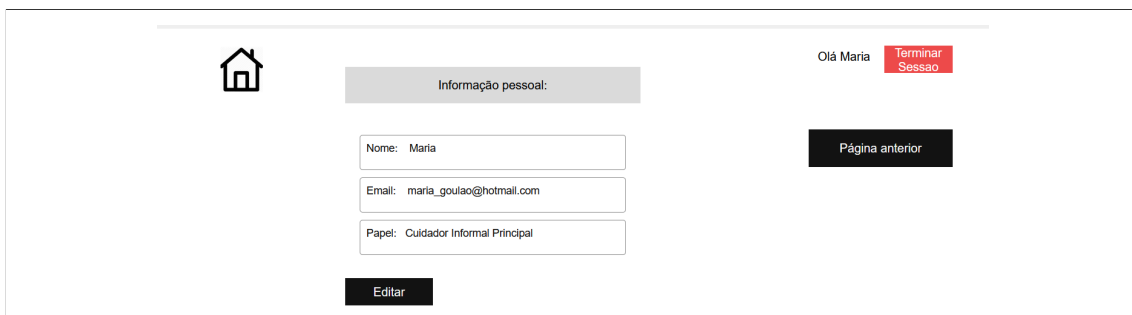
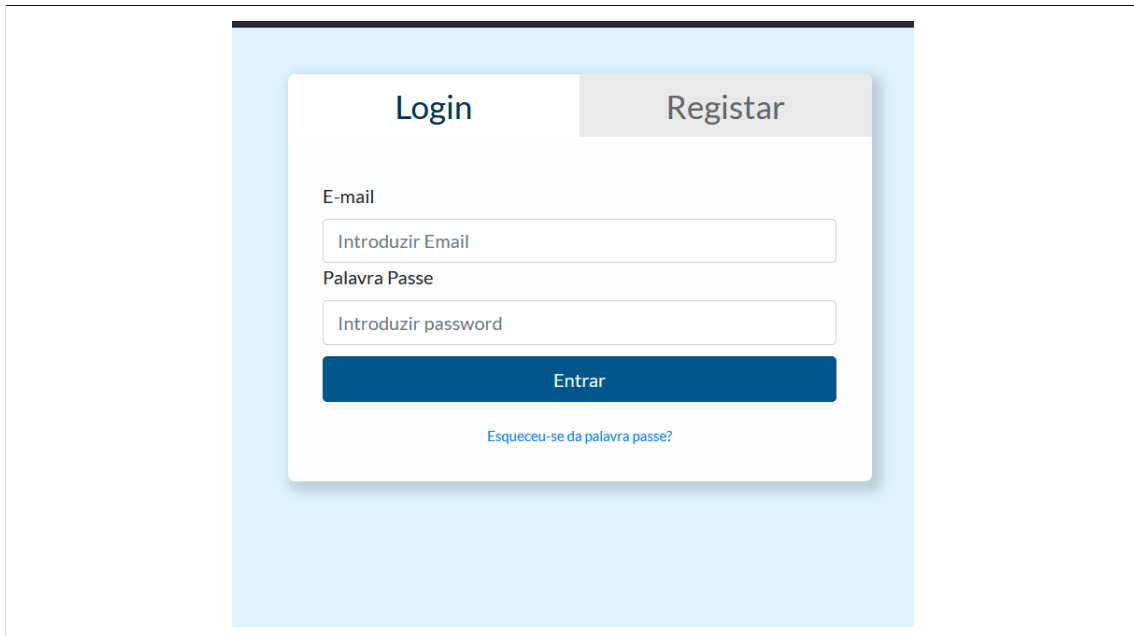


Figure 4.7: Caregiver Information Prototype Page

4.3 RTPatient Platform

Based on the previous prototypes we created a slightly different design, a more simple version with less clicks to navigate between pages. We also have all the Cancel or Delete buttons in red, all the Save or confirmation button in green and the neutral buttons, like Edit in dark blue, this is consistent throughout the platform, even in the pop up confirmation messages. We also made sure we have feedback when completing a task, if the task was successfully completed than we display a message surrounded by a green background, if not it will be surrounded by a red background with the exact error. We display this messages at the top of the area we are working on to make sure it is visible for the Caregiver.

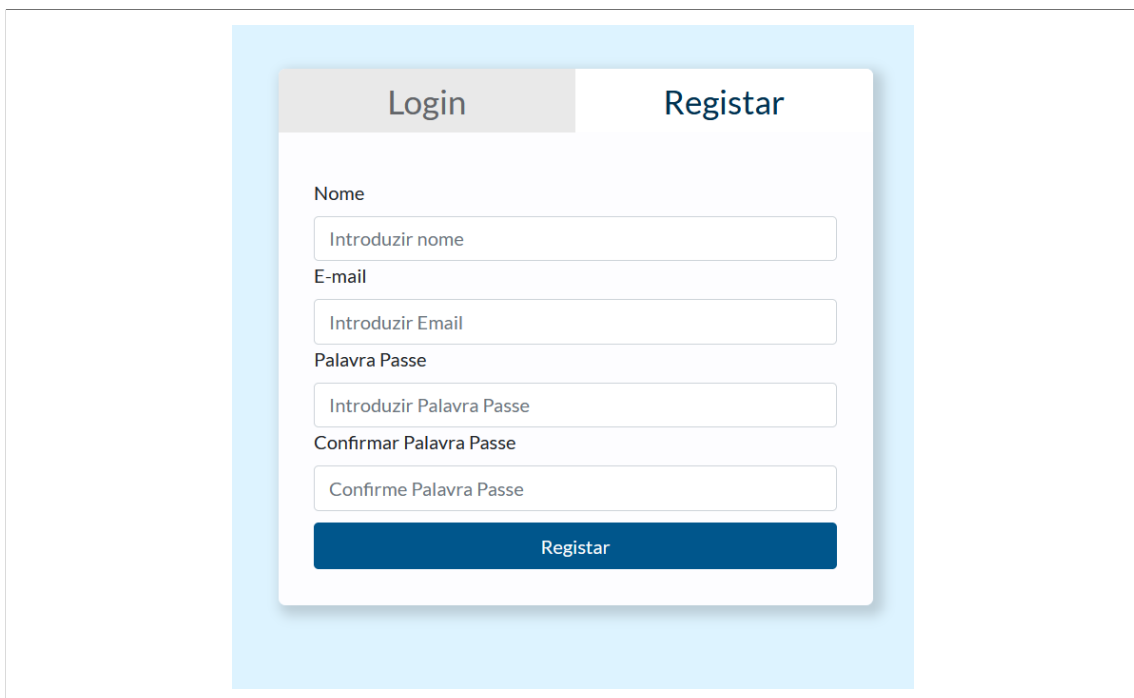
We can see the final design of the Login, in Figure 4.8, and Register, in Figure 4.9. We decided to do them on the same page in tabs, but we kept the same inputs.



The image shows a login form with two tabs: 'Login' (active) and 'Registrar'. The form contains the following elements:

- E-mail:** Input field with placeholder text 'Introduzir Email'.
- Palavra Passe:** Input field with placeholder text 'Introduzir password'.
- Entrar:** A dark blue button.
- Link:** A blue link below the password field with text 'Esqueceu-se da palavra passe?'.

Figure 4.8: Login Page



The image shows a register form with two tabs: 'Login' and 'Registrar' (active). The form contains the following elements:

- Nome:** Input field with placeholder text 'Introduzir nome'.
- E-mail:** Input field with placeholder text 'Introduzir Email'.
- Palavra Passe:** Input field with placeholder text 'Introduzir Palavra Passe'.
- Confirmar Palavra Passe:** Input field with placeholder text 'Confirme Palavra Passe'.
- Registrar:** A dark blue button.

Figure 4.9: Register Page

In Figure 4.10 we have the Patient List Page. As we can see the design is slightly different from the original prototype. We now have the title of the page on the left side and we have a dark blue bar at the top, with the "Maria2, Meu Perfil" and if we hover over it, it will change colour to a lighter blue and the mouse will get the shape of a clickable item. We did that so the Caregiver became aware it can click there and it will bring him to his details page. So we no longer have a separate button in the middle of the Patient list page. Next to it, we have in red the "Sair" button, we wanted this button to be easy to stop and keep it in line where the logout button normally stand. Still on this page, at the top we have a green "box", that represents the new requests, where an action is required. The user can press "Rejeitar pedido" or "Aceitar Pedido", if the Caregiver presses the first button a pop-up will show up, Figure 4.11, to make sure the user wants to reject the request. If the user presses "Aceitar pedido" then the request will automatically be accepted. Another thing to notice is the picture in the patient request, if the Caregiver prefers not to add a picture while setting up a Patient we add a non-picture that can be edited later on.

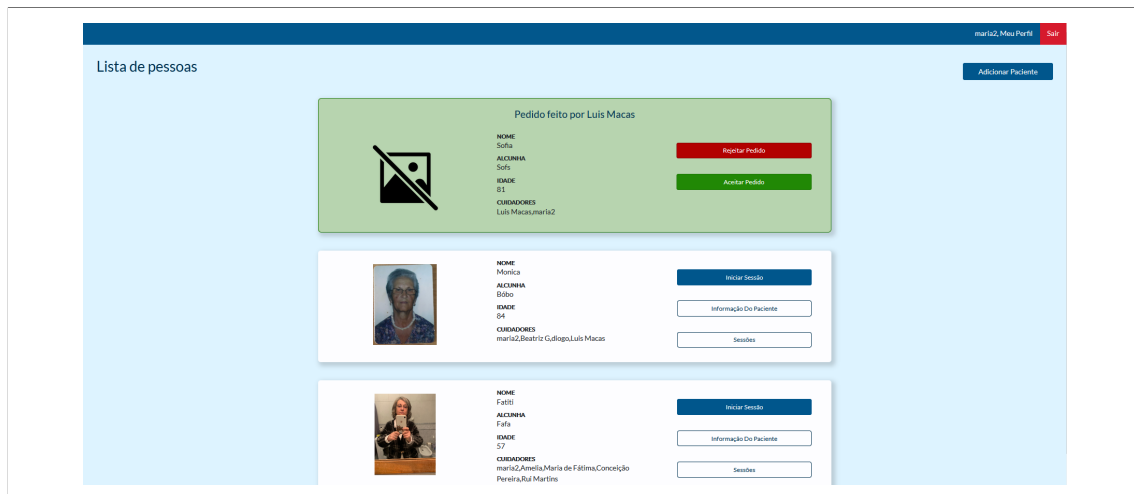


Figure 4.10: List of patients

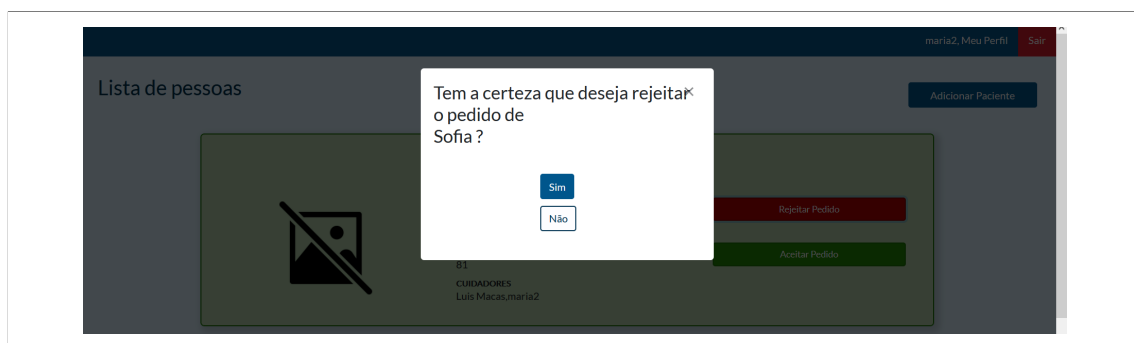


Figure 4.11: List of patients - Reject Request

In Figure 4.12 we have the Caregiver Details Page and in Figure 4.13 we can see how the page looks like when we edit it. We also changed that from our prototype. Before we had a house icon to indicate us if we click there we would go to the main page, and we also had a black button on the right side to go to the previous page. The way we have our platform build we do not need that any more. The previous page will always be the main page, so we just choose to have an arrow next to the page name, in this case we have, in both pages, an arrow before "Meu perfil".

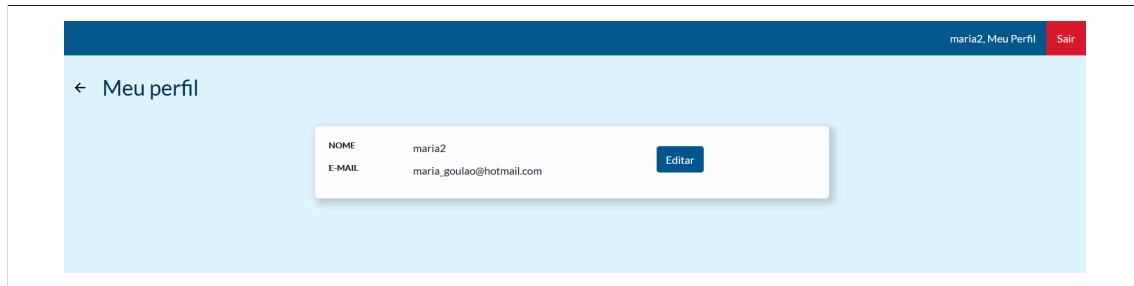


Figure 4.12: Display Caregiver Details Page

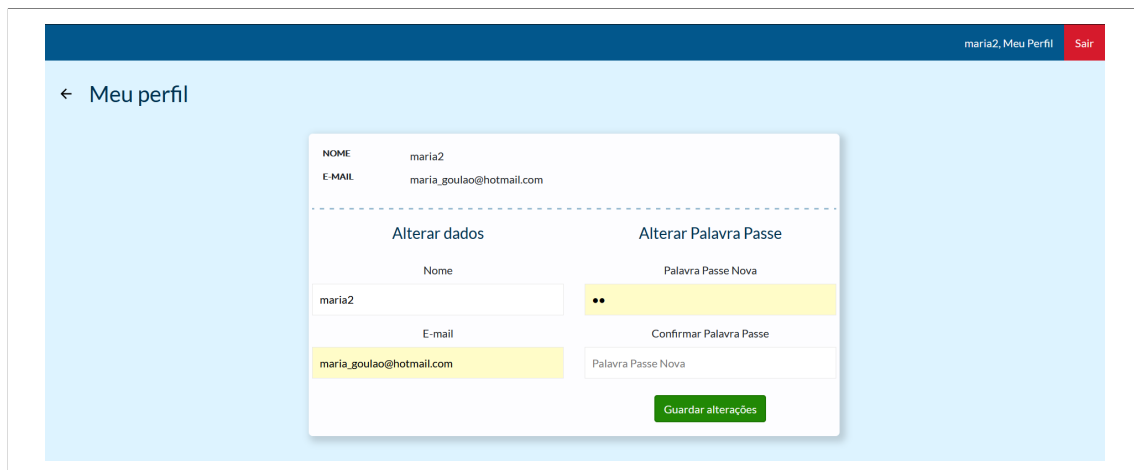


Figure 4.13: Edit Caregiver Page

In Figures 4.14 and 4.15 we have the add Patient page. We start by adding the main information, name, nickname, identification number, NIF, date of birth, relationship and adding an image. The image is not a mandatory field, but all the others are. The Caregiver won't be able to save Patient information, without all the mandatory fields being filled, we did that by keeping the "Adicionar Paciente" button in a lighter colour, like it is washed out. The NIF will be validated before being able to add the Patient, by that we mean we check if the NIF is valid and if does not already exist in the Database. The NIF is our unique key for a patient. If it occurs any error a message in red will be displayed at the

top of the page, if the Patient is successfully added a success message in green will be displayed. We decided to start by adding the main information of the patient and then the rest, because we need for the patient to be inserted in the Database, to have an id, before inserting anything else about it. After being successfully added the "More information" tab will appear with tabs like family members, pets, and favourites. As we can also notice, we no longer have a specific area designated for the connection between Caregiver and Patient, this is now part of the main information and we only need "Relação Familiar" from it and this is now an empty field.

In Figures 4.16 and 4.17, we have the format of the information in the Family tab before and after being added.

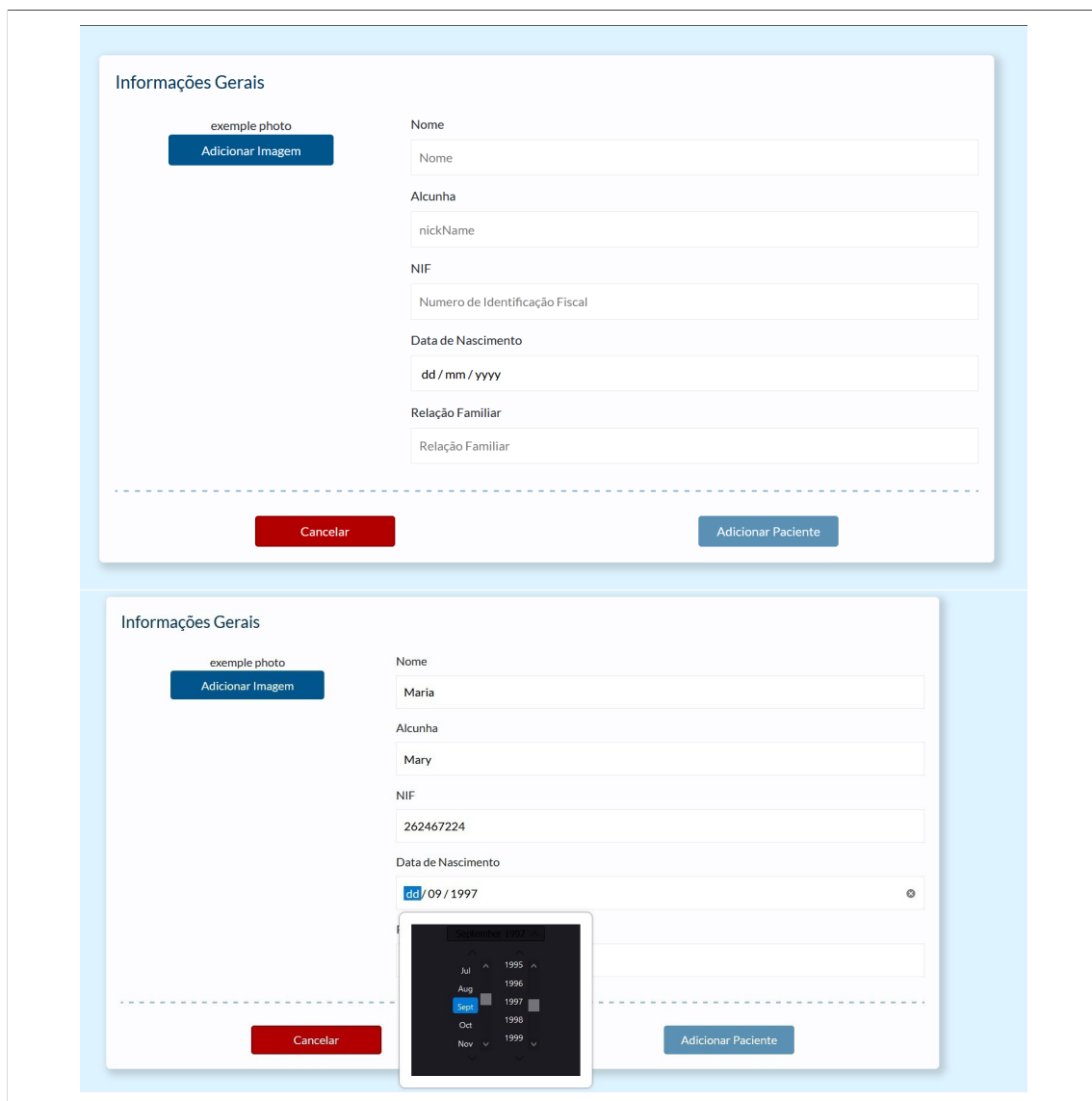


Figure 4.14: Display and add Patient Details Page 1

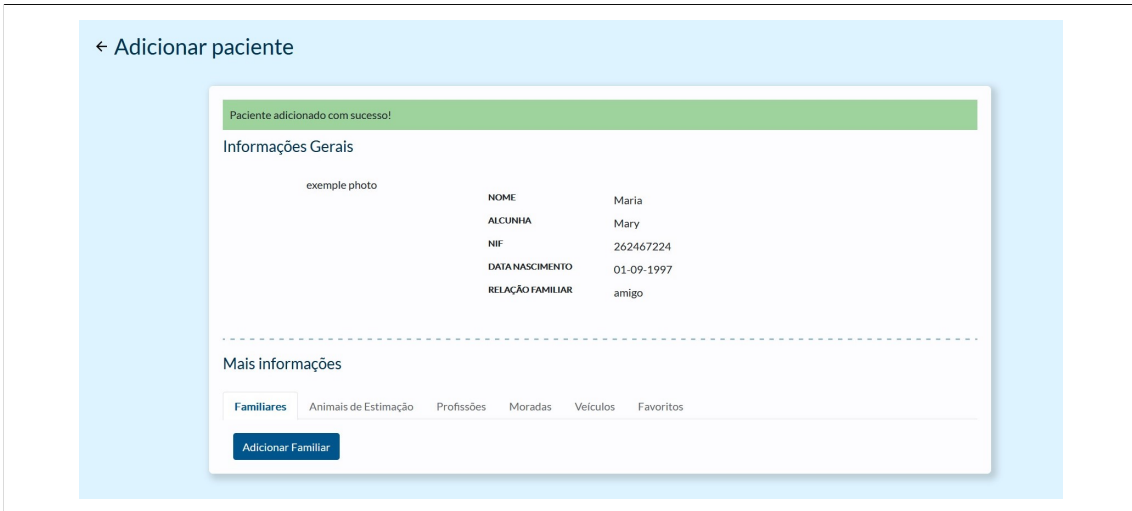


Figure 4.15: Display and add Patient Details Page 2

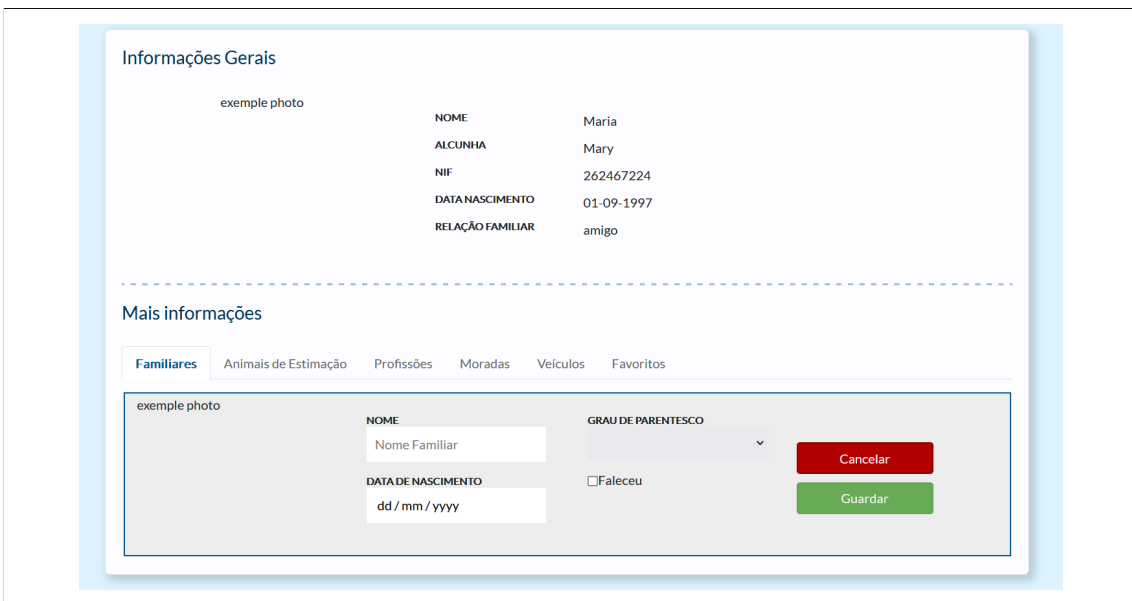


Figure 4.16: Display and add Patient Details Page 3

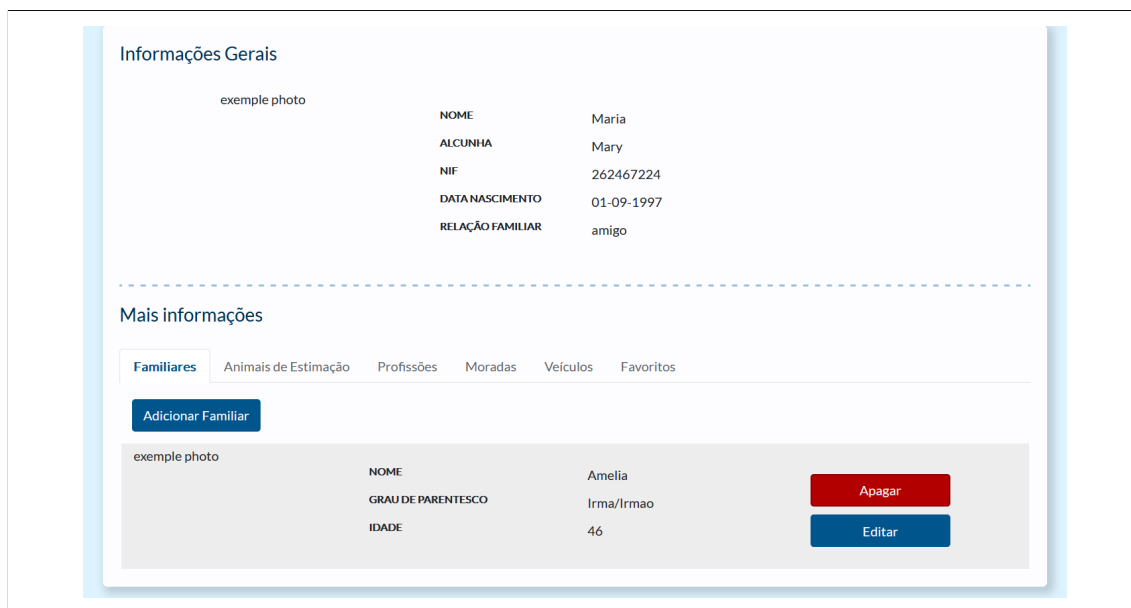


Figure 4.17: Display and add Patient Details Page 4

In Figure 4.18 we have the patient details. On this page we can edit the patient main information, or edit or delete the information related to his relatives, address, pets, jobs and favourites. As we can see at the top of the page we add two buttons, "Associar outro cuidador" and "Deixar de cuidar".

In Figure 4.19 we have a pop-up message to send a request to another caregiver. This request will only be made for people that are also registered in the platform and do not take care of the patient which request is being sent for. If any of the previous two happens then an error message will be displayed saying either "O email que tentou introduzir não se encontra registado na plataforma, por favor tente novamente", for the first scenario or "O cuidador que tentou introduzir já é cuidador deste paciente", for the second scenery.

In figure 4.20 we have a pop-up message to confirm if the Caregiver really wants to stop taking care of the patient on that page. If the Caregiver presses "Sim" then the connection will be removed and the Caregiver will be redirected to the main page, the List of patients page, Figure 4.10.

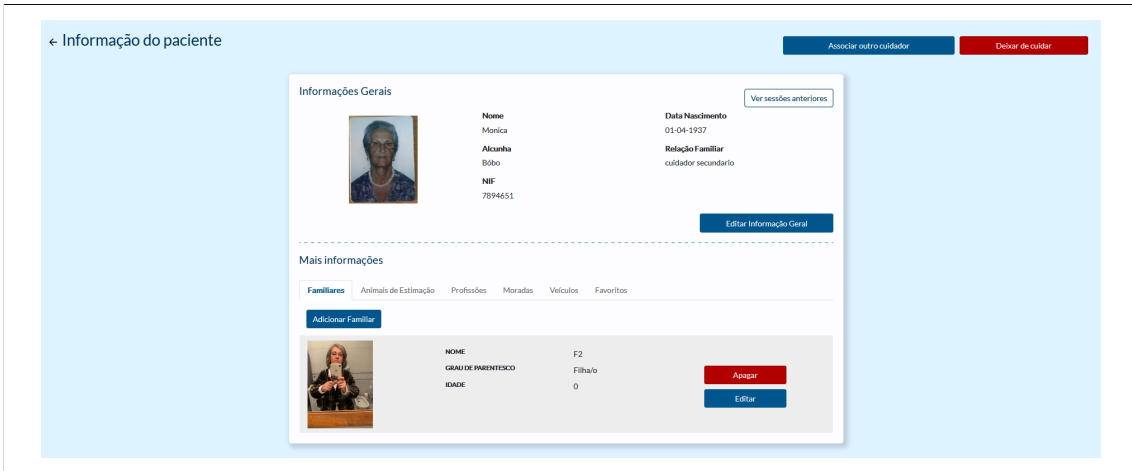


Figure 4.18: Patient Details Page

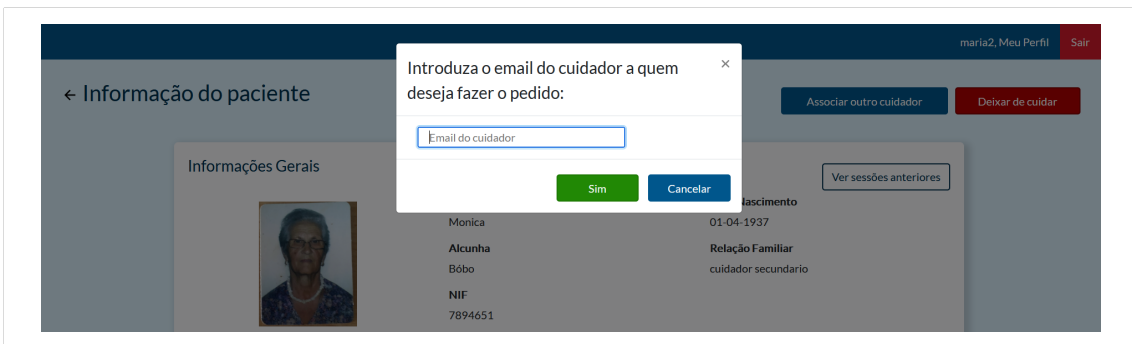


Figure 4.19: Patient Details Page - Send Patient Request

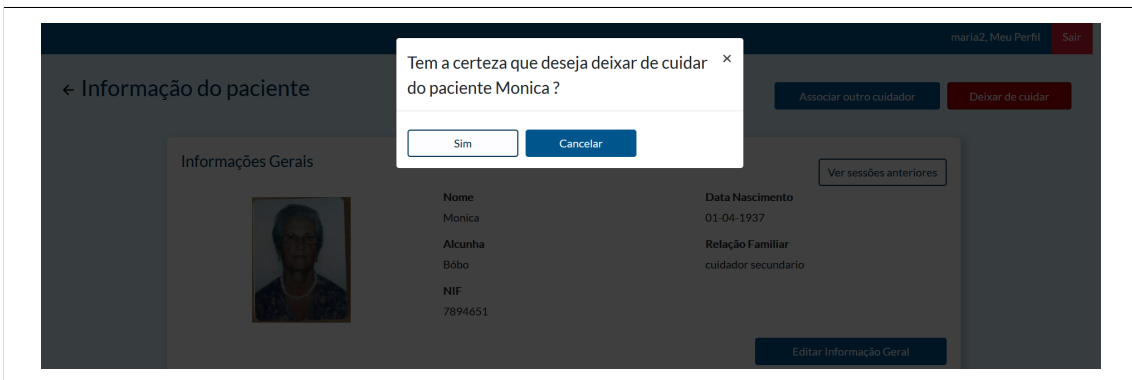


Figure 4.20: Patient Details Page - Stop caring

Chapter 5

Experimental Evaluation

In this chapter, we describe the usability tests we did, what methodology we took, the necessary scenarios to make the usability tests, how we decided who was doing the tests, the questionnaire we gave the users to do while doing the scenarios, the obtained results and the feedback and suggestions given by the testers. We made this to help us understand if our functionalities are useful, and if we were missing others, and to check the platform usability.

5.1 Methodology

We did an evaluation based on tasks, described as scenarios, for the different platform functionalities.

We defined seven scenarios to test all the necessary functionalities of the platform. We did not just give the users a task to do, we also gave some context around the task itself, some history behind, to help completing it. We made sure the user did the scenarios in an order that follows the platform flow. Having that in mind, we present the seven scenarios in Table [5.1](#)

Number	Scenarios
1	Imagine that your patient or family member has dementia and you wish to start having Reminiscence Therapy with him. Please Register and Login in the application.
2	To be able to start having Reminiscence Therapy sessions with a patient, you need to first add this one taking into consideration the requested parameters. After that add a family member, then a pet, a job, an address and lastly a favourite item like food.
3	After adding the new patient you realise that you made a spelling mistake on the added family member. Please rectify this mistake.
4	Now consider you have a family member that is also registered on the platform under the email "maria_goulao@hotmail.com" and this family member would like to start having Reminiscence Therapy sessions with your patient. Please share the patient information with your family member.
5	While using the platform you realised the password you chose is hard to remember so you decide to edit it for an easier one.
6	When checking your patient list page you realised you have two new pendent patient request. Please accept one of them and reject the other.
7	Now, imagine you move to London to work and you can no longer do Reminiscence Therapy session with one of your patients. Please stop taking care of that same patient.

Table 5.1: Scenarios to be executed by users

When we first did the scenarios we had more details, like all the information that should be added for the patient, but after the first test we realised that was more confusing for the user, because it was a lot to memorise, so we decided to only give the main instructions and let the user create its own patient.

For our tests, we only focused on informal caregivers, and due to the Pandemic going on theses tests where only possible to do remotely. In total we did eleven tests. After the eleven tests being done, we realised we were no longer getting new feedback, so we reached a point of data saturation.

In Figure 5.1 we can see a pie chart with the age group represented in our tests, where 27.3% are in between 55 and 64 years old and 72.7% are in between 25 and 34 years old. In Figure 5.2 we can se a pie chart with the gender difference, where we can see the percentage of women is bigger by 27.2%. The age group is limited considering the way we had to conduct our usability tests.

Idade
11 responses

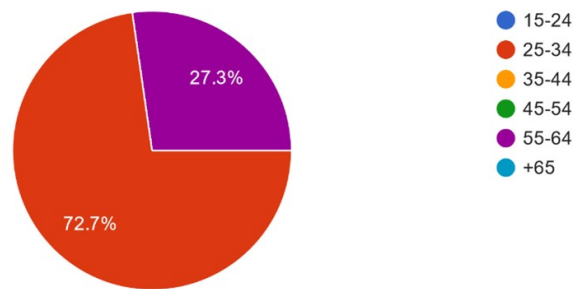


Figure 5.1: Participant's age distribution

Genero
11 responses

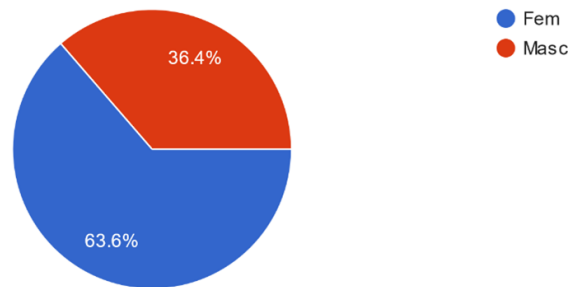


Figure 5.2: Participant's gender distribution

Before we started the tests we gave a general explanation about what Reminiscence Therapy is about, for whom the platform was created for and what its goal is.

To begin the user started by giving it demographic information. After that the user had to complete seven different tasks. The tasks were timed, and after each being concluded there was a satisfaction question answered by the user. After the seven tasks being concluded we had a satisfaction questionnaire with ten questions, the System Usability Scale. Finally we had a three feedback questions. The questionnaire is showed in [A.0.1](#).

5.2 Results

After the tests being done we used the google forms analytics to divide the answers by gender and age, and to get the more common answer. Analysed any correlation between

age and duration to execute a scenery. We also used the System Usability Scale Calculation to analyse the data from the satisfaction questionnaire. We go into more details in the sections below.

5.2.1 Scenario Usability Analyse

In this subsection we go into more details on the users opinion about the difficulty to execute each scenario.

For each scenario we asked the user to answer the following question "In general, I am satisfied with how easy it was for me to complete the task described in this scenario. In a scale where 1 is totally disagree and 7 totally agree, tell us how you felt".

Scenario One:

- From Figure 5.3, we know nine out of the eleven responded seven, meaning totally agree, one responded six, meaning moderately agree and one responded five, meaning agree. One of the problems here was that the user forgot to Register first, making it impossible to Login.

"No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu
11 responses

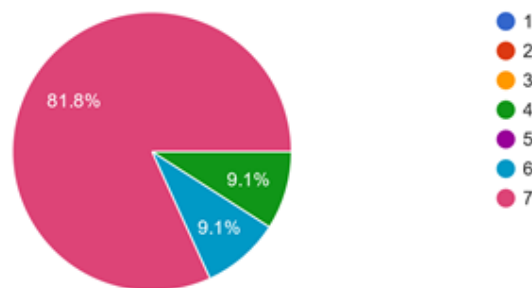


Figure 5.3: Participant's answers for the first Scenario

Scenario Two:

- The second scenario was the one that took longer to execute, but not because of the complexity to do it, but because it was a more detailed task, with more required requisites. And that is represented in the answers from the users that are displayed in Figure 5.4. From Figure 5.4, we can see that three out of eleven responded seven, meaning totally agree, five responded six, meaning moderately agree, two responded five, meaning agree and one responded four, meaning undecided.

"No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu
11 responses

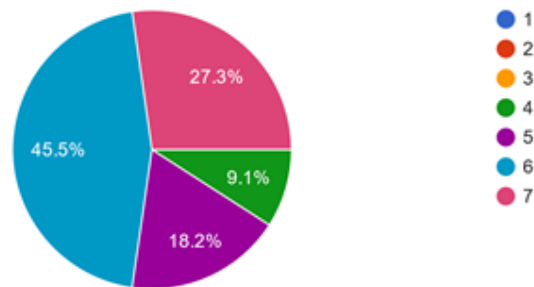


Figure 5.4: Participant's answers for the second Scenario

Scenario Three:

- From Figure [5.5](#), we can see that all users have the same opinion, the task of editing any information from the patient, in this case, the name of a family member, was not a complex task to do.

"No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu
11 responses

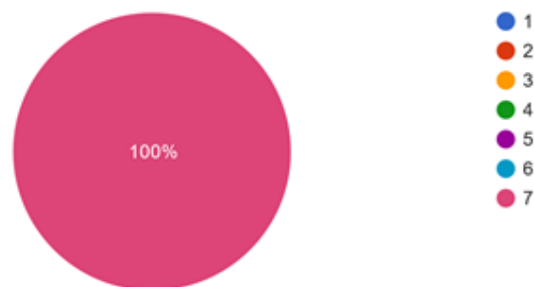


Figure 5.5: Participant's answers for the third Scenario

Scenario Four:

- In scenario four the opinion was not as uniform, as you can see from Figure [5.6](#), where eight out of the eleven responded seven, meaning totally agree, one responded six, meaning moderately agree and two responded five, meaning agree. This was because some users could not easily find the button "Associar a outro

cuidador”, being one of the reason having to scroll a bit to get to the top of the page.

"No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu

11 responses

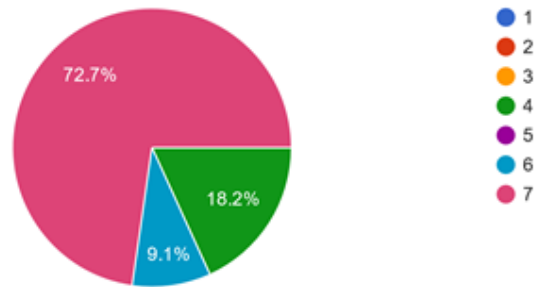


Figure 5.6: Participant's answers for the fourth Scenario

Scenario Five:

- On the fifth scenario the problem was not editing the caregiver details, but getting to that page. Some users thought the "Meu Perfil" should be more visible and that was reflected in the users answers, as it can be seen in Figure 5.7, we can see that five out of eleven responded seven, meaning totally agree, four responded six, meaning moderately agree, one responded five, meaning agree and two responded three, meaning disagree.

"No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu

11 responses

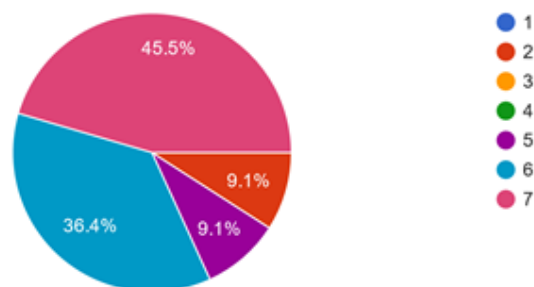


Figure 5.7: Participant's answers for the fifth Scenario

Scenario Six:

- The problem with this scenario was not accepting or denying a patient request, but getting from the caregiver profile to the patient list page, this was because the "Meu Perfil" and the back arrow next to it, Figure 4.12, did not showed a different mouse when hovering over it. This is represented in Figure 5.8, where we can see that nine out of eleven responded seven, meaning totally agree, one responded six, meaning moderately agree and one responded five.

"No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu
11 responses

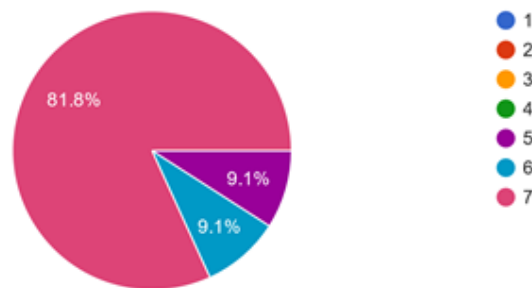


Figure 5.8: Participant's answers for the sixth Scenario

Scenario Seven:

- The opinion about scenario number seven, stop taking care of a patient, was more unanimous, the only concern for some was to get to the patient details page. Some thought it would be better if the "Deixar de cuidar" button was on the patient list page with the main information. This is represented in Figure 5.9, where we can see that five out of eleven responded seven, meaning totally agree and six responded six, meaning moderately agree.

"No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu
11 responses

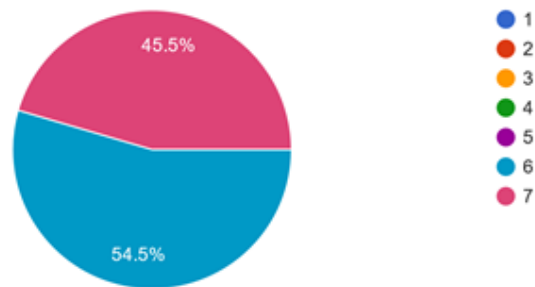


Figure 5.9: Participant's answers for the seventh Scenario

5.2.2 Scenario Duration Analyse

In Table 5.2 we present the Users and how long they took to execute each scenario, by Group Age and Gender. Looking at the table we do not see much difference between the gender and the time needed to complete a scenario, but the same can not be said about the group age. Even with the users considering the platform easy to use, and do not had any major concerns with it, we can see that the users between the age of fifty-five and sixty-four took slightly longer to complete the tasks. Having said that, no one took particularly a concerning amount of time to execute a task. As referred before the scenario that took longer, was number two, but not because of the difficulty associated with it, but because of the number of required fields needed to complete it. In Table 5.2 we have the average and standard deviation for each scenario. From all the scenarios we got quite a big difference between the average and standard deviation, meaning that the time it took for each user to complete each task is very different. The reason for this to happen is because our sample contains an outlier. If we look closer we can see that user number two took way longer than any other user to complete the scenarios.

Users			Scenario/Duration (seconds)						
Number	Group Age	Gender	1	2	3	4	5	6	7
1	25-34	F	39	264	12	15	15	20	19
2	55-64	F	173	514	48	69	67	60	30
3	55-64	F	95	195	9	57	32	36	17
4	25-34	F	64	194	10	30	27	23	15
5	25-34	F	46	257	30	20	37	11	13
6	25-34	F	38	198	32	33	24	14	15
7	25-34	F	43	183	31	44	30	16	14
8	25-34	M	43	311	14	6	23	11	20
9	25-34	M	27	125	11	18	16	5	11
10	55-64	M	115	318	34	33	67	35	40
11	25-34	M	37	234	15	34	51	12	12
Average			65.45	253.90	22.36	32.64	35.36	22.09	18.73
Standard Deviation			44.75	103.61	13.08	18.57	18.52	15.95	8.79

Table 5.2: Timing, in seconds, of the duration of each User to execute each Scenario, referencing the age group, gender and the average and standard deviation for each scenario

5.2.3 System Usability Calculation Analyse

System Usability Scale, SUS, is normally used after the user has had the chance to test the system being evaluated, but before any discussion about the same, to make sure the user do not have much time to think about it before answering. SUS measures the overall usability of the system being tested, so in our case, of our platform.

To calculate the SUS score, we started by adding the score contributions from each item. Each item's score contribution will range from zero to four. For items one, three, five, seven and nine the score contribution is the scale position minus one. For the items two, four, six, eight and ten, the contribution is five minus the scale position. Then we multiplied the sum of the scores by two point five to obtain the overall value of SUS.

SUS scores have a range of zero to one hundred.

In Table 5.3 we have represented the calculation of the System Usability Scale for our platform. We also know from the table that the standard deviation is 7.3 and the average is 91.4. That means in average our users were happy with the usability of the platform developed.

Users Number	Questions										SUS Score 100.0
	1	2	3	4	5	6	7	8	9	10	
1	5	1	5	1	5	1	5	1	5	1	100.0
2	4	3	3	2	4	2	4	1	4	1	75.0
3	4	1	5	1	5	1	4	1	4	1	92.5
4	5	1	5	1	5	1	5	2	5	1	97.5
5	5	1	3	1	4	1	5	1	5	1	92.5
6	3	1	5	1	4	2	5	1	3	1	85.0
7	4	2	5	1	4	1	4	1	5	1	90.0
8	5	1	5	3	4	1	4	1	4	1	87.5
9	5	1	5	1	5	1	5	1	5	1	100.0
10	5	2	5	2	4	1	4	1	5	1	90.0
11	5	1	4	1	4	1	5	1	5	1	95.0

Table 5.3: System Usability Scale, SUS, Calculation

5.3 Feedback

To finish we collected feedback given by the users about the platform.

The main feedback was that every field that is clickable should be represented, meaning, for example the mouse symbol should change when hovering over. Another one that should be make more obvious is that instead of just making a button disable we should display an error message or add an asterisk symbolizing the field is mandatory.

Regarding the address type, "Tipo de Moradia" any of the users understood the meaning of it, all of them thought it was the type of building, like house or flat, instead of being home holidays, permanent house. It was suggested that should be a drop-down with pre-define types to make it easier to understand. It was also suggested it should not have a start and end date, because that was not a relevant information to have.

An interesting feedback from some users was to add the "Associar outro cuidador" and "Deixar de cuidar" button inside the main square where the main information about the patient is, so next to the "ver sessões anteriores" button, to see better go back to picture [4.18](#). Another suggestion was to remove the "Deixar de cuidar" button from the patient details page and move it to the patient list page.

Still in the patient details page, it was suggested the text "Mais informações" should be more complete, it should refer that the more information is about the patient. It was also said the Favourite tab should maybe have a different name, like Extra, because some users associated favourite as adding some of the previous tabs information to the favourites. Another suggestion was to increase the size of the arrows from the drop-downs to be easier to see.

As mentioned before some users pointed out that the "Meu Perfil" should be made

more visible of its position, if not hover over it is hard to see that is a clickable option. A suggestion was to have it in a different colour, or maybe add a icon like the user icon or a cog.

Going back to the the patient list page, some users suggested to have a more complete name for the patient buttons, like instead of just saying "Iniciar Sessão" or "Sessão" have "Iniciar Sessão de Terapia" and "Consultar Sessões" and change the order of the buttons to have the button "Informação do paciente" in first place.

There was only one suggestion of a new functionality, which was to have a list of all the patients a caregiver stopped caring for. The goal of this feature was to allow a caregiver, in the future, to take care of an old patient.

Chapter 6

Conclusion

In this project we developed a platform to support Reminiscence Therapy, caregivers and patients. With the research we have done about the subject and current platforms, definition of the functional requirements for our platform, the architecture of our system the creation of an entity model to help us understand better what our platform needs, defining the technology being used to make this all happen, the creation of mock-ups to help us see how the platform would look like and how everything should be displayed, and then transforming the mock-ups in the final platform. Lastly the tests done by users to help us see what could be improved in our platform. Even existing things to improve in our platform, our finally evaluation with SUS test, gave us an average score of 91.4, which means most of our users found the application easy to use and would recommend it.

In this chapter we summarize all the content within our work, the limitations we found during the development of our platform and the future work proposed to improve it.

6.1 Summary

In this document, we started by presenting some background with respect to dementia, and the reminiscence therapy. Dementia is one of the geriatric disorders more widespread across the world. Alzheimer's disease (AD) is one of the degenerative brain disease that causes gradual loss of brain cells. This leads to the decline of cognitive abilities such as memory, language, communication, problem solving, reasoning and judgment. This disease also presents unique challenges to caregivers since they are the ones who assist them in their daily activities. A non-medicinal treatment or support focused on memory training, memory support, assisting life aspects strained by memories loss that can enhance the well being of individual's lives and in some cases slow down the progress of the disease is reminiscent therapy.

Following, we presented our motivation to build this platform and defined our goals, being the main one to create a solution that will gather the patients biographic information,

collect generic pictures from this information and with that build a dynamic and customize session for each PwD. We want each session to be different and based on the pictures that bring more joy to the PwD. For that to be achievable each patient will have their own session.

We then presented all the solutions found and compared them with ours, and showed what ours bring new. We want to fill the existing gaps, by making our platform able to collect generic images and upload personal ones, collect information and use that to create better and personalised sessions. To create reports and give feedback so we can monitor the patients evolution.

Following, we have our functional requirements for our platform, the architecture of our system the entity model we create to better understand what our platform needs and the technology being used to make this happen.

After that we started working on the mock-ups and then in our final platform. The final version follows the mock-ups design, with just some small adjustments we considered it would help a caregiver to navigate in between pages.

To finish our work we did Usability tests and SUS tests to help us see what improvements had to be done in our platform. Even getting feedback about some improvements we could do, like the order of some buttons, or their location, our average SUS score was high, showing that users consider our platform easy to navigate in.

6.2 Limitations

Our work's major limitation was performing usability tests during the Covid-19 pandemic. As a consequence, we could only perform the testing remotely, limiting the the number of people we could reach.

6.3 Future work

Future work regarding the platform we would like to implement, as suggested by one of the users, is the ability for a caregiver to see a list of old patients, and the possibility to take care of them again. The caregiver would only be able to do this with the patients that are still alive, so we would have to add a reason why a caregiver would like to take care of a patient.

Another improvement would be to make the "Meu Perfil" functionality more visible, make address type, "Tipo de Moradia" as a drop-down and make it more obvious what are the mandatory fields while requesting information from the user.

More future work would be to add the functionalities of consulting the sessions like we have in the mock-ups and do more User Usability tests after this functionality being implemented, with a bigger sample of users.

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Appendix A

Satisfaction Questionnaire

A.0.1 Usability Tests

Teste de usabilidade

<https://docs.google.com/forms/u/0/d/1LvaHk9vFMozrz82YCAqzx5aAl...>

Teste de usabilidade

1. Nome

2. Idade

Mark only one oval.

15-24

25-34

35-44

45-54

55-64

+65

3. Genero

Mark only one oval.

Fem

Masc

Cenário

1

Imagine que o seu paciente tem demência e deseja começar a fazer Terapia de Reminiscência com ele. Registre-se na aplicação e depois faça Login na mesma.

4. Tempo demorado na tarefa

5. "No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu

Mark only one oval.

- 1
 2
 3
 4
 5
 6
 7

Skip to question 6

Cenário
2

Para poder realizar sessões de Terapia de Reminiscência com o seu paciente precisa de primeiro adiciona-lo tendo em conta os parâmetros solicitados. Adicione um familiar. De seguida adicione um animal de estimação, adicione uma profissão, adicione uma Morada. Por fim adicione um favorito.

6. Tempo demorado na tarefa

7. "No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu

Mark only one oval.

- 1
 2
 3
 4
 5
 6
 7

Cenário
3

Após adicionar o seu paciente, percebeu que se enganou a escrever o nome de um familiar. Corrija o nome deste.

8. Tempo demorado na tarefa

9. "No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu

Mark only one oval.

- 1
 2
 3
 4
 5
 6
 7

Cenário
4

Tem um parente que também está registada na plataforma, com o seguinte email maria_goulao@hotmail.com. Este disse-lhe que também queria fazer sessões de Terapia de Reminiscência com o paciente que adicionou. Partilhe os cuidados deste com o seu parente.

10. Tempo demorado na tarefa

11. "No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu

Mark only one oval.

- 1
 2
 3
 4
 5
 6
 7

Cenário
5

Ao tentar lembrar-se da sua palavra-passe, apercebeu-se que escolheu uma palavra-passe muito difícil de se lembrar, por isso decide alterar a palavra-passe para uma mais fácil.

12. Tempo demorado na tarefa

13. "No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu

Mark only one oval.

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Cenário
6

Ao consultar a sua lista de pacientes vê que tem dois pedidos novos de partilha de cuidados consigo. Como apenas reconhece um pedido, aceite este pedido e rejeite o outro.

14. Tempo demorado na tarefa

15. "No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu

Mark only one oval.

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Cenário
7

Imagine agora que tem de se mudar para Londres para trabalhar e não consegue mais fazer sessões de Terapia da Reminiscência com o seu paciente. Deixe de ser seu cuidador.

16. Tempo demorado na tarefa
-

17. "No geral, estou satisfeito com a facilidade em completar a tarefa descrita neste cenário." Sendo 1 (discordo totalmente) e 7 (totalmente de acordo), diga-me como se sentiu

Mark only one oval.

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Testes de satisfacao

Responda às seguintes questões tendo em conta a seguinte escala, 1 discordo bastante e 5 concordo bastante.

18. Penso que gostaria de usar este sistema frequentemente (1 discordo bastante - 5 concordo bastante)

Mark only one oval.

	1	2	3	4	5
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. Achei o sistema desnecessariamente complexo (1 discordo bastante - 5 concordo bastante)

Mark only one oval.

	1	2	3	4	5
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. Achei que o sistema fácil de utilizar (1 discordo bastante - 5 concordo bastante)

Mark only one oval.

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21. Penso que iria precisar do suporte de alguém especializado para poder usar este sistema (1 discordo bastante - 5 concordo bastante)

Mark only one oval.

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. Achei que as várias funcionalidades do sistema estavam bem integradas (1 discordo bastante - 5 concordo bastante)

Mark only one oval.

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23. Achei que havia demasiada inconsistência neste sistema (1 discordo bastante - 5 concordo bastante)

Mark only one oval.

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

24. Imagino que a maioria das pessoas iria aprender a usar este sistema muito rapidamente (1 discordo bastante - 5 concordo bastante)

Mark only one oval.

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25. Achei o sistema muito incómodo de utilizar (1 discordo bastante - 5 concordo bastante)

Mark only one oval.

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. Senti-me muito confiante ao utilizar o sistema (1 discordo bastante - 5 concordo bastante)

Mark only one oval.

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. Precisaria de aprender muitas coisas antes de me poder habituar a este sistema (1 discordo bastante - 5 concordo bastante)

Mark only one oval.

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Feedback

28. O que gostou mais?

29. O que gostou menos?

30. Tem alguma sugestão de melhoria, por exemplo alguma tarefa que não lhe tenha parecido adequada ou alguma tarefa que gostasse de ter visto implementada

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