O JÚRI

PRESIDENTE

Doutor Rui Mendonça,

PROFESSOR AUXILIAR DA FACULDADE DE BELAS ARTES DA UNIVERSIDADE DO PORTO

ORIENTADOR

Doutora Teresa Sarmento

PROFESSORA AUXILIAR CONVIDADA DA FACULDADE DE ENGENHARIA DA UNIVERSIDADE DO PORTO

ARGUENTE

Doutor Miguel Terroso

PROFESSOR ADJUNTO DO INSTITUTO POLITÉCNICO DO CÁVADO E DO AVE
ESCOLA SUPERIOR DE DESIGN

16

02.11.2017

MESTRE Joana Grenha
MDIP/**44**

Geriatric care and Design Opportunities

Joana Maria Grenha Teixeira

Tese de Mestrado em Design Industrial e de Produto

Orientador: Prof. Teresa Sarmento

U.PORTO
FACULDADE DE BELAS ARTES
UNIVERSIDADE DO PORTO

U.PORTO
FEUP FACULDADE DE ENGENHARIA
UNIVERSIDADE DO PORTO

Resumo

A demografia mundial encontra-se a sofrer grandes mudanças, a população envelhece cada vez mais rápido, as taxas de natalidade descem e lidamos com uma população cada vez mais envelhecida. Este crescimento é demasiado rápido e a evolução da sociedade não o acompanha o que leva a uma deterioração na qualidade de vida.

É importante reverter estes quadros e integrar este grupo que futuramente será maioritário na sociedade. Esta investigação promove um estudo qualitativo onde foi possível perceber quem são as pessoas envolvidas no processo de envelhecimento, os seus problemas, as suas necessidades e em que posição se encontra o Design relativamente a este tema.

Considerando várias abordagens do Design, como Design Universal e o Design Inclusivo, é possivel perceber que não existe ainda uma resposta aos problemas demonstrados por estes utilizadores. Apesar de existir trabalho e consideração por este tema, a evolução demonstrada não é suficientemente rápida para acompanhar o ritmo do envelhecimento.

É possivel então encontrar uma solução a estes problemas através do Design de Produto, que deve considerar maioritariamente questões como a segurança e acessibilidade de todos os utilizadores.

Palavras-Chave: Design, Geriatria, Produto, Cuidadores, Envelhecimento

Abstract

The world's demography is undergoing major changes, the population ages faster and faster, birth rates are falling and we are dealing with an aged population. This growth is too fast and the evolution of society does not accompany it, which leads to a deterioration in quality of life.

It is important to reverse this situation and integrate this group that will be the major in society considering the future. This research promotes a qualitative study where it was possible to perceive who are the people involved in the aging process, their problems, needs and what is the current position of Design concerning the theme.

Considering several design approaches, such as Universal Design and Inclusive Design, it is possible to realize that there is still no answer to the needs verified in these users. Although there is work and consideration for this subject, the evolution shown is not fast enough to keep up with the pace of aging.

It is possible to find a solution to these problems through Product Design, which should mainly consider issues such as security and accessibility to all users.

Keywords: Design, Geriatric, Product, Caregivers, Ageing

Agradecimentos

Neste espaço, dedicado a todos que de uma ou de outra forma contribuiram para a realização desta tese de mestrado, agradeço todo o apoio e atenção, impriscindiveis para a concretização de todos os meus objectivos.

Agradeço ao Director de Mestrado, Professor Rui Mendonça, por me ter possibilitado a frequência deste enriquecedor mestrado que em muito contribui para a minha formação. Obrigada por me ajudar em tudo e se demonstar sempre disponível, foi sem dúvida um dos grandes pilares deste percurso, obrigada por me ter ensinado sempre a ver o "outro lado da moeda".

À minha orientadora, Professora Teresa Sarmento, que me passou todo o seu conhecimento e me guiou em todo este percurso, motivando-me sempre a ser melhor e a saber mais. O meu profundo obrigada por todo o tempo dedicado ao meu trabalho e acompanhamento e por incentivar sempre o meu lado criativo, desafiando-me sempre a descobrir coisas novas.

Ao meu irmão, Jorge Teixeira, que como Professor da Faculdade de Engenharia do Porto, me ajudou em tudo o que precisei, indicando-me sempre qual o melhor caminho. Obrigada por toda a paciência para telefonemas e mensagens a horas indesejadas, que em muito contribuiram para a realização deste trabalho. Obrigada por estares sempre a meu lado e realizares com sucesso a difícil tarefa de irmão mais velho, vou também assegurar-me que continuo a motivar-te com todos os transtornos que é ter uma irmã mais nova.

À professora Barbara Rangel, por me ter motivado à realização deste trabalho e pelo conhecimento que me transmitiu ao longo destes dois anos.

Ao professor Jorge Lino, que está sempre pronto a ajudar, sempre disponível a esclarecer todas as dúvidas, e a quem sei que devo recorrer sempre que é necessário alguma coisa, por mais pequena que seja.

Agradeço também à Doutora Fátima Magalhães, Directora do Lar e Centro de dia Raio de Sol por se ter disponibilizado a ajudar-me, e ter colocado todos os possiveis meios a meu dispôr.

À Clinica Fisiátria Dr. Paulo Milheiro Maia, e a todos os seus funcionários pela simpatia e disponibilidade comigo, por me terem permitido conhecer novas realidades e o contacto com os seus pacientes, aos quais também deixo o meu sincero obrigada pela sua

participação.

À minha cunhada, Catarina Luís, por ter disponibilizado o contacto com a Clinica Fisiátrica Dr. Paulo Milheiro Maia, e esta maravilhosa experiência. Obrigada também por ser como uma irmã mais velha.

A todos os professores que acompanharam o meu percurso académico e que me passaram todo o seu conhecimento.

À minha mãe por me ter permitido todo este maravilhoso percurso académico, espero que com esta etapa concluída possa retribuir todo o apoio constante. Obrigada porque sem ti, não seria a pessoa que sou hoje.

A toda a minha restante família, pelo carinho que suporta o meu dia-a-dia. Por quererem saber sempre tudo do meu percurso académico e me motivarem a ser melhor.

Ao meu namorado, por estar comigo e me apoiar nos momentos de maior stress sempre preocupado em motivar-me e deixar bem claro que eu consigo concretizar todos os meus objetivos e ultrapassar todos os desafios. Obrigada por seres o meu suporte em todos estes anos.

A todos os meus amigos, que acompanharam todo o meu percurso sempre disponíveis para me ajudarem e motivarem.

Agradeço também a todos os meus colegas de turma, por se terem tornado parte dos meus dias, sempre disponíveis para todas as dúvidas e partilhas de conhecimentos, sem eles esta experiência não teria sido tão enriquecedora. Obrigada e fica a saudade e carinho a cada um de vocês.

Obrigada também à Faculdade de Engenharia e de Belas Artes, por se complementarem tão bem e permitirem a realização deste excelente mestrado.

Table of contents

1. INTRODUCTION 16

1.1. RESEARCH GOALS 18

1.2. RESEARCH FRAMEWORK 19

1.2.1. Project Background: Win Hurdle 20

2. DESIGN AND GERIATRICS 21

2.1. DESIGN AND INCLUSIVE VALUES 22

2.2. DEMOGRAPHICS 25

2.2.1. Worldwide 25

2.2.2. Portugal 26

2.3. THE DIFFERENT TYPES OF CAREGIVERS AND THEIR TASKS 28

2.3.1 Elders problems and needs 30

2.3.2. Caregivers problems and needs 31

2.4. THE DESIGN APPROACH TO AGING 32

2.5. EXISTING PRODUCTS 34

3. METHODOLOGY 43

3.1 SAMPLE DESIGN 44

3.2 CONTENT ANALYSIS 46

4.RESULTS 47

4.1. CAREGIVERS/NURSE TASKS 47

4.2. CAREGIVERS DAILY PROBLEMS 48

4.3. HEALTH INJURIES 49

4.3.1. Caregiver's work-related injuries 50

4.3.2. Problems verified in the elderly by the professionals 50

4.3.3. Elder problems by themselves *52*
4.4. AUTONOMY 54
4.4.1. By the professionals *54*
4.4.2. By the elders *56*
4.5. ATTENDANCE 58
4.6. PRODUCTS 59
4.6.1. Existing Problems: *63*
4.7. EVOLUTION OF GERIATRIC 67
4.7.1 Future of Geriatric care *68*
5. DISCUSSION 70
6. CONCLUSION: 74
ATTACHMENTS: 79
A. ELDERS INTERVIEW 79
B. PROFESSIONALS INTERVIEW 80
C. STORE SELLER INTERVIEW 81

List of Abbreviations

INE – Instituto Nacional de Estatística
DLA – Daily life activities

List of Figures

Fig.1 – Key Components of the Research Project. Designed by the author, based on Collins (2010).

Fig.2 – Project Win Hurdle. Render by the author.

Fig.3 – Design Approaches. Designed by the author

Fig.4 - Data from INE (Accessed at 4 September 2017). Aging Index in Portugal

Fig.5 - Data from INE (Accessed at 4 September 2017). Elder dependency index in Portugal

Fig.6 – Elderly cares. Designed by the author.

Fig.7 – Monolight. From Wai (2012b).

Source: http://lanzavecchia-wai.com/projects/monolight/ (Accessed 11 August 2017).

Fig.8 - Together Canes. From (Wai, 2012c).

Source: http://lanzavecchia-wai.com/projects/together/ (Accessed 11 August 2017).

Fig.9 – Assunta. From Wai (2012a).

Source: http://lanzavecchia-wai.com/projects/assunta/ (Accessed 11 August 2017).

Fig.10 – The Aid. From Ugintaite (2011)

Fig.11 – Linea e-lock. From G&V and TENTE (2012).

Fig.12 – Elevance. From Kohler .

Fig.13 – Handrail. From (Kohler).

Fig.14 – Diagram of elders problem based on professional interviews

Fig.15 – Elders problem by their interviews

Fig.16 – Autonomy seen by the professionals.

Fig.17 – Autonomy in the point of view of the elders.

Fig.18 – Diagram concerning future in Geriatric care

List of Tables

Table 1 - Transcribed from World Population Aging, United Nations, 2015. Represents the aging of the world's population until 2030.

Table 2 – Data from INE (Accessed, 1 September 2017). Portugal average life Expectancy.

Table 3 – Products already in the geriatric market.

Table 4 - Sample

Table 5 – Caregivers Tasks

Table 6 – Caregivers problems

Table 7 – Caregiver injuries

Table 8 – References to Attendances by the elders

Table 9 – Products referred

Table 10 – Problems on the existing products.

Table 11 – Evolution of Geriatric in past years

1. Introduction

"There is nothing like looking, if you want to find something. You certainly usually find something, if you look, but it is not always quite the something you were after" - J.R.R. Tolkien (Collins, 2010)

In daily life, we are confronted with situations that lead us to question what surrounds us, even if inadvertently, we use research methods to help us understand the world around us. Although the experience gained from what is happening at the moment is extremely important, if we really want to know something about a subject it is necessary to research and analyze data related issues, only then we will really discover the information sought or many times, after an analysis and reflect, new things that would never be

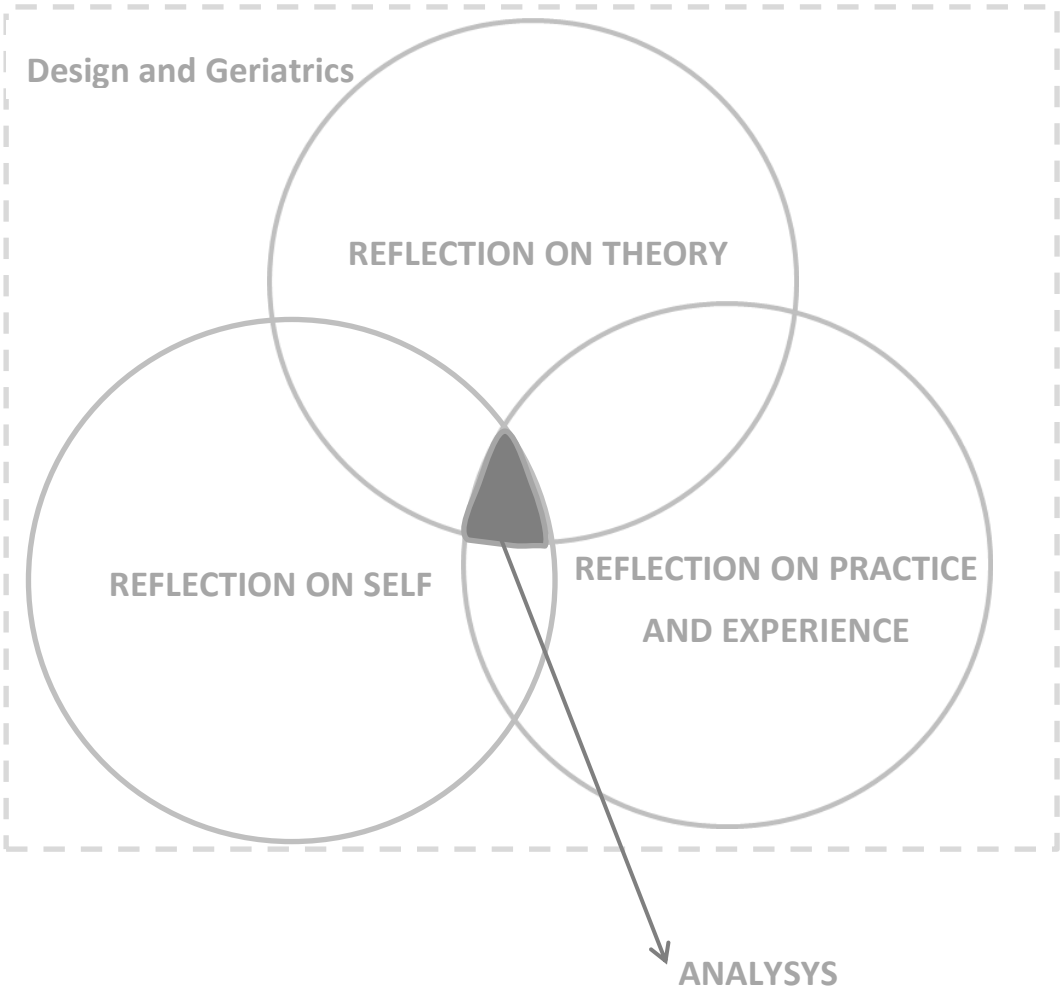

Fig.1 – Key Components of the Research Project. Designed by the author, based on Collins (2010).

available to us only through our experience appear. It is important to confront experience, research and analysis so that there really is meaning in something. (Collins, 2010)

After a demographic study presented in chapter 2, it is concluded that there is a great opportunity in the trend that is aging, it is necessary to create solutions and to explore geriatrics so that the frames of reduction of a sustainable life are reversed (Chand & Tung, 2014). As it is said in universal design principles, Design must be for all, (Simões & Bispo, 2006) the today scenery is that there is still not a response for this problem, although there are several studies about this subject the industries still haven't taken any position and adopted any specific method that serves the people. Ageing is a challenge because it leads with a big heterogeneity; it is very hard to predict how people are ageing and what they will need (Dankl, 2017). So, how can Product Design give an answer to this challenge? What should he do?

With this idea of joining Design and Geriatrics begins a process of research that goes through the analysis of what already exists and what is described in the literature. In the Design and Geriatrics chapter, will be developed a constant search on already existing data, with the aim of discovering something new and consecutively analyzing and comparing the data that is being collected (As it is possible to see in Fig.1).

This investigation explores both Geriatrics and Design and aims to search for opportunities that can give a solution to the exposed problems. This way the possible users may have a better quality of life.

This dissertation is structured as follows. In the first chapter it is possible to understand the motivations. The next section provides an initial analysis, which is necessary to know and understand about where and how design can help us and what it is already done in this area. Thus, starting with an open theme that is Design and Geriatrics, new questions are emerging and new problems are encountered, to which design is not yet capable of providing an effective response. In the next section it is possible to taper the information, contributing to an effective comparison of existing thoughts. Following this strategy, important information for research should be taken to the next phase of qualitative analysis, which will allow a greater approximation with the users and a better understanding of their point of view, comparing in the final at the discussion all the data that was collected, so that in the end there is a conclusion that is beneficial by contributing with something new.

1.1. Research Goals

"In today's complex environment, a designer must identify problems, select appropriate goals, and realize solutions". (Friedman, 2003)

The main objective of this research is to find in the design field tools that fill some shortcomings in the geriatric products (existing in Portugal's context) and to highlight the problems provoked by the aging population, thus adding scientific value with an in-depth investigation on the subject that verifies the importance that this topic acquires.

After several demographic studies, ((Nations, 2015); (Alnasir, 2015); (Mustaquim, 2015); (Rodrigues et al., 2014); (INE, 2017)) carried out, it is possible to conclude that aging is a trend that has increased all over the world, generating various problems of adaptation and inclusion in society, which is not prepared for these changes. This constitutes an opportunity for the development of new projects that can face this new reality (Chand & Tung, 2014). By the principles of Universal Design, Design must be achievable for all (Simões & Bispo, 2006) which does not happen nowadays because of the standardization that is happening in most of the existing products, services, spaces, etc. There are several approaches to Design that relate to inclusive values, but still there is not an agreement about reaching accessibility and equal opportunities (Persson, Ahman, Yngling, & Gulliksen, 2015). Although there is a necessity, attitudes must change towards it so that is possible to break the several barriers that have been made.

We can also realize that this aging will be very fast, and that society will not be able to have a rapid response that can connect with this phenomenon. This is going to test society, economics and politics, which are not prepared and still don't know what to do to make a sustainable living. The present generations will see their quality of life decreasing. (Chand & Tung, 2014) The research goals are to make a bond between Geriatrics and Design and answer to the challenges proposed by the possible users, who need to be studied firstly. This is going to happen by allying theories, self-analyses and practical, and constantly comparing the three of them, building a strategy with the continuing findings that are going to be done. This way problems and questions start to appear by the constant and deep research done, such has mobility, accessibility, who are the real users and, what has already been done, what has to be done

Lastly, this investigation aims to find niches in the area of geriatrics that are not explored or to which Design has not yet found a satisfactory solution, for this it will be used

a qualitative approach that intends an approximation to the users so that it is possible to understand their real point of view and what they actually need. It is important to consider what are the research questions so that is possible to have a concrete finding at the end, what firstly motivated this research was a background project about a geriatric product, here it was possible to understand that there were several users to the products of geriatric that were not included in Design. So, who are the real users of geriatric products? What are their main needs? What gaps exist in designing for aging? Considering the Geriatric field what can be Product Design contribution?

At the end several results and conclusion that take in account every research done are presented and research questions are discussed and answered.

1.2. Research Framework

The interest for this project was developed from the early beginning, with the accomplishment of a previous work (Win Hurdle) where it was possible to concretize a geriatric product that would fill several uses in the transport of bedridden. Thus, this subject acquired a new level of interest when the possibility of further in-depth research arose.

This research project makes use of a qualitative methodology where direct contact with the actors is possible, being this tool of high importance with regard to the inclusive design (Simões & Bispo, 2006). This work is divided into six phases.

The first one defines the goals and introduces what firstly motivated this research, a background project.

In the second phase there is an in-depth research and study, where is talked about Design and inclusive values, and a small demographic study is conducted which will help to define the scale of the problem.

Next, a research from the theory and literature, where it is analyzed what has already been done and what other author say about these themes. Here there is a constant research that allows discovering new subjects constantly; it is possible to understand that new questions and problems start to appear motivating the research with more information that is important for future analyzing.

The fourth chapter defines the methodology used, explains it and shows the results. It demonstrates the experience gained with the practical exploratory aspect and analyzes all the data that was collected.

In the fifth phase there is the discussion, here it is compared what was discovered in the third chapter and in the fourth, and it is possible to make a bridge between several subjects, answering to the defined goals at the beginning, and to the research questions.

The last chapter concludes everything that was done and what was found. It also talks about the limitations in this research and outlines the next steps.

1.2.1. Project Background: Win Hurdle

Win Hurdle is the project that firstly motivated this research; it started with the need to response a company of injection molding that required a project within some parameters, such as a quick production.

This product essentially consists on the aid of caregivers when they are transferring the patient. It allows them to make a lower effort on their hands when doing the transfer; this prevents injuries for the elder and for the caregiver. When transferring the patient, the two handles are placed on the both opposites sides of the bed sheets or towels, they are then joined and lifted up, helping this way to move the patient.

Fig.2 – Project Win Hurdle. Render by the author.

This product would require an injection molding process which would make its mass production much easier, therefore significantly reducing its price. It also takes into account the easy storage in small spaces and the low maintenance necessary.

2. Design and Geriatrics

This chapter starts with analyzing Design and some inclusive approaches that are frequently considered when specific needs are required, such as Universal design, and inclusive design.

Then there is a demographic study that motivates the research of the theme, considering that this focus group is getting bigger every year. This demographic study starts exploring worldwide and then emphasis in Portugal, because it is the reality known and that can be explored.

When considering geriatrics it is important to realize who the intervenient in this subject are, and to comprehend what they do. For this it was made a study about the caregivers, who they are and what's their task with the elders. After understanding who is a caregiver and what type of tasks he does, it's important to refer the elder's point of view, as they are the main focus group that motivated the research. Considering the research done about the caregivers it was possible to understand that it was necessary to go deeper in the subject as there were found a lot of difficulties in doing their jobs, so it was made a research about what are these problems and what are their needs.

After this it was questioned what was the current position of Design facing the demographic study results, and the work that had already been done, analyzing the literature and some products that are already designed

2.1. Design and inclusive values

There are several approaches to design that concern inclusive values and accessibility (as it's possible to see in Fig.3).

Universal Design is seen as the database to design projects and it is considered the design for all method - that pretends to achieve the most extended amount of people; it has seven principles as criteria and aims to be used by all the people without adding any further adaptation to it. This may be considered the largest and main design group which led to other different approaches. Their principles may be used for all project disciplines and have as main objective guiding design lines to good projects and making them usable for everyone (Persson et al., 2015).

In these principles we see that what is most important is that design is simple, reachable, intuitive, equal to every user, flexible and comfortable. When designing for a special need or to specific user, this one is studied in detail, considering all it concerns and barriers, the object is designed for that specific user or group of users.

Inclusive Design and designing for special needs are often together as they have similar values and consider a deep study of users and their environment, but they differentiate a lot and both may bring advantages and disadvantages (Simões & Bispo, 2006). Inclusive design aims to put every user together, treating them like equal but it doesn't take in mind that is impossible to reach every single user especially as some may have special debilities, when designing for special needs we refer to a single project for a single target, although this last approach is very important for that specific user, it can at the same time bring disadvantages to a regular user as it can compromise his environment (Heylighen, Van der Linden, & Van Steenwinkel, 2016). When side by side, Universal Design and Inclusive Design - it is obvious that Inclusive Design is more reasonable with the user and makes the biggest effort to target him, as Universal Design takes no adaptations into account whereas Inclusive Design tries to adapt and include to everyone (Persson et al., 2015).

Inclusive Design is a different approach to Design, as it tries to reach the largest amount of users and fit the products or services to all of them trying to include everyone in a normal society environment. This vision of design for everyone is often considered a utopian vision as it tries to make objects to reach the largest amount of people and include them in the most variable environments, combining accessibility and functionality. In spite of this scenario, Inclusive Design is more and more taking over, as the population itself evolves to demographic and social changes (Heylighen et al., 2016).

Considering Inclusive Design there is a will to answer the needs of a specific user or group of users and integrate them in the society as equals, contributing this way to fight stigma (considering stigma as the standardization of products in society). These users are characterized with different conditions that are not inserted in the regular industrial products available in the current market. Inclusive design must not be cataloged for people with specific debilities, it should be the solution for different needs as there is unlimited heterogeneity in users, "however, it is these, which are worse off, that greater benefits will feel for their implementation, being integrated in equal rights with all the others" (Simões & Bispo, 2006). There are several debilities considered, such as mobility problems, visual, hearing, brain damages (Karwowski, 2001), this are not considered normal and becomes a problem for living in society. It is important that all citizens have access to equal conditions

of living, as a lot of products nowadays can make tasks harder or even impossible to specific users' needs. When talking about mobility problems, we can consider that everyone sees their own mobility conditioned at certain moment of life such as when a baby, child or when getting to elderly age (Simões & Bispo, 2006).

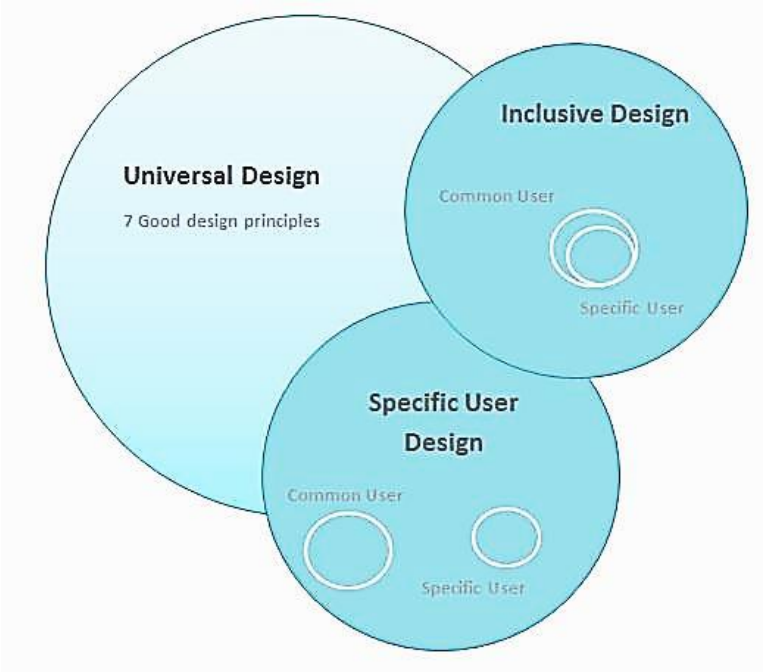

Fig.3 – Design Approaches. Designed by the author

At the same time that the group of elderly population is growing faster in most of the developed countries, the same doesn't happen when talking about birth rates, so we are more and more dealing with elder people which bring us closer with several challenges. *"This raises a variety of problems for individuals, for families, and for societies as a whole. Elderly people often suffer from mobility, memory, communication and general health problems. They tend to become both physically and socially isolated, which leads to distress and poor mood states, all of which contribute to a worsening of their quality of life and health." (Pattison & Stedmon, 2006)*.

2.2. Demographics

2.2.1. Worldwide

One trend, of the twenty first century is population ageing as mentioned above. Between 2015 and 2030 it's expected that people above sixty years grow in a scale of 56%. This tendency is bringing a lot of changes to society since health factors, social or even economical (Nations, 2015). One of the main reasons for this phenomenon, is the reduction of mortality rates and the increase in the average life expectancy, it is possible to verify these changes essentially in the developing countries, where the results are more evident, which leads us to conclude that the access to health and medical services has been improving gradually (Alnasir, 2015). However, they will not be able to adjust to this changes in the future since there is not a prepared structure that allows quality of life.(Chand & Tung, 2014)

While on one hand the percentage of people over sixty-five years of age grows, on the other hand with access to better conditions of employment, education and family planning, it is also observed that birth rates are more and more reduced (Nations, 2015). Fertility reduction rates is essentially due to the changes that have been observed, such as the fight for gender equality, greater education in terms of contraceptive methods, easier access to them and lack of support to raise children (Chand & Tung, 2014).

With these significant demographic changes, it is possible to denote that a great age gap is being created. Aged population is increasing and young population is decreasing, this leads to a major change at all levels of life in society. It is necessary to pay for more reforms and to provide greater economic support to this group of people, but on the other hand the working age population is decreasing, which leads to a lower economic growth and a reduction in access products and services (Mustaquim, 2015). Therefore, despite the growth of the aging population, there is no increase in the quality of life that can respond to this trend, and it is possible to verify that there are no responsibilities added by the governments that maintain an old-fashioned position, discarding the need for new support at both, social and economic levels (Alnasir, 2015).

Although there are many problems due to this change, it can also be considered an opportunity, as it is necessary to adapt society to a new way of living, valuing older people and focusing on them an increased interest, as, despite the growing phenomenon, services and products are not adapted to this trend. This way, although for some industries it is impossible to escape these consequences, for health, product industries and services there

has been an exponential increase of opportunities, which suggests an evolution that pleases both involved (Chand & Tung, 2014).

The demographic study of population and its aging is important so that it is possible to predict where it is necessary to intervene and ensure a sustainable future.

Regarding the world population, it is concluded that changes are necessary both politically and socially, so that quality of life is guaranteed and it is possible to access a health system that encompasses the aging process, economic and social support. This way, the development of industries is maintained and can meet the new needs.

One of the main goals in 2030 of the United Nations (2015) is to promote sustainable development; this includes providing good health conditions at all ages and quality of life (Nations, 2015).

	Persons aged 60 years or over (millions)				Percentage change	
	2000	2015	2030	2050	2000-2015	2015-2030
World	607.1	900.9	1402.4	2092.0	48.4	55.7
Development groups						
More developed regions	231.3	298.8	375.2	421.4	29.2	25.6
Less developed regions	375.7	602.1	1027.2	1670.5	60.3	70.6

Table 1 - Transcribed from World Population Aging, United Nations, 2015. Represents the aging of the world's population until 2030.

2.2.2. Portugal

According to studies, Portuguese life expectancy is rising since 1999, but birth rates are getting lower, this way it is expected that Portuguese population is ageing more and more towards eld (Rodrigues et al., 2014).

According to statistics provided by INE in 2017, population projections for 2080 show a decline in the total number of inhabitants and a strong aging of the population, in 2015 the aging index shows 147 elderly per 100 young people, and in 2080 this index more than doubles with 317 elderly in every 100 young people.

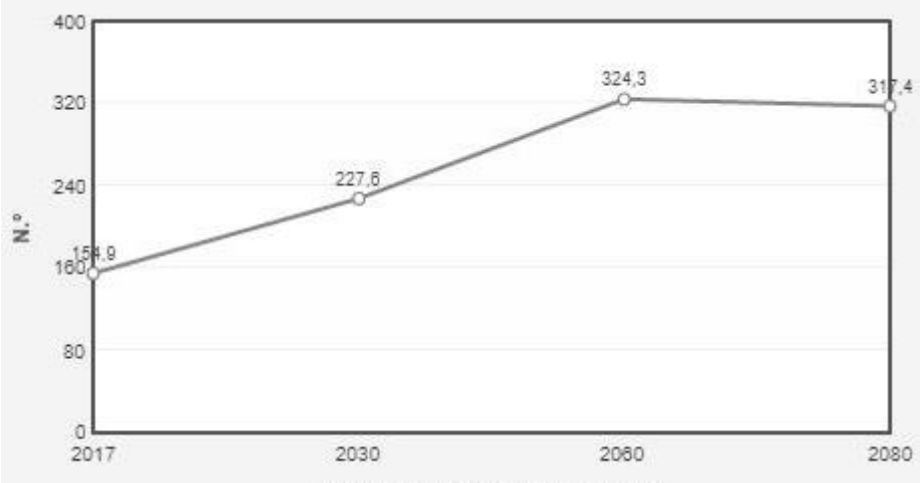

Fig.4 - Data from INE (Accessed at 4 September 2017). Aging Index in Portugal

As a consequence of these factors, the working age population will also decrease sharply from almost 7 million today to almost 4 million, this will lead the sustainability indexes to drop to more than half as it is possible to see in Fig.4 from INE (2017). Mortality rates also define what has already been achieved for the countries of the rest of the world, which has gradually declined, leading to an increase in the average life expectancy, which will not be very marked, since in the last years health care is increasing across all age groups and most of the mortality is concentrated at advanced ages (INE, 2017).

Average Life Expectancy			
2013-2015		2080	
Men	Women	Men	Women
Years			
77	83	87	92

Table 2 – Data from INE (Accessed, 1 September 2017). Portugal average life Expectancy.

Although health in Portugal is improving, there are several factors that influence the human being, physical and psychological. In the elderly it is common to refer to indicators such as mobility or autonomy to evaluate the quality of life. In Portugal these factors are divided, with totally dependent population groups and groups that can independently develop their DLA (Daily Life Activities). When we analyze these groups we observe that, in common, they have the constant devaluation of their condition (Rodrigues et al., 2014).

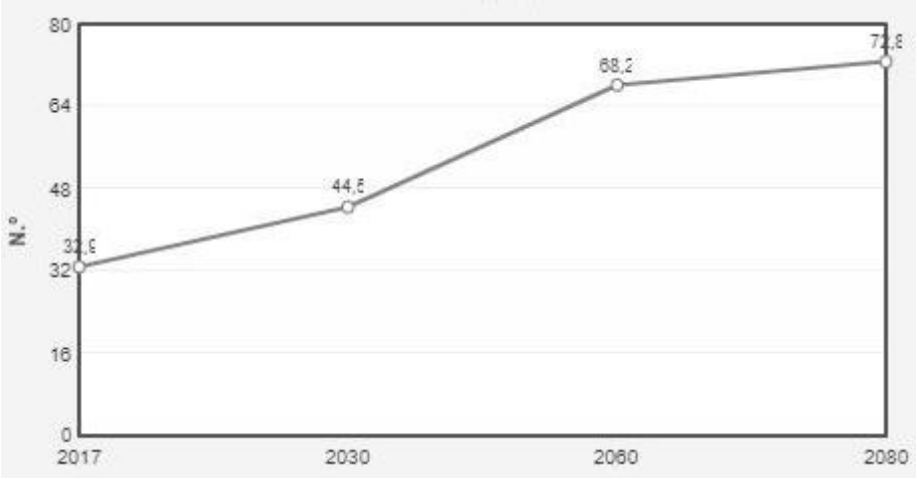

Fig.5 - Data from INE (Accessed at 4 September 2017). Elder dependency index in Portugal

2.3. The different types of caregivers and their tasks.

"…working with clients in life stages that we have yet to experience involves a degree of humility, self-awareness, and a critical shift in our view of the world." - Qualls, Segal, and Hiroto (2015)

Aging is a natural process, which is not defined by any particular age, and is considered as the last stage of human life where some vital capacities gradually degenerate, potentiating the onset of illnesses due to the increasing vulnerability of the elderly (Soeiro, 2010).

The growth of the elderly population has been occurring since 1960 in Portugal (as mentioned in the demographic study), as a consequence of this growth the increase of chronic diseases and dependencies leading many elderly and dependent people to require

partial or total support in their daily life or specific activities (Maria João Fernandes, Helena Jorge Cardoso, & Dayse Cristine Dantas Brito Neri de, 2012).

When dealing with the aging population it is necessary to recognize the heterogeneity of this group, associating age only as a number with no meaning regarding health, physical or psychological state (Qualls et al., 2015). This heterogeneity is also referred to social and economic factors that will have a great influence to the care that the elderly will receive.

The existent types of caregivers can be divided in two major groups: informal and formal - (Kydd, Wild, & Nelson, 2013); The informal caregivers who, despite being generally family figures, are considered all those who treat the well-being of the elderly without receiving any kind of monetary remuneration. Formal caregivers are those who receive training and provide their services in exchange for monetary values. Despite these differences the important thing to note is that both work and relate to the elderly providing care and help (Maria João Fernandes et al., 2012).

The tasks of a caregiver vary both according to the elderly and their conditions. The tasks are categorized into basic and advanced; Basic tasks include DLA, such as: getting up, walking, feeding, dressing, bathing, etc. The advanced ones include feeding through medical systems, medication or operation of life support machines (Hignett, Edmunds Otter, & Keen, 2016).

When referring to basic care the most important is the maintenance of the independence of the elder, for this, there is a need for him to keep active in his DLA or even in society. (Marina Picazzio Perez, Juliana de Oliveira, Maria Helena Morgani de, Elisabete Ferreira, & Selma, 2014) . Advanced care is mostly considered health and clinical situations (Hignett et al., 2016).

With the gradual increase of the average life expectancy in Portugal, the government is unable to respond to the needs of this population, which means that the number of informal caregivers increases day by day, many not because of their own choice but because they have no other choice (Maria João Fernandes et al., 2012). Although this is often the best option for many families, this model of home care can lead to several risks, both for the elderly who are not in a controlled environment, and for the caregiver (whether formal or informal) who often performs his duties without any kind of support. (Hignett et al., 2016)

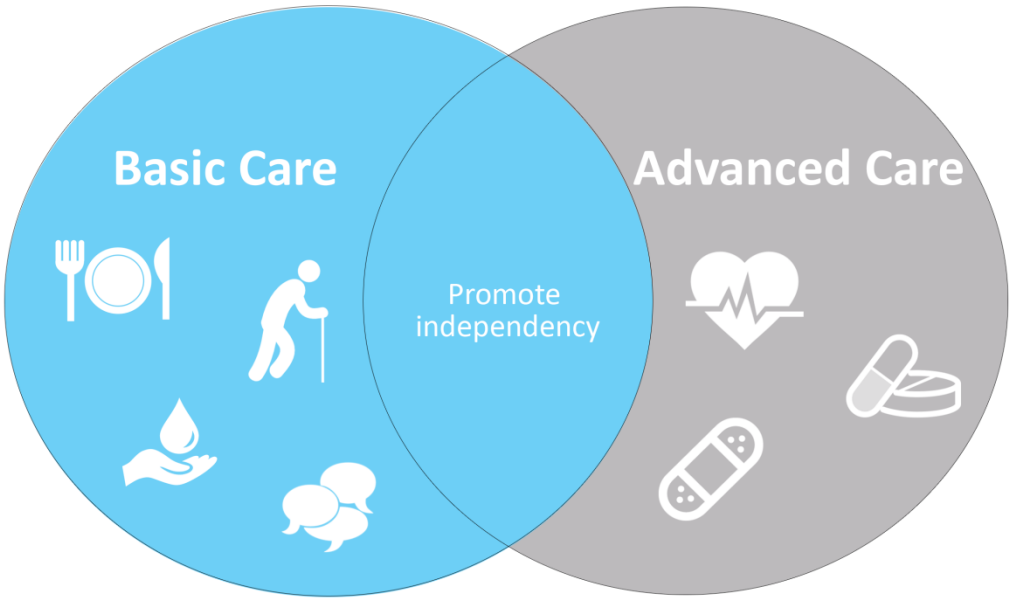

Fig.6 – Elderly cares. Designed by the author.

2.3.1 Elders problems and needs

After relating with older people, it's possible to understand that there's a big gap between their perception of quality of life and society perception of quality of life. This happens because of the constant adaptation that elders need to take in their daily living to fulfill their need or tasks. As they constantly adapt to their condition to maintain their independence they usually have a wellbeing perception that they can do everything (Fonseca, Paúl, & Martin, 2008). It is important to understand too that children and elders are often compared because they're both vulnerable groups (Parmonangan, 2016).

When considering elders' debilities it's essential to discuss their level of independence, this usually indicates the type of cares that they need, for this evaluation Karwowski (2001) uses a scale of 1 to 5 in DLA (being 1 independent, and 5 totally dependent) to determinate what needs each elder has. The activities considered in this evaluation are: Ability to use phones, feeding, mobility, health cares, ability to shop, to deal with finances and to do house related tasks. Aging is a progressive changing process that affects both physical and sensory (Qualls et al., 2015).

As for physical aspects, there are several issues to be reflected as they vary a lot. This contemplates several health conditions that vary in every user, mostly considered are sense related, mobility, hearing, seeing and even understanding (Karwowski, 2001).

Referring to mobility, one of the main problems that are often related with elderly is falling, due to strength, muscle mobility or even fear (Parmonangan, 2016). Falls happen mostly at home and consequently lead in 50% of cases to hospitalizations with more serious problems, one of the places with greatest risk are bathrooms and most of the elderly finds it difficult to perform DLA such as brushing their teeth or doing their needs (Afifi, Al-Hussein, & Bouferguene, 2015).

But, dealing with older people it's not only about harsh indicators; feelings are a good part of quality of life too. After a long living there's the need to live with dignity, and for this elders ask for affection, safety and comfort too (Ferreira Correia, Pereira, & Costa, 2016). The United Nations believe too that elders have several rights that can bring them a good life and acceptation by society being those; the right of participation, assistance, personal realization and dignity (GDDC, 2017). Safety perception is an important topic too; not only safety as security but as protection as well (Ferreira Correia et al. (2016); Wiles, Leibing, Guberman, Reeve, and Allen (2012)) Homecare is one of the most discussed subjects when talking about protection, as for elders the known environment gives them this perception which helps them to keep their independence and social dimensions. But, although home care gives them this perception, most of the time it's not safe, as it does not have most of the condition to maintain then (Wiles et al., 2012).

2.3.2. Caregivers problems and needs

According to Marina Picazzio Perez et al. (2014), supporting the elderly is essential to promote their quality of life. A caregiver should essentially assist the elderly in the DLA, and encourage their independence.

When discussing caregivers' tasks it's difficult to understand what they should really do, if they should do domestic tasks, if they should do medications, or even if they should actually change diapers. This issue is a problem for the caregivers since there is a lot of miss- communication, between the elders, the family and even the identities that they work with (Marina Picazzio Perez et al., 2014). When considering the informal caregivers the issue is the lack of education and information to how it's supposed to take care of an older person. (Maria João Fernandes et al., 2012)

Considering ergonomic and safety questions, when at their job, caregivers deal constantly with heavy weights, such as glucometer, pulse oximeter's, wheelchairs, and even the weight of the patients, this causes a constant effort in the musculoskeletal which as

consequences injuries the caregiver (Or et al., 2009). Even when doing transfers and positioning's the caregivers are exposed to awkward positions that can cause several damages. **"Repositioning patients, including turning and lifting patients up in bed, was ranked as the most significant activity leading to compensable injuries" - Fragala (2015).**

Most of the injuries of the caregivers report to falls, shoulder, neck or back pain. When referring to falls this happens usually due to improper use of devices or bad prepared spaces. It's also said in Craib, Hackett, Back, Cvitkovich, and Yassi (2007), that most of these falls take place with those who give assistance at home (formal or informal caregivers), these can happen due to shortage education about caregiving or physical barriers, such as tiny spaces, heavy furniture or even non existing maintenance of devices. Although elderly prefer most of the time home nursing, (Wiles et al., 2012) it's important to consider that at this situation home is not only where one user lives, but also where another user works so, he need space, lightning and devices to execute his tasks (Hignett et al., 2016).

As caregivers are exposed daily to heavy loads and movements of great effort they frequently get injuries, which makes this work one of the most propitious to the development of permanent health problems (Fragala, 2015).

During the day caregivers have much more tasks to consider, since the elder is awake and he has to help him with the DLA. But during the night they are usually alone taking care of the asleep elder, here is related another problem since if something goes wrong with the caregiver, the elder stays without assistance (Aced López, Corno, & De Russis, 2015).

Maria João Fernandes et al. (2012), also refers to another dimension the psychological considering that informal caregivers (family), also mention emotional pain, since they see their relatives getting worst every day, and tiredness since they stop having time for themselves. At this point families also say that they don't request for formal cares since they don't have economical support for that.

2.4. The design approach to aging

"Design involves solving problems, creating something new, or transforming less desirable situations to preferred situation." (Friedman, 2003)

Design is a problem solving process that is oriented toward a specific objective; it must improve or solve what it proposes. A designer is a creative thinker who must pass his

ideas to actions (Friedman, 2003).

When we talk about aging, the many problems to which Design can be a possible answer are endless. There is a variety of products, adaptations and tools that help the elderly, but when it comes to the aging process, it is important to treat the entire surrounding environment and create ways to meet the daily challenges and the constant changes in this phase of life. But it is not only the elderly that should be emphasized when we put Design aging, it is also important to highlight all the involved in the process, such as doctors, caregivers or the family itself (Stichler, 2013).

When we think about who are the users of the designed products, in general we refer to people of common age without debilitations, or exactly to the opposing users, people with great debilitations but, with the severe demographic changes is necessary to find a new focus in the design user, who is going to be mainly aged but not completely debilitated. Although, in general society considers this population as a debilitated population, this is a completely wrong idea because the majority accumulates difficulties and restrictions gradually, but few are those who become debilitated at all and, those who really are, hardly consider themselves in this condition (Karwowski, 2001). In Hosking, Waller, and Clarkson (2010), a person is considered with debilities is the one who cannot live as an equal in society. What usually happens when dealing with industries is that most of the designed products have two completely different types of users, the one for those who are considered “normal”, and another one for users who have severe debilities. With this, people who have minor disabilities such as the ones provoked by aging end up forgotten (Hosking et al., 2010).

When we talk about Design and aging it is essential to refer to environmental gerontology. This idea seeks to create an environment conducive to the whole phase solving the problems mentioned and others associated with the process, using Design as a tool for this to be possible. This includes the use and study of constant improvements in products such as walking sticks, wanderers, wheelchairs, handrails, and also whenever possible the search for new products that assist the elderly or the caregiver, who is also benefited and this environment must also be adapted to it (Stichler, 2013). Still referring to the environment that involves the elderly it is possible to denote that most of the spaces are not adapted to them, which ends up hampering some aspects of his daily life and many of his DLA that are contradicted by physical barriers, a conducive environment to the development of an elderly person must always take into account their autonomy, security and accessibility (Soares, Jacobs, Paiva, & Villarouco, 2012).

The elderly population is extremely heterogeneous and it is a great challenge to design for it, as all elderly people age differently and it is difficult to predict the future

condition of the aging population and what their greatest difficulties will be. For this population their autonomy is one of the greatest indicators of quality of life, and it is essential to take this into account when designing for this group. One of their biggest difficulties is to adapt to new and unknown situations and for this it is necessary that the intervention occurs in the environment that is known to them and without major changes to what has always been present in their lives (Karwowski, 2001)

Although there is already some work done, a great gap is found regarding the needs of the caregiver because there is no design guideline that takes into account their needs, and the that's being done in this field, is largely for the wellbeing of the elderly, taking way the importance of those who look out for them, either if they are family members, nurses or caregivers (Aced López et al., 2015).

2.5. Existing Products

When dealing with elders, it is important to create an environment that they can relate. It is necessary that Design works towards this focus group as it will be one of the main users in the future. Considering product design, this should be accessible, functional and concern all the related possible users. For that it is important that products are simple and reasonable for everyone, have a 0 mistake rate in usage, and most important considering the questions before concern, they must be low effort in physical related conditions (Parmonangan, 2016)

Lanzavecchia & Wai "No Country for Old Men"	Monolight	Magnifier lent and light
	Together canes	Collection of canes with different accessories
	Assunta	Adapted chair
Egle Ugintaite	The aid	Technological Walking Stick
G&V Design Produced by TENTE	LINEA e-lock Serie 594E	Adapted castor for articulated beds
Kohler	Ageing in Place. Product Solution	Collection of Bathroom adapted products

Table 3 – Products already in the geriatric market.

Lanzavecchia & Wai – No Country for Old Men

Lanzavecchia & Wai are two designers, Lanzavecchia is from Italy, Wai is from Singapore. They're a collaborative creative group that is internationally highlighted and have recently won the "Red Dot Award Product Design 2016". One of their well-known collection is "No Country for Old Men", which has 3 series of products; 'Monolight', 'Together Canes' and 'Assunta'. This is a collection based on the needs of the elderly's.

Monolight

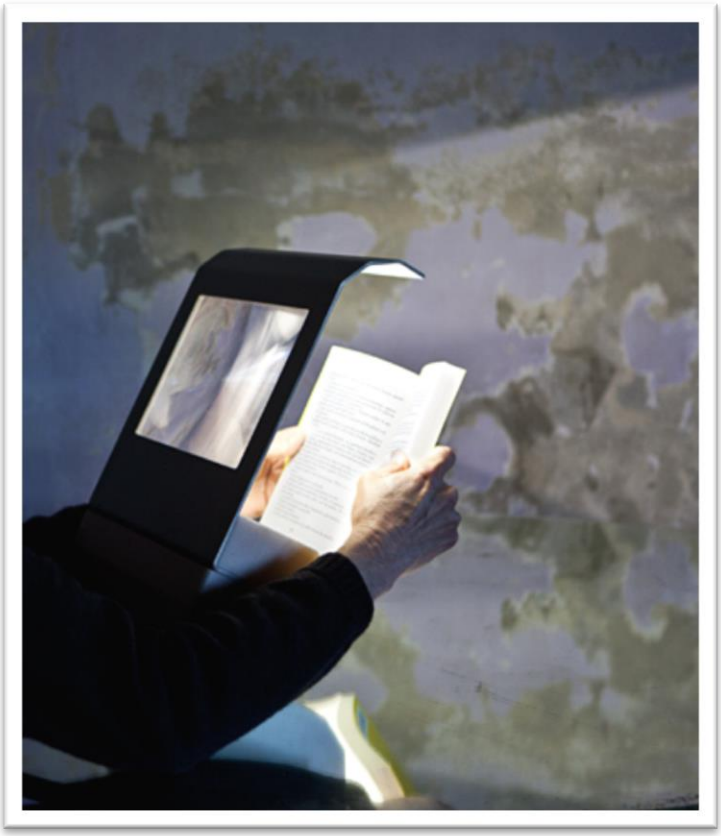

Fig.7 – Monolight. From Wai (2012b).

Source: http://lanzavecchia-wai.com/projects/monolight/ **(Accessed 11 August 2017).**

'Monolight' is a magnifier lent with LED lightning. This lamp has a marble rounded base that allows various degrees positioning, and has an aluminum frame that hides the LED lights. Comes in two models, landscape and portrait. It aims to help with vision deterioration since it's one of the incoming problems of ageing (Wai, 2012b).

Together Canes

Fig.8 - Together Canes. From (Wai, 2012c).

Source: http://lanzavecchia-wai.com/projects/together/ (Accessed 11 August 2017).

'Together Canes' is a collection of three walking sticks the 'T-can', 'U-can' and 'T-can'. These products concern elder's mobility and quality of life.

The 'T-can' is said to be the tea holder, and allows being sited and having the walking stick in front to function like a table.

The 'U-can' is a container that allows the elderly to hold their personal thing to everywhere.

The 'I-can' can function like a table too but it was thought to hold an I-pad.

All of the walking sticks have wheels on the three foots to help the elder's move one way to another with it, this way it aims to help not only in their mobility but help moving things around and interact with others (Wai, 2012c)

Assunta

Fig.9 – Assunta. From Wai (2012a).

Source: http://lanzavecchia-wai.com/projects/assunta/ **(Accessed 11 August 2017).**

Assunta is an adapted chair that concerns musculoskeletal and strength problems, since this is one of the main problems that elders have in their ageing process.

This chair is made of wood and has metal structure which has the goal to help elder get up by stepping one foot on the bar that is next to the floor. This way the users own wight will help him get up from the chair (Wai, 2012a).

All of the products from this collection have as a goal to help elder with their independence and to have a better quality of life.

The Aid

Fig.10 – The Aid. From Ugintaite (2011)

Source: http://p3.publico.pt/cultura/design/7216/jovem-inventa-uma-bengala-inteligente-para-idosos (Accessed 11 August 2017).

Egle Ugintaite is designer from Lithuania and won the 'Fujitsu Design Award 2011' with this product.

'The aid' is a technological walking stick that has GPS localization, Wi-Fi and Bluetooth. It allows the elder to leave the house without getting lost, since it helps him to find the way and tells them if he goes in a wrong track. It also measures blood pressure and contacts immediately emergency services if detects something that's not normal.

This device can be used not only by elders (although it's the focus group) but by everyone who has a mobility debility. It also helps the older people to get active in society since more safer to leave the house (Ugintaite, 2011).

LINEA e·lock

Series 594E

Fig.11 – Linea e-lock. From G&V and TENTE (2012).

Source: https://media.tente.com/download/LINEA_elock_EN.pdf (Accessed 11 August 2017).

Designed by G&V Design Company, from Germany, and produced by TENTE.

This bed castor for articulate beds has a remote controller that switches the lock of the bed. It can also be switched on and off by cable or by another choice of the buyer. In case electrical cut off t's manually controlled.

This castor concerns all the related users that have contact with the device (T. G&V, 2012) (G&V & TENTE, 2012)

Ageing in Place. Product Solutions

Kohler is an international company that considers several design subjects. One of their collections is 'Ageing in Place' that considers several designer products and considerations to a good design that is accessible. This collection has full bathroom equipment such as comfort height toilets, handrails, shower bases, adapted bathtubs, washing stands etc. It was fully designed taking the company guidelines to make the environment accessible and esthetical appealing.

Design guidelines such as; color contrast of the products to the rest of the architecture, rounded countertops, easy access baths and low washing stands. (These considerations are described in:

http://www.kohler.com/bold-independence/products/design-considerations)

Elevance Rising Wall Bath

Fig.12 – Elevance. From Kohler .

Source: *http://www.kohler.com/bold-independence/product-solution* (Accessed 11 August 2017)

Elevance Rising Wall Bath, it's an adapted bath that has a wall which goes up and down when taking baths. For entering the wall is downs, while showering is up and then when not necessary anymore and to go out of the bath it goes down again.

Grab bars and Handrails

Fig.13 – Handrail. From (Kohler).

Source: http://www.kohler.com/bold-independence/product-solution (Accessed 11 August 2017)

This collection has a series of handrails and grabs bars that allow the user to use along the bathroom. These pretend to combine functionality, accessibility and esthetics.

3. Methodology

Considering Friedman's point of view (2003) a designer must solve problems and create new things, but for this it is necessary to analyze their environment and discover how and what works and why they work that way, so in addition to the creation process is equally important theory and research.

For the present study a qualitative approach was used. A qualitative approach gives more importance to words than to numbers and creates an interpretation of the connection between the participants and their world (Bryman, 2015). Qualitative research also emphasizes the intrinsic connection between theory and research (Bryman, 2015).

Several authors conclude that aging was a trend yet to be explored and where intervention is needed (Heylighen et al., 2016; Nations, 2015; Persson et al., 2015).

It was also concluded in Or et al. (2009), Fragala (2015), Craib et al. (2007), that the work of auxiliaries, caregivers or direct actors with the elderly is greatly hampered by the lack of sufficient support in monetary, social or physical terms. Thus it was possible to define some parameters where a more in-depth study is necessary so that it is possible to understand how to intervene. For this, a qualitative study was carried out.

In this qualitative study, ten individual interviews were made with elderly (up 65 years old), physiotherapists, caregivers, nurses, doctors, and hospital store sellers. These interviews made possible a more intimate conversation with the user which led to a deep learning process about the discussed topic. This study involved two institutions (Lar e Centro de dia Raio de Sol and Clinica Fisiátrica Dr.Paulo Milheiro Maia) and it was possible to obtain a more complete understanding with field ethnography items, in which the daily life of the possible users was observed (Laurel, 2003). Photo ethnography was not possible due to privacy questions.

This study had as main goal the identification of problems encountered in the direct contact with the elderly (1), to perceive possible consequences that the caregiver can suffer with this contact (2), to better understand the situation of Portugal regarding the theme of aging (3), to support and be aware where to act and where it would be necessary to intervene (4). Regarding interviews with the elderly, the main objective was to perceive the elderly person's view of their current situation, what they think, their difficulties, and essentially whether they realize that they need help, or are able to live independently.

In qualitative studies it is important that the questions elaborated are

comprehensive, that is, although there is an interview script, this can be constructed along, exploring the answers given by the participants in order to contribute to the knowledge and to the research. In a qualitative methodology this is called semi-structured interviews, which start with introductory questions. Open and explorative questions were used such as "when did your contact with geriatrics begin?" through these questions it is possible to get to know the participant. In order to generate the dialogue and to initiate a discussion it were asked questions on the topic in general that can suggest to the participant several ideas, it was used for example with the caregivers "What do you think about the mobility of the elderly?" and with the elderly "What do you consider independence?" this type of questions raises feelings in the participant himself and make him reflect and give a direction to the interview, from here it is important to analyze and explore the answers that are given and to look through indirect questions to know more about the subjects mentioned and the opinion of the participant "what would make your mobility easier?".

The interview started by specifying the suggested topics, and going deeper in every question. At the end, several direct questions were made to conclude the themes. Having in mind that these questions should not suggest an opinion or response to the participant so that what he tells us is not influenced, like "What difficulties do you feel in the transfers processes of the elderly?" or "Have you suffered injuries from falls?". At the end of the interviews it was revealed as important to close the subject by summarizing it "Was it any evolution in the area of geriatrics?" it was however added questions that appeal to the critical sense and creativity of the participant "How do you think the mobility of the elderly will be in the XXIII century?" (Bryman, 2015).

.

3.1 Sample Design

With the help of the institutions “Lar e Centro de dia Raio de Sol”[1] and “Cliníca Fisiátrica Dr. Paulo Milheiro Maia”[2] it was possible to carry out a sample of people who are of high interest for this research.

There were 3 interviews with the elderly, with ages over 65 years that present

1 -“ Raio de Sol aims to respond to the demands of its users and their families by providing services focused on maintaining the quality of life, with qualified and motivated resources, in order to provide a service with high quality standards.” Retrieved from www.laresonline.pt/ -Accessed 5 August 2017

2 – “Activities of physiatrist and other medical activities of specialized clinic, in the outpatient clinic. Other human health activities, unspecified. Retail sale and wholesale of orthopedic and medical products. Professional qualification”. Retrieved from https://www.racius.com/´ -Accessed 5 August 2017

varying degrees of dependence and problems in the field of health and autonomy, it was important to find some diversity in these participants to be able to study what both have in common and what the differences Found. An interview was also conducted with a doctor, a physiotherapist and a nurse who were experienced in the area so that they could identify the main problems in the area of health and wellness, and what in their vision should be different or that is in positive evolution. Concerning health assistants and social animation technicians, participants with different years of experience and different ages were chosen so that they could be considered different problems; some of them due to their less experience being able to be more objective and those with more experience had a vision quite emotional theme.

The store sellers were chosen to be able to define what the buyer is looking for, and the store chosen is closely linked to hospitals.

These interviews had an average time of 30 minutes and their recording by sound was authorized by the involved institutions and respective actors, who obtained knowledge of the research and authorized the analysis of the data through a duly signed informed consent.

Nurse (Male)	32 years old	Clinic
Caregiver (Female)	47 years old	Nursing Home
Caregiver (Female)	22 years old	Nursing Home
Technic/Entertainer (Fem.)	38 years old	Nursing Home
Doctor (Male)	69 years old	Nursing Home
Physiotherapist (Male)	29 years old	Clinic
Elder (Female)	75 years old	Clinic
Elder (Female)	91 years old	Clinic
Elder (Female)	82 years old	Clinic
Store seller (Female)	29 years old	Store

Table 4 - Sample

3.2 Content Analysis

For the content analysis it was used the Nvivo 11 program, which allows the insertion of interviews for cataloging and organizing themes, creating graphs and schemes of interest.

Grounded theory was the framework used for the analysis of collected data, this is considered “theory that was derived from data, systematically gathered and analyzed through the research process. In this method, data collection, analysis, and eventual theory stand in close relationship to one another”(Corbin & Strauss, 2008). One of the tools used in this theory is coding, it categorizes the data collected and gives them importance. It is through coding that we can organize the research and generate concepts

Thus, Nvivo is one of the programs that allows this process to be carried out, where the interviews were transcribed and the researcher can define the topics covered in each of them, by placing them organized. It was possible to perceive which subjects were most mentioned and to which they were given more importance, several concepts consequently rise. (Bryman, 2015)

4.Results

4.1. Caregivers/Nurse Tasks

When questioned about their role in the daily life of the elderly, the answers multiplied by addressing the most diverse tasks from medication, to wound treatment or mobility.

The task that was most often mentioned was undoubtedly the ‘mobility’, referring here from transferring techniques, to placements or the simple help of getting the elderly in and out of bed. It is also mentioned by one of the caregivers that they often only accompany the elderly in their walks for safety and to make them feel more comfortable "They ask for help to feel safer". Also highlighted, are the ‘maintenance’ of the elderly's condition and their hygiene. Speaking of ‘maintenance’, it is mentioned the improvement of the quality of life of the elderly and to keep the tasks that he can still do independently "it is important to have a caregiver that gives them quality of life and that allows them to maintain their condition"

Regarding ‘hygiene’, several different tasks are addressed by all caregivers such as changing diapers, washing teeth, cutting nails, moisturizing the skin so that it does not get injured, but the most referred is bathing. Both ‘feeding’, ‘rehabilitation’ and ‘wound treatment’ are referred at the same level. At ‘feeding’, what they refer the most are completely disabled elderly who need probes to feed themselves or to the need for them to have schedules for this task. In ‘rehabilitation’ they refer to the training of daily life tasks so that they can become independent and in the treatment of wounds the surgical dressings are most talked.

Fewer references concern the ‘fight sedentary lifestyle’, that only was mentioned by the socio-cultural entertainer, and the ‘medication’ and ‘prescription’ of treatments referred only by the doctor.

Nº Coding References	
Mobility	7
Maintenance	4
Hygiene	3
Wound Care	2
Rehabilitation	2
Feeding	2
Prescription	1
Medication	1
Fight Sedentary lifestyle	1

Table 5 – Caregivers Tasks

4.2. Caregivers daily problems

When asked about the difficulties experienced in the daily execution of the caregivers work, it was noticed that all the caregivers refer the weight of the elderly as the main difficulty felt, since some refer to elderly obese and others to the elderly without any mobility, is also quite mentioned the fact that sometimes a single caregiver is not enough to perform certain tasks "the weight has to be distribute in one or two people", "at certain times it can´t be done by a single person ...". It was also mentioned by three of the caregivers (All of them women) that one of the problems was to 'hurt themselves', one mentioned the transfers "They make a lot of strength, they hold onto things and we go together." another referred that especially in the baths it is difficult to guarantee the safety of her as well as the elderly, mentioning once again the fact that two people are often needed, and another one says that first it's always the safety of the elderly and that often leads to the caretaker to get hurt "often to ensure their safety we hurt ourselves…".

Another dimension is the 'lack of mobility', 'feeling' and 'fear', mentioned by 2 of the caregivers. Considering the 'lack of mobility', the main problems detected are the poor mobility of the elderly, which makes it difficult to the caregiver to perform their functions. Regarding feelings, the sentimental issue is addressed, the difficulty of seeing the elderly gradually lose their abilities and the need to give them love and affection. "I am sad to see

them in and out, to have more and more difficulty eating, walking…it's sad... they stop talking ... eating ... then the probe... and day by day they go out... ", "it hurts us differently, we feel a lot because we are here every day with them, we talk to them, they tell us their life and stories."

At a lower level we have - pain - impossibility to work – or – afraid to hurt elders – was only mentioned by one of the caregivers each. The impossibility to work - question of possible injuries (which will be discussed later in the analysis) from the work performed is discussed, pain is then spoken of as a possible consequence of this "when they can work, they have pains for a long time, discomfort...". In relation to feeling hurt -, it was mentioned that even with all the security this can happen and that often elderly don't even feel it because they are accustomed to the pain "Sometimes and even then, we also hurt them ... they don't even feel so accustomed they are to it".

Nº Coding References	
Elders Weight	6
Hurt themselves	3
Lack of mobility	2
Feeling	2
Fear	2
Pain	1
Impossibility to work	1
Hurt elders	1

Table 6 – Caregivers problems

4.3. Health Injuries

Speaking of health injuries, it was possible to obtain a great amount of information regarding this concept, since both caregivers and the elderly refer to the most varied problems. Caregivers reported both work-related injuries as health problems from aging and the elderly often report their symptoms. With this it was possible to analyze several points of view related to this concept.

4.3.1. Caregiver's work-related injuries

There were four caregivers at all that mentioned health injuries for themselves (Table 7). Column problems was the injury that was most mentioned by the caregivers, one of them even mentioned that he had been on medical leave due to back problems caused by the weight of patients on a transfer to a wheelchair, "I have had medical leave by the insurance due to back problems, I was transferring the patient to a wheelchair, and he was very heavy ...". Also referred by the nurse and another caregiver are injuries to the wrist articulation due to the weight to which it is exposed and to changes to difficult positions. Regarding the arms, also mentioned twice, one of the caregivers says that sometimes she feels so much pain that she stops feeling her arms, she also says that it depends a lot on the shifts, and that if the takes the night shift or the morning shift the amount tasks she have to perform is much higher than on an afternoon shift.

About 'feet' and 'shoulders', the complaints only refer to pain in general but importance is given above to the feet and here also they approach the legs in general.

Nº Coding References	
Column	3
Wrists	2
Feet	2
Arms	2
Shoulders	1

Table 7 – Caregiver injuries

4.3.2. Problems verified in the elderly by the professionals

When asked about the most frequent problems in the elderly the answers divided into - health problems and - other problems of daily life, as we can see in the diagram below (fig.14).

In health problems it was observed that obesity is the most commonly mentioned disease, probably because it is also the one that the caregivers approached as the one that

had the most consequences for themselves, here are exposed the problems that this disease can cause in the elderly and how it affects their daily life activities, making impossible for example their hygiene "we have an extremely heavy lady, and to put her in the bathroom is complicated".

‘Bedsores’, ‘breathing infections’, ‘pressure ulcers’ and ‘articulation level’ injuries are all mentioned in the same dimension, bellow obesity. Bedsores, pressure ulcers and breathing infections are a consequence of being permanently in the same position, sitting or lying down, regarding breathing infections the doctor specifies "hypostatic pneumonias happen because they are always in the same position, the secretions are accumulating, and they do not breathe as they should". Articulation level injuries are referred twice by the physiotherapist, who says that it’s very important to constantly change the position of the elderly to avoid the problems mentioned above and for them to maintain their articulation condition "it is preferably to change the position of the bedridden sock in every half an hour, in maximum at every hour.”

‘Hip problems’, ‘urinary infections and ‘malnutrition’ are among the least commonly reported in the health area. ‘Urinary Infections’ and ‘Malnutrion’ were both mentioned by the doctor, but hip problems were addressed by the nurse who suggested that these happen often due to transfers "Sometimes when we are transferring them, we do the rotation and they complain about the hip".

Another problem mentioned is the need to have adapted spaces, lack of monitoring and the difficult to follow orders. Lack of monitoring is the most referred, here it is mentioned the importance of having surveillance in order to have quality of life and for the elderly to maintain their condition, the problem of lack of resources in Portugal is also presented. "In our country, the monitoring to this type of people is minimal, both in homes and nursing homes."

In a smaller dimension the ‘lack of adapted spaces’ is mentioned but it is possible to relate this parameter to the previous one, since once again it is said that there are few available conditions "when they are at their houses, they end up having to come to nursing homes because they don’t have any adaptation in their houses, sometimes they can’t have, they don’t have conditions....".

At last, regarding the difficulty to follow orders, it is mentioned that sometimes due to cerebral diseases it is difficult for the elderly person to perceive and remember what is requested.

Fig.14 – Diagram of elders problem based on professional interviews

4.3.3. Elder problems by themselves

In one of the phases of the interview the elderly participants were questioned, in a direct question that had the objective to summarize the subject, about their greater difficulties here the answers were almost all the same, they all said that they did not have great difficulties "I consider myself well...without major difficulties ... "," I do it at home with one hand, I can do everything .. ", but the answers that were given previously during the interviews prove a large number of identified situations that they are not good with, so It is possible to verify that they do not have any kind of notion about their problems and for

them nothing is very serious.

Starting with health problems, ‘back injuries’ are the ones that elderly refer the most, saying that they feel a lot of pain when they lower and cannot do anything below the waist level "when I lower it me hurts ...", "while being bending it also hurts...".

At another level is spoken are ‘strokes’, here the participants’ mention that this problem was the cause of all the others that they have "it was only since stroke that I stayed like this...”. In a dimension also below there are mentioned problems in the ‘hips’, ‘hearing’ and ‘memory’. Regarding problems in the hips, later falls are associated to this and to their back problems. At ‘hearing’ they say that they listen badly but that something has to age with them, again devaluing the problems they are referring to during the interview. In the ‘memory’ problems, the elder woman who refers to them also associates it with the stroke that she suffered and subsequent hospitalization "it even seems I forgot some things after being hospitalized ... “.

In another group of daily problems, we found that all the elderly interviewed referred to bathing as the biggest concern of all, being at the top all the other problems mentioned. It is possible to verify that everyone is afraid to slip or become unbalanced "In the bath, I'm afraid ... "," Now, I don’t shower, I'm afraid ... "so they adopt other methods to carry out this task, as the constant help of people" I have my daughter-in-law who is always there to see if I'm okay. ", the use of small bath adaptations" to take a bath I have a rod "or even alternative methods like bathing in the lavatory" I do not go to the bath because I'm afraid, I wash in the washstand that is very big…I use the *bidet* ... in the tub i can slip. "

At a level below we can see that ‘dexterity’ is also a much referenced parameter and that users relate it with the loss of capacities that left them incapacitated for some tasks. On an economic level, two of the elderly say that they have no possibilities and that the retirement pension they receive is very low and therefore they cannot afford luxuries, and most of their money pays only the expenses "I do not have the money for that…my retirement Is (…)... with all the expenses .. I have nothing else ... "," my retirement is very small and I do not have many aids ... “.They also refer to ‘mobility’ as a problem, one even defines the stairs as a physical barrier that represents a major concern. With regard to the psychological level, they highlight the sadness that turns out to be related to ‘dexterity’ and loss of abilities.

In lesser attention, referring to ‘pains‘ generally defines, due to their physical condition, the ‘lack of resources’ that, although not so directly mentioned, are related to

economic needs, and also the safety that ends up being most stated when it relates to the fear of taking bath.

Fig.15 – Elders problem by their interviews

4.4. Autonomy

4.4.1. By the professionals

Considering professionals interview, when talking about elders 'autonomy', they refer mostly 'independence', giving several meanings and relations to this subject. Caregivers consider that elderly are independent that lose their capabilities slowly and that are different types of dependencies "The elderly, in the use of their mental faculties is always

an autonomous and independent person."; "There are several levels of dependencies". Still in the independence subject, there are numerous themes to consider.

'Safety' is often referred when talking about independence, since (as shown in the caregivers tasks) it is the first thing to take in account every time. For the caregivers the elder can do anything if he feels safe "safety…if they feel safe they can do anything.". Still about safety two of the internments' refer that elder often feel safer when the caregiver is a man since they think they have more strength and are more reliable "often they prefer our touch, for them it is much better ... even because I'm a man they feel better, it is a different feeling of security ... the oldest distinguish man and woman very much".

About 'mobility', the caregivers consider that the elder may walk around a lot but they always need their help and supervision, they also talk about the need of the elder to move so they do not lose capabilities.

Next is 'communication', here they refer to a big variety of subjects; communication to the elder, if they say what they need or do not and how the caregiver need to understand what they want even if they do not say it "We can see when they do not complain and it is something wrong, because of their expression…when they need something and do not want to say it. Or even when they think they do not need it but we know they need. For example going to the bathroom, we ask them and they say no, but we know they need so we take anyway, almost like with the children. But the opposite also happens that they say they need something and do not need anything.". The elders choices when the caregivers asks him something "they also refuse sometimes, not every day but some days they are tired and do not want", and how it's important for the elder to communicate to maintain socially active.

To' feeding' and 'hygiene' was given the same importance, for the caregivers their level of independence is seen in these activities. They also specify 'DLA' as an important item for this "if they do DLA independently". In the same level of 'DLA', they also refer 'fight sedentary' lifestyle. Here they talk about the need to have several activities and to exercise, referring to 'new activities' too (that goes at a lower level). They also say that elders are dependent when they need to cure wound and that it is important to that they make their own choices.

Finally, when talking about 'autonomy' they also refer 'falls' and 'comfort'. About 'falls' they talk about the high probability of falling if there is a low autonomy and that if they have already fallen they may lose mobility capabilities.

In the lowest dimension there's also 'comfort'. Related to confort the caregivers say that if they are comfortable they can be self-directed.

Fig.16 – Autonomy seen by the professionals.

4.4.2. By the elders

When elders were asked about their autonomy, they tended to say that they were completely independent and that they did everything alone, but as said above (Elder problems and need by themselves), that was not what they showed along the hole interview, when asked about independence and autonomy they all devaluated their condition saying "I can leave the bed alone", "I go to the kitchen by myself", "I live my life well… I can even make my own bed".

Though they answered that they are independent and can do everything alone, it was possible to understand that they are conditioned majorly because of ‘fear’ and ‘falls’. They show fear to DLA, such as bathing “I do not trust in myself and my daughter is even worst”, and they show fear to ask for help because they think they can disturb “I always say that they can leave without worrying and that I am ok by myself”, another elder also says “I live well this way…everyone is ok and they do not want to put up with old people…I am ok like this and I know how much work I am giving” .

About ‘falls’ it is considered one of the major difficulties of the elder since they always refer to it, saying that they are afraid once again to be unbalanced when taking shower.

Although the concerns above, it can be observed that elders are grateful for the help that caregivers and family give in order to maintain their autonomy and quality of life, referring that “They help me a lot”, “I am spending a good time at life… I do not need to do anything everyone helps me”, and “The help they give me is very important, sometimes I even say that they give me too much pampering and I recognize that they want to help me. They are all very careful”. But, it is possible to see that even though they are grateful they still show will to do what they want “They do not want me in the kitchen…I try to help but they do not want me to do it”.

Fig.17 – Autonomy in the point of view of the elders.

4.5. Attendance

When referring to who helps them the elderly mainly talk about their family, saying that they do not want them to stay alone and to do anything, they talk about, daughters, daughters in law, sons, grandchildren or even bedpan; “my son does not want me to do it, but I already told him several times that I can...”, “I live with my son ... I have my house but he does not want me to be alone.. He is not always with me but I have grandchildren, I have my daughter-in-law ... I always have someone...”, “I always have my family encouraging me”

Some of them also refer that they were alone and now their families want them with them, but they prefer to be at their houses because they do not want to move;-“My granddaughter always says to come here, but I do not want”; “I lived by myself but now that I do not have anyone to help me there I came here”.

Neighbors are mentioned too, saying that when they were at their houses they only had their help and they often refer to them as friends too: - “I kept asking for the neighbors to help me with the laundry”; “I had a neighbor that was my friend but now she died and I do not have any help”.

Only one of the elders mentioned that she had a family doctor that helped her and another firstly said that she had a housekeeper. This housekeeper helped her getting in bed, taking bath, etc. and it was possible to understand that she was mentioning a caregiver that also did her laundry; - “I have a housekeeper that helps me with everything I cannot do…taking bath…helps me to dress”.

Family	Alone	Neighbors	Friends	Doctor	Caregiver
8	4	3	2	1	1

Table 8 – References to Attendances by the elders

4.6. Products

After questioning about the use of product it was possible to make a big list of the variety products referred, by the professionals and by the elder.

Walking Sticks

The most talked product were walking sticks, here it is several times stated that it is necessary to know how to walk with it, and that a poorly prescribed cane can be much worse as it can cause falls - “The problem with walking sticks is that you have to know how to teach them to walk with them, you do not walk anyway”; “an improperly prescribed walker or cane may be a cause of falls, the elderly may stumble on the walking stick, may slip…it may be the reason for falling”. These leads to the elderly feeling insecure. It is also mentioned that often when elderly use walking sticks they forget about them at all, or walk with them in the air, which turns out to be worse - “they need it but forget about it or do it for forgetting...”; It is also said by the auxiliaries that in tumbles the cane does nothing and may even be worse because they have busy hands and end up feeling insecure - “The cane can give the feeling of security but sometimes, on the stairs in houses, on different levels floors, they feel insecure. Sometimes the wooden floor has the frills… They get stuck in the cracks, and then they fall, even with our supervision. Falling once with a cane, a second

time and a third, after that they no longer want the cane".

One of the caregivers also refers the lack of comfort in the handle of the walking stick, which does not adapt to the hand – "but often at the grip, I think it should be more ... it's just that little bit to grab ... I think it could be more evolved ... ".

Already the elderly also a different point of view, one of them states that it helps her getting strength, but another indicates that it has one walking stick at home but does not use it because feels more scared when using it and prefers to walk alone – "I do not use a cane, I have it there but I do not use it ... I do not trust ... my daughter bought it when I came ... those flares with four sides ... I do not have the confidence to walk with her, I'm afraid of hitting one foot in the other ...i prefer to walk alone".

Hygiene Adaptations

For bathrooms what is most talked about are the handles and two of the elders indicate to use them, but they need help anyway.

One of the caregivers indicates that often the adaptations do not exist or are not enough to support the patient, and it is necessary to give him bath with sponges in bed. The nurse is dissatisfied with these adaptations and says that the majority is weak and breaks, or there is no maintenance possible – "There are almost zero adaptations, even the benches that are bought in the supermarket they break, the elderly falls .... There are toilet adaptations to get taller, shorter, wider, shorter, but then they cannot be cleaned, or repaired."

The store salesperson indicates several existing products, such as adapted showers, benches, bathtubs or even tail supports.

Walker:

As for the walker they also say the same as the cane, that if it is bad prescribed it can cause injuries and that some elder forget about it, they also say that they are not functional and comfortable – "she was going to the bedroom and forgot it, I had to go after her to give her the walker", "they walk with the walker in the air ... they raise it and walk like that... only then they remember...", "I think the wanderers for elders are neither comfortable nor functional...", "no one likes to walk with that…".

Opinions are divided, while some believe that the walker is not functional others say that the elderly feel safer to use it and that it is more comfortable than the cane – "they use the stroller more, because it is more comfortable...".

Wheelchair:

Considering the wheelchair most of the references say that they think that there is not enough evolution, and when it does it is expensive. They think that they are not comfortable and sometimes it may even hurt the elder – "I know they get hurt to spin the wheels, it is not comfortable, I think the chairs are not light enough and do not slide enough, until the chair starts to slide they have to do a lot of strength that most of the time they do not have.", "they should take into account the seat, the backrest, there is no comfort and they do not consider that there are people who spend many hours in them, the seat has no cushion, is not padded, there should be more variants as needed ...they could help the own caretaker to raise the elderly, they are poorly evolved ... those elderly who remain in the chair for a long time, end up getting more sore… there is a lack of concern with the backrest ... that is just a piece of cloth, they do not care about the back with possible injuries…there are bedsores, ulcers ... derived from all these factors".

Adaptations for stairs and articulated beds:

Regarding adapted stair and articulated beds, the only question referred continuously is that there are no possibilities to exist at home, they are expensive and there are no supports – "There are adapted stairs, but in companies, not in private homes, social security also does not help.", "For example an articulated bed here, it costs a thousand euros, in a house where each one receives the minimum wage and that there is a dependent there are no contributions by the social security to have it...", "there are no articulated beds due to economic reasons".

Transfers:

In the transfers the caregivers report that they only exist in hospitals and that they are useful for transferring from bed to bed, but when it is from bed to chair they do nothing. They also point out that people prefer the touch to this product – "sometimes in hospitals we have the transfers, which is a plate that slides to make the transfer from stretcher to stretcher or from chair to chair. It is possible to make the transfer from bed to bed, but bed for chair... that is out of the question.", "they prefer our touch, for them it is much better"

Cranes:

Referring cranes, what the caregivers say is that there are too big to have in houses and that there is no money or space to have them. They also say that the elder does not like them because they do not feel worthy –"we have lifting cranes that are only used in

extreme cases because people generally do not like them, do not have space, do not have money, it is more for hospitals, clinics and some more expensive nursing homes ... because at home it does not even exist, except for people who really need and have lots of money and space…", "they do not feel comfortable or dignified...".

Environment

Caregivers also refer a lot to adapted spaces that should exist more, but because of lack of space they do not exist, saying that products help feeling this gap –"to use in house, they use a lot of products as houses are never thought for these things and the products help".

Other Products:

For the other products there are only make small references, saying that they exist and are used. Referring to 'slippers' they say they are prohibited for causing falls and that they can only use closed ones. The 'presence light' one elder says she uses it to go to the bathroom at night.

As for 'feeding' and 'house adaptations', it is only the store seller, who says there is a lot of variety of these products.

Adaptations for stairs	4	Slippers	1
Articulated beds	3	Environment	2
Cranes	2	Walking Stick	13
Feeding	1	Transfers	3
House adaptations	1	Walker	9
Hygiene adaptations	9	Wheelchair	6
Presence light	1		

Table 9 – Products referred

4.6.1. Existing Problems:

When questioned about the problems in the existing products, there were a lot of opinions and points of view.

Price

The price of the products was the most mentioned problem.

All of the caregivers say that the existing products are too expensive and most of the people do not have money for them, - “Most of the product are no accessible, they are too expensive, it is ok for the hospitals but not for individual use”, “unfortunately better things are more expensive and people do not have money for them”, “there are a lot of product but because of economic reasons almost nobody has them”. It is also said that there is no support from the government and because of that it is very difficult to buy whatever they want, since most of the elder money goes to medication or food, - “there is no help at all”, “their pensions are too low, they barely are enough for medication and food”.

The store seller also refers that families go after the best for their elders, but most of the time they have no money for it, so they end up questioning if other products will fulfill their needs, - “and then often, they cannot buy the best for economic reasons, and are a bit afraid about the quality, if it is the best and if will work.”

Comfort:

When referring ‘comfort’, only one of the caregivers says that walkers are comfortable, all of the rest say that there is no comfort on the existing products, - “there is no comfort at all”, “and elders do not feel comfortable using them”. Also the store seller says that people question her about the comfort of the products, - “they also ask me if they are comfortable”.

Fear:

There are also several references to ‘fear’ but most of them are elders saying that they are afraid of using products, such as walking sticks “I am more afraid using the cane then alone”.

Functionality:

Considering 'comfort', the caregivers say that products are not comfortable and the stores seller also says that she is frequently asked about that. – "Most people are afraid that the products will not adapt to the elderly, most of the time those who buy are the family".

Knowledge:

Referring 'knowledge' the caregivers say that elders do not know how to use products and that it is important to educate them towards it – "the important thing is to teach and educate them how they should and should not do".

The store seller, also says that there is not enough information and so people ask her how to use the products and she says that it is ok for her but who should help are the caregivers or doctors – "there are a lot of doubts and little information in general, either in treatment or use ... people end up looking for information in us and that is good of course, glad they trust! But also is not the most correct because there are things that must be auxiliary, doctors and nurses to give information...".

Maintenance:

When talking about 'maintenance' the caregivers say that products are too fragile and sometimes they break, they also say that they are difficult to clean. – "maintenance is not always possible and it is necessary to buy a new one", "they break and the elder falls", "they are difficult to clean and maintain".

Space:

The 'space' that products occupy is also referred. The doctor and the seller say that often people do not have the space necessary to use products, - "they do not have space", "a lot of the times they occupy a lot of space and people do not have that".

Hurt themselves:

The caregivers also say that people elder hurt themselves when using especially wheelchairs, - "they hurt themselves when spinning the wheels".

Dignity:

Who refers dignity are the caregivers that say that some of the products make the elder feel bad about themselves, - “they do not feel respected, it is too much”.

Aesthetics:

One of the caregivers says that what exist it is not appealing and elders do not want to use, -“what already exists is ugly and nobody wants to use it because they are not appealing, they do not care about aesthetics...”. The store seller also says that people say they do not like products for being too health related and ugly, - “they ask about the aesthetic for being very "hospital" and want more appealing things for the elderly to use, but unfortunately these things are also much more expensive and not all have these possibilities ..”.

Falls:

Referring to ‘falls’ the caregivers say that the elders fall even using products, - “even using canes or walkers they fall… it not so normal but they fall”.

Forget:

One of the caregivers also said that often they forget to use the products and leave them behind, -“they forget about them and we have to constantly remember them”.

Lack of time:

The physiotherapist also says that most of the times they do not use the products because is easier to use their own hands, as they do not have enough time for their tasks, - “we use no products many times because of lack of time, it is easier to do ourselves than to have more work”.

Quality:

The store seller says that a lot of people ask her if the products do have quality.

Safety:

It is also referred by the nurse that some products are not safe to use since they break a lot.

Several options:

One of the caregivers says that products do exist but no enough range of them for the heterogeneity of elders that need them, -"there should be more variety as there are many needs and elders."

Stimulate use:

The store seller says that some of her clients say that her clients do not want to use the products and the families ask her for help, - "They also talk a lot that family members do not want to use and question how to encourage their use…".

Weight and Strength:

Considering 'weight' and 'strength', a caregiver says that wheelchairs are too heavy and that elders do not have the strength to use them.

Price	10
Comfort	8
Fear	4
Functionality	3
Knowledge	3
Maintenance	3
Space	3
Hurt themselves	2
Dignity	2
Esthetics	2

Falls	2
Forget	1
Lack of time	1
Quality	1
Safety	1
Several options	1
Stimulate use	1
Weight	1
Strength	1

Table 10 – Problems on the existing products.

4.7. Evolution of Geriatric

When the professionals where asked if there has been any evolution in geriatrics in the past years, all of them agreed that things are slowly changing, saying that in general there is greater concern about the elders, “There is a bigger concern with the elders nowadays.”

Social consciousness:

The caregivers say that there is a bigger concern about the elders, that ageing is getting more relevant every day and that there must be an equal response, -“Very slowly but there has been some evolution, we do not follow the speed of aging, the average life expectancy has increased significantly and is not accompanied by improved quality of life, people live longer with poor quality of life ...”, “There is a giant aging and low birth rates, which leads us to think that geriatrics will be a strong area in the future, not yet because we have evolved but very little, but it will be for sure ...”.

The social entertainer also refers to nursing homes, and that people start to have a better idea of them, - “There has been an evolution in terms of thinking, formerly the idea of nursing homes was worst, now it has already evolved a bit...”

Financial problems:

Concerning financial problems, all references mention that there is little support from the state, - “despite financial problems since there is no help of the government, people and families, try to help every time they can and put elders in a good nursing home, or buy better products, they try to give a better quality of life.”, “unfortunately, there is little help…”, “the government should help everyone that need..”, “At the level of geriatrics we are still very little evolved. There are a lot of limitations on certain types of work, at the socioeconomic level.”.

Education towards the elders:

Referring ‘education towards the elder’, two of the caregivers say that elders are more conscious that they need help – “I think they have more and more notion that they need us.”, “elderly people are already mentally aware of what is going on... and they are already prepared for everything, they do not have problems in being in nursing homes.

Social consciousness	Financial problems	Education towards the elders
4	4	2

Table 11 – Evolution of Geriatric in past years

4.7.1 Future of Geriatric care

When asked to be creative and to think how the future of geriatric will be in the future (XXIII century) professionals gave the most varied ideas.

Some think that the government is going to give more support and that there must be first more knowledge "First we have to solidify the foundations of our country, and solve the great and serious problems that we have in health today, it passes for human value, for the knowledge that we have and we must demonstrate to the users and third parties. First we must solidify what we have and only then evolve... all we have in terms of health in Portugal is very above the knee".

Others say that technology is the future and that there is only going to be machines - "Technology, only machines…", others go further and say that this technology is going to help with mobility and that some motor abilities are even going to be substituted – "There will be computer-driven electronic equipment that will replace many of the motor functions and any capacity of the elderly... there will be voice-controlled robots or commands to do everything...". Considering 'safety' they also say that maybe are going to be machines that help the elders fee more protected, - "maybe there will be some machine or instrument that makes them feel safer and wander better". Still concerning technology a caregiver also says that there can be machines that help them to give baths to the elders, - "For example something for giving baths because we wet ourselves a lot". They also say that this technology must not be expensive as elders do not have a lot of money "it has to be simple and accessible, the elderly are not normally people with lots of money".

There were also considered new products that are more appealing, - "there has to be something more pleasant, colorful, more unusual" and that promote elders independence, -"I think that the ideal would be appliances ... that help them to become independent, there should be devices that help them to have autonomy and be themselves to use and to want to use.". The price of the products is one more time concerned, - "There should be price and quality".

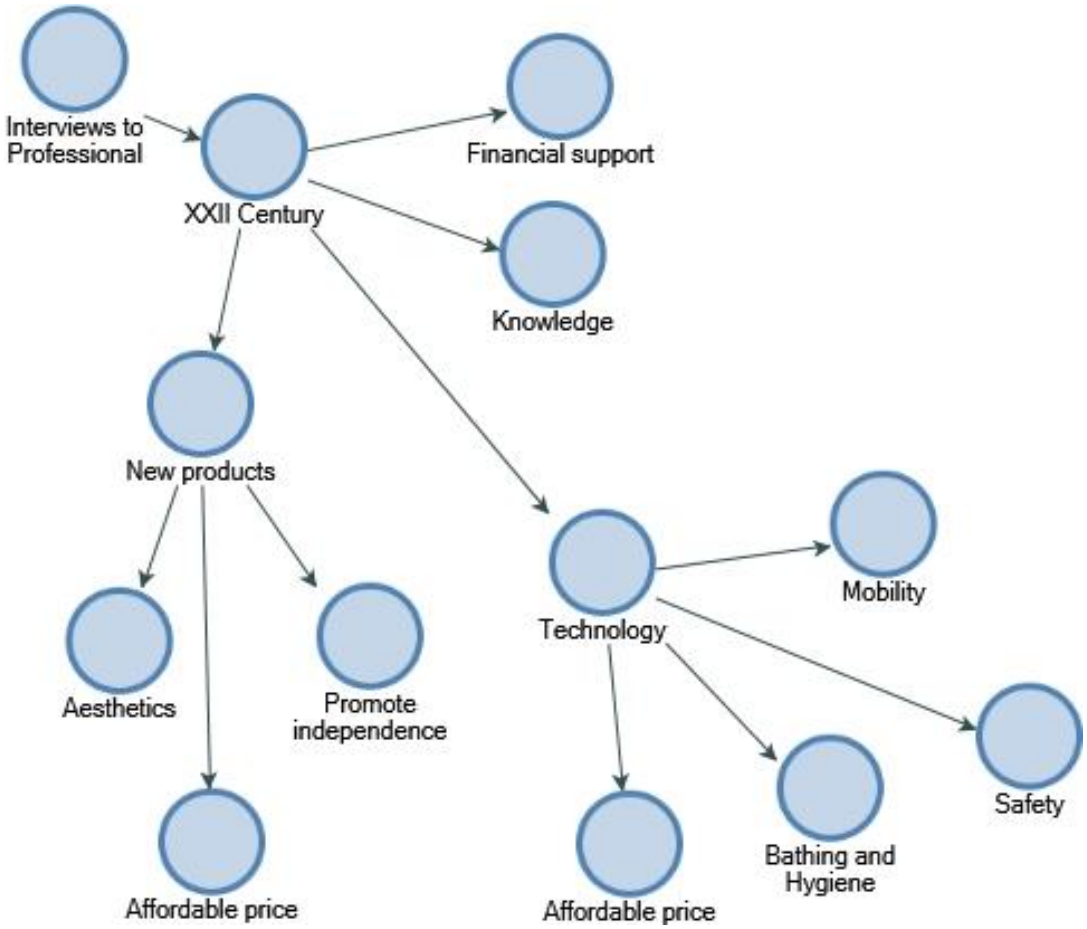

Fig.18 – Diagram concerning future in Geriatric care

5. Discussion

Through a qualitative methodology it was possible to perceive the real experience of the professionals in the area of geriatrics and to make some bridges regarding the state of the art in Design and Geriatrics. Comparing this information it was possible to achieve several findings.

When talking about the caregivers there are several issues that were uncovered. From the interviews it was denoted that there are several tasks associated to the caregiver but maintenance and promoting quality of life are the most important ((Kydd et al., 2013; Wiles et al., 2012). Although the tasks that are more referred as associated to a caregiver are DLA, in the interviews it was also understood that the elders often associate the caregivers to people who help with house cleaning and that their tasks often include everything. This way there are no limitations in their job which makes the caregiver not worry about what it is more important, the elder (Marina Picazzio Perez et al., 2014). It is also possible to understand that this problem makes the communication between caregiver and elder very difficult. It should be done a guideline to geriatric care so that caregivers can focus on the elder.

Considering informal caregivers, in Maria João Fernandes et al. (2012), it can be seen that these caregivers end up being caregivers without even realizing, and they do not have access to information about how to care an elder. This was proved in the interviews since it was possible to see that most of the elders refer to their family has their help. They often say that their families are afraid that they fall or that they end up hurt when doing a task, so they won't let them do anything. Comparing these points of view to formal caregivers' point of view it is observed that they try to do exactly the opposite, which is fighting a sedentary lifestyle and try that the elders do everything so that they can be independent. To fill this gap there can be support from the formal caregivers and government that should give help to these users, educating them towards giving quality of life and independence to the elder. There could also be a service that help this type of caregivers.

It is also evidenced in the interviews the injuries that the caregivers suffer in the accomplishment of their work, often because of the lack of resources, of time or even help from others. This problem can have consequences both in the short term and in the long term, and the recurrent efforts may go beyond pains that make it impossible to work for a definite time, to fixed injuries that cannot be cured and which makes the performance of their work impossible (Craib et al., 2007; Fragala, 2015; Hignett et al., 2016). There can be products that are lighter and help the caregiver supporting heavy weights; these products

must be accessible to the caregiver and elder.

Despite the physical difficulties, it is not only those that really matter to the caregiver, although Maria João Fernandes et al. (2012) point out that informal caregivers suffer emotional difficulties due to the fatigue of being always working, stop having a life of their own and do not take care of themselves. Formal caregivers also refer in the interviews to emotional pain but in a different way, saying that they get close to the elderly and that they end up being family to them as well, being the ones that support and help them and that they share their own life and routine.

As seen in Stichler (2013) and (Wiles et al., 2012) it is possible to understand that despite lack of information, the family prefers to have the elder ageing with them in their houses. This was also seen in the interviews with the elders, who say that the family always wants them at their houses to take care of them so nothing happens, even though the elders have their own home.

With regard to the elderly, it is possible to perceive both in the literature (Fonseca et al., 2008; Karwowski, 2001) and in the interviews that they are constantly devaluing their condition, and that they never have any type of problem. During the interviews, and later in their analysis, it is observed that, when directly questioned about their problems, they say that they do not have any health problem, they do not need help and that they can do everything by themselves. Thus, they tried to escape the questions that relate to their problems, never answering directly. However, when in conversation and questioned by open questions, they enumerate that they have the most varied difficulties and problems. This finding may also be related to the communication factor referred to in the autonomy by the caregivers, where the caregiver indicates that she often has to be aware that the elderly has some problem and needs something, because they do not say it.

It is also possible to perceive, comparing the various results obtained, that the views of the caregiver and the elderly, differ a lot regarding their condition. In fact, while the elderly devalue their problems, the caregiver values when the elderly complains and tries to perceive what is wrong in him even if he does not say it. Despite maintaining a realistic point of view, the caregiver always seeks improvements and works daily so that the elderly can have a better quality of life and depend less and less on him/her. It is concluded that the fear of the elderly to bother the caregiver, as was mentioned in the interviews, does not contribute to their improvement, and ends up being more laborious for the caregiver who, in addition to performing his tasks, still needs to try to understand what really is wrong and is necessary.

It is also concluded that the concern with falls and security is a constant, and that security often leads to the issue of fear or not feeling safe. These issues are common to

both the caregiver and the elderly, (and are also referred in Parmonangan (2016), Rodrigues et al. (2014)). It is also possible to conclude that the task of bathing is one of the main concerns mentioned by both the elderly and the caregiver (Alnasir, 2015). It can be concluded that the existing answers provided by Design are not enough or do not fulfill their objectives. Although there are several aids, this problem is not solved and has several gaps. This way, Product Design, must create products that address these fears, so that both users feel safe on this task. The government should also foster creative solutions so that they are easier to implement on industries.

It was found that most of the products only consider the elders and forget all the other possible users. These users are all who intervene with the elder, including family members, health professional, formal and informal caregivers, and also have contact with the product. It was also found that many of the caregivers say that there is not enough space to use current products and that they are difficult to store, since most of the spaces are too small.

As for the caregivers they frequently refer their injuries, physical pains, but also emotional pain. These users need not only products that help him with physical tasks and are easy to use but also, psychological accompaniment, to get them through this pain. Family, as an informal caregiver most of the times, must be educated towards the care of elders. As such, the design of products, should also be coordinated with the design of services that support caregivers.

Regarding products, it was found that the main problem reported was that they are not accessible to all, they are expensive and there is no government support (something that has also been systematically reported as a problem (Chand & Tung, 2014). It is also said that products are not functional and that most of the times users do not feel comfortable, safe and forget their existence because they do not like to use them. It is necessary that the products are really for everyone, as referred to in the principles of Universal Design (Simões & Bispo, 2006), and not just for those who have possibilities to have them. As mentioned in the initial demographic study (Nations, 2015), there is a great heterogeneity in the aging process, but the products for the elderly are standardized and do not serve all their needs.

'Time' is also considered not only due to time to perform tasks, but also as future, as most of the professionals consider that evolution is too slow and as said in chapter two, the demographic change is occurring fast, so this evolution must be fast too.

The products designed for elders and their caregivers should be accessible both economically and functionally (easy to understand), easy to maintain, tidy up, and more importantly, also take into account the caregiver who daily raises weights without any help,

a solution that is also accessible for them considering also the time factor.

6. Conclusion

This research was firstly motivated by one background project, with this it was understood that there were still a lot of gaps to fulfill between Design and Geriatric care.

To start this project a study about the demographics and several approaches to Design, from here it was possible to understand that aging is a current concern that is growing up and that Design, has a solving problem method, is still not accompanying this problem.

With this finding, it was adopted a theoretical approach (Bryman, 2015), in which there were researched several authors considering the theme, from here, it was possible to have a lot of points of view about subjects such as the position of Design in Geriatrics. It was found that there are several types of caregivers (Kydd et al., 2013), and that they are not usually concerned when talking about Design (Aced López et al., 2015). It was also found that safety is one of the main concerns considering elders.

After this, it was used a qualitative methodology (Corbin & Strauss, 2008), in which where made several interviews, concerning a more intimate conversation with all the intervenient. From here, the interviews were analyzed and they were coded in several dimensions that made possible a deep research about the practical view. Here, there were understood existing gaps and there were analyzed several points of view, from either caregivers, elders, or even a store seller.

Considering Product Design it was possible to understand with all the investigation that there is still not a position of Design that actually considers Design for All concerning the current demographic changes (Persson et al., 2015; Simões & Bispo, 2006).

Even though it existed a deep study and investigations about all the subjects, there were some limitations, such as being only in Portugal context and not able to explore the theme in other reality. Also being very difficult to contact nursing homes that are available to open their door to research and investigation which made difficult to exhaust the theme.

Concerning future steps, there should be a bigger research considering more interviews to enrich the investigation.

References:

Aced López, S., Corno, F., & De Russis, L. (2015). Supporting caregivers in assisted living facilities for persons with disabilities: a user study. *Universal Access in the Information Society, 14*(1), 133.

Afifi, M., Al-Hussein, M., & Bouferguene, A. (2015). Geriatric bathroom design to minimize risk of falling for older adults–a systematic review. *European Geriatric Medicine, 6*(6), 598.

Alnasir, F. A. (2015). Ageing and Pattern of Population Changes in the Developing Countries. *12*(2), 26.

Bryman, A. (2015). *Social research methods*: Oxford university press.

Chand, M., & Tung, R. L. (2014). THE AGING OF THE WORLD'S POPULATION AND ITS EFFECTS ON GLOBAL BUSINESS. *28*(4), 409.

Collins, H. (2010). *Creative research: the theory and practice of research for the creative industries*: Bloomsbury Publishing.

Corbin, J., & Strauss, A. (2008). Basics of qualitative research: Techniques and procedures for developing grounded theory.

Craib, K. J. P., Hackett, G., Back, C., Cvitkovich, Y., & Yassi, A. (2007). Injury Rates, Predictors of Workplace Injuries, and Results of an Intervention Program Among Community Health Workers. *Public Health Nursing, 24*(2), 121-131.

Dankl, K. (2017). Design age: Towards a participatory transformation of images of ageing. *Design studies, 48*, 30-42.

Ferreira Correia, A., Pereira, E., & Costa, D. (2016). De que necessitam as pessoas idosas para viver com dignidade em Portugal? *, 51*(219), 366.

Fonseca, A. M., Paúl, C., & Martin, I. (2008). Life satisfaction and quality of life amongst elderly Portuguese living in the community. *7*(2), 87-87-102.

Fragala, G. (2015). Bed care for patients in palliative settings: considering risks to caregivers and bed surfaces. *International Journal of Palliative Nursing, 21*(2), 66.

Friedman, K. (2003). Theory construction in design research: criteria: approaches, and methods. *Design studies, 24*(6), 507-522.

G&V, & TENTE, P. b. (2012). LINEA e-lock Serie 594E. Retrieved from https://media.tente.com/download/LINEA_elock_EN.pdf

G&V, T. (2012). Red Dot Award, LINEA e-lock Serie 594E. Retrieved from http://red-dot.de/pd/online-exhibition/work/?lang=en&code=2012-15-1151&y=2012&c=167&a=0

GDDC, G. d. D. e. D. C. (2017). Princípios das Nações Unidas para as Pessoas Idosas. Retrieved from http://direitoshumanos.gddc.pt/3_15/IIIPAG3_15_1.htm

Heylighen, A., Van der Linden, V., & Van Steenwinkel, I. (2016). 10 Questions: Ten questions concerning inclusive design of the built environment.

Hignett, S., Edmunds Otter, M., & Keen, C. (2016). Review: Safety risks associated with physical interactions between patients and caregivers during treatment and care delivery in Home Care settings: A systematic review. *International Journal of Nursing Studies, 59*, 1-14.

Hosking, I., Waller, S., & Clarkson, P. J. (2010). It is normal to be different: Applying inclusive design in industry. *22*(6), 496.

https://www.racius.com/´.

INE, I. N. d. E. (2017). Projeções de População Residente 2015-2080. *Destaque - Informação à comunicação Social*, 19.

Karwowski, W. (2001). *International encyclopedia of ergonomics and human factors* (Vol. 3): Crc Press.

Kohler. Ageing in Place. Product Solutions. Retrieved from http://www.kohler.com/bold-independence/product-solutions

Kydd, A., Wild, D., & Nelson, S. (2013). Attitudes towards caring for older people: findings and recommendations for practice. *25*(4), 21.

Laurel, B. (2003). *Design research: Methods and perspectives*: MIT press.

Maria João Fernandes, M., Helena Jorge Cardoso, T., & Dayse Cristine Dantas Brito Neri de, S. (2012). Cuidadoras informais de Portugal: vivências do cuidar de idosos Informal

caregivers in Portugal: experiences of caring for elderly. *Trabalho, Educação e Saúde, Vol 10, Iss 1, Pp 147-159 (2012)*(1), 147.

Marina Picazzio Perez, B., Juliana de Oliveira, B., Maria Helena Morgani de, A., Elisabete Ferreira, M., & Selma, L. (2014). Formal caregivers of older adults: reflection about their practice / Acompanhantes de idosos: reflexão sobre sua prática. *48*(5), 732.

Mustaquim, M. M. (2015). A Study of Universal Design in Everyday Life of Elderly Adults. *Procedia Computer Science, 67*, 57-66.

Nations, U. (2015). World Population Ageing.

Or, C. K. L., Valdez, R. S., Casper, G. R., Carayon, P., Burke, L. J., Brennan, P. F., & Karsh, B.-T. (2009). Human factors and ergonomics in home care: Current concerns and future considerations for health information technology. *Work, 33*(2), 201-209.

Parmonangan, M. (2016). CONSIDERING THE ELDERLY'S NEEDS IN DEVELOPING NURSING HOME DESIGN. *Dimensi: Journal of Architecture and Built Environment, Vol 43, Iss 1, Pp 9-14 (2016)*(1), 9.

Pattison, M., & Stedmon, A. W. (2006). Inclusive design and human factors: Designing mobile phones for older users. *PsychNology Journal, 4*(3), 267-284.

Persson, H., Ahman, H., Yngling, A. A., & Gulliksen, J. (2015). Universal design, inclusive design, accessible design, design for all: different concepts-one goal? On the concept of accessibility-historical, methodological and philosophical aspects. *14*(4), 505-505-526.

Qualls, S. H., Segal, D. L., & Hiroto, K. E. (2015). Special issues in working with older persons. In J. R. Matthews, C. E. Walker, J. R. Matthews, & C. E. Walker (Eds.), *Your practicum in psychology: A guide for maximizing knowledge and competence.* (pp. 203-223). Washington, DC, US: American Psychological Association.

Rodrigues, V., Mota-Pinto, A., Sousa, B., Botelho, A., Alves, C., & Oliveira, C. (2014). The Aging Profile of the Portuguese Population: A Principal Component Analysis. *39*(4), 747.

Simões, J. F., & Bispo, R. (2006). Design Inclusivo: acessibilidade e usabilidade em produtos, serviços e ambientes. *Manual de apoio às ações de formação do projeto de Design Inc*.

Soares, M. M., Jacobs, K., Paiva, M. M. B., & Villarouco, V. (2012). Acessibility in collective housing for the elderly: a case study in Portugal. *Work, 41*, 4174-4179.

Soeiro, M. d. A. S. (2010). *Envelhecimento português. Desafios contemporâneos. Políticas e programas sociais: estudo de caso.* Faculdade de Ciências Sociais e Humanas, Universidade Nova de Lisboa.

Stichler, J. F. (2013). Design Considerations for Aging Populations. *Health Environments Research & Design Journal (HERD) (Vendome Group LLC), 6*(2), 7-11.

Ugintaite, E. (2011). Jovem inventa uma bengala inteligente para idosos. Retrieved from http://p3.publico.pt/cultura/design/7216/jovem-inventa-uma-bengala-inteligente-para-idosos

Wai, L. (2012a). No Country for Old Men - Assunta. Retrieved from http://lanzavecchia-wai.com/projects/assunta/

Wai, L. (2012b). No Country for Old Men - Monolight. Retrieved from http://lanzavecchia-wai.com/projects/monolight/

Wai, L. (2012c). No Country for Old Men - Together canes. Retrieved from http://lanzavecchia-wai.com/projects/together/

Wiles, J. L., Leibing, A., Guberman, N., Reeve, J., & Allen, R. E. (2012). The meaning of "aging in place" to older people. *The gerontologist, 52*(3), 357-366.

www.laresonline.pt/. Retrieved from https://www.laresonline.pt/pt/valencia/estruturas-residenciais/equipamento/2454-raio-de-sol-lar-de-terceira-idade-e-centro-de-dia

Attachments:

A.Elders Interview

Boa tarde, sou uma estudante do mestrado em Design Industrial e Produto da Faculdade de Engenharia do Porto e estou a desenvolver a minha tese na área do design para a geriatria, será que me pode ajudar respondendo a algumas perguntas?

1. Qual é a sua idade ?
2. À quanto tempo tem contacto com esta instituição ?
3. Quais são as tarefas que sente mais dificuldade em realizar ?
4. Qual considera ser o papel do auxiliar / médicos / enfermeiros no seu dia-a-dia ?
5. É independente na sua mobilidade ? o que considera como independência ?
6. Sente medo nas tarefas diárias , quando está sozinha e com a ajuda dos auxiliares ?
7. Já sofreu algum tipo de lesão proveniente de quedas ou dificuldades no seu transporte ?
8. Relativamente ao seu auxiliar deteta alguma dificuldade quando ele o tenta ajudar ?
9. Tem algum tipo de equipamento que usa para o ajudar no seu dia-dia? Se sim, gosta ? porque sim ? porque não ? o que podia ser melhor ? sente medo quando usa ?
10. O que facilitaria a sua mobilidade e independência ?
11. O que o preocupa relativamente à sua mobilidade e independência ?

B.Professionals Interview

Boa tarde, sou uma estudante do mestrado em Design Industrial e Produto da Faculdade de Engenharia do Porto e estou a desenvolver a minha tese na àrea do design para a geriatria, será que me pode ajudar respondendo a algumas perguntas?

1. Qual é a sua idade ?
2. Que função desempenha nesta instituição?
3. À quantos anos trabalha nesta área?
4. Relativamente à mobilidade do idoso, qual é a sua autonomia perante si ?
5. Qual o seu papel para auxiliar o idoso nas tarefas diárias ?
6. Quando falamos de doentes acamados quais os problemas que identifica.
7. Quais as tarefas em que a sua presença é indispensável ?
8. (médicos - Que parametros são importantes na avaliação da evolução do idoso ?)
9. O que acha mais importante referenciar na àrea da mobilidade dos idosos?
10. Nas transferências entre cama cama e cadeira, ou banho e, vice versa quais são as maiores dificuldades que sente durante a sua realização ? Conhece algum tipo de produto que auxilie a suportar o peso do idoso ou alguma técnica específica? Quantas vezes por dia em média realiza esta tarefa ? ((Por idoso e no geral))

se usar produto/técnica : qual ? conforto ? manutenção ? facilidade de uso ? Noção de preço?

11. Que consequências traz quer para si como para o idoso esta tarefa ? (lesões, etc.)
12. Como pensa que será no futuro a mobilidade dos idosos (séc.XXII)?
13. Considera que tem existido alguma evolução relativamente à àrea da geriatria ?

C.Store Seller Interview

Boa tarde, sou uma estudante do mestrado em Design Industrial e Produto da Faculdade de Engenharia do Porto e estou a desenvolver a minha tese na àrea do design para a geriatria, será que me pode ajudar respondendo a algumas perguntas?

1. Qual a sua idade ?
2. À quanto tempo trabalha nesta loja ?
3. Sempre trabalhou neste tipo de lojas ?
4. Tem alguma formação na àrea da saúde ou relacionada?
5. Quem são os principais compradores da loja ?
6. Ligados a geriatria quais são os produtos mais comprados ?
7. Que problemas refere na àrea da geriatria?
8. Que tipo de produtos são mais usados?
9. O que refere relativamente à mobilidade dos idosos?
10. Que dificuldades encontra nos seus compradores?