Enhancing the Independence and Mobility for the Elderly and Disabled

A New Approach for Older Users

Harry West Henriksen
Massey University 2013

Fig. 1

ABSTRACT

This applied design research expresses the increasing importance of mobility aids through redesigning and enhancing the abilities of an existing mobility walker; which creates both a new product and enlightened user experience that encourages elderly and disabled to remain active and independent in all aspects of life.

Through personal experience and research, this project outlines how important mobility products are to the elderly and disabled communities and that existing products are out-dated and repeatedly fail to meet the growing needs and wants of these individuals. This is achieved through experience focused methods and processes designed to increase empathy and understanding of the target audience.

This new mobility product promises to eliminate the requirement for multiple aids, and remove previous limitations that exist both socially and physically within the environment; thus strengthening the trust bond between the user and the product. This outcome therefore presents a practical solution to help support the market increase for personal mobility, through integrating new and feasible, electric capabilities in addition to redesigning the entire structure and appearance of the walker from scratch.

COPYRIGHT

ACKNOWLEDGEMENTS

This research project was only possible through the constant love and support of family and friends. Without them, my work would never have taken flight.

A tremendous thank you goes to my supervisors Lyn Garrett and Chris Jackson, as well as the rest of the Massey University staff, for their guidance and inspiration.

Finally, thanks to the participants who played a vital role by contributing invaluable information and feedback through their life e xperiences.

CONTENTS

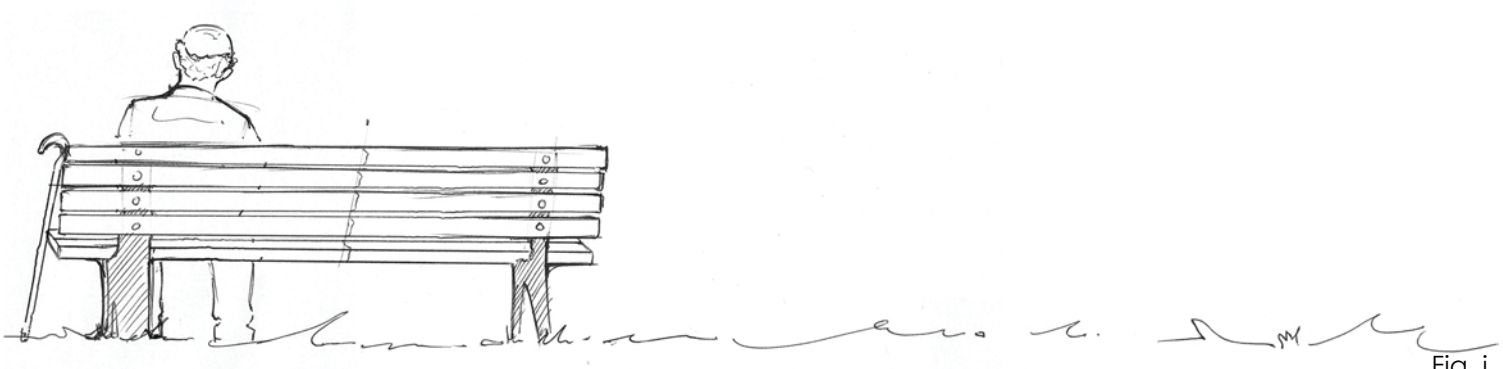


Fig. i

PREFACE

This project was ignited and developed through my own intimate experiences gained from working at my parent's retirement homes after Graduating in 2010 from Massey University with a Bachelor of Transport Design. This two year experience advanced my decision to return to Massey and undergo a Master's degree and bring my project to light.

At this stage I've witnessed many facets of the rest home environment; seen the daily rotation of life and made many local friends, but also witnessed the effects aging has on the human condition. I had seen residents full with life, active and engaging, alongside others who appeared to have been forgotten by the world, slowly becoming into a shadow of their former self.

In truth, many would not survive without retirement homes; without the constant 24 hour health and medical care, constant support by the caregivers, and without the safe and carefree environment they provide. But in my opinion, there are many indicators that some residents could survive independently outside this environment if it were not for their reduced physical abilities. Witnessing this, mixed with my passion for design, I felt compelled to combine these experiences and undertake this research project; with a potential outcome of igniting future opportunities.

However, it was one incident in particular that sparked the pathway for my project and let me look at the developmental needs of mobility aids. I noticed an elderly resident resting on his walker at the end of the drive watching traffic. The only thing holding him at the gates was the physical condition of his body, as if these gates had now become the extent of his world. This is when the concept occurred to me that improved personal mobility can drastically enhance one's quality of life.

Without my involvement with the retirement homes I don't believe I would have noticed this design problem. These experiences have helped to mould my design into a way that can help these individuals, and ultimately, enable my parent's generation to have a more comfortable and independent future.

Fig. 2

INTRODUCTION

The aim of this research project is to enhance independence and mobility for elderly and disabled by redefining and recreating the standard mobility walker. This is successfully achieved by utilising the study of gerontology, a practice directed at improving the function of elderly through technology, whilst interweaving a design approach involving a range of multi-method processes.

Contemporary mobility products have certainly evolved over the years, however, they rarely deviate from their predecessor's design style and purpose. They continually fail to meet the growing needs of an aging population that requires multipurpose, enhanced usability, and customisation to users' preference.

I accomplish this by integrating the traveling capabilities of a conventional mobility scooter with the practical functions and role of the mobility walker; creating a hybrid product free of prevailing social stigma of which surrounds current mobility aids, and ultimately creating a market opportunity that had not existed before.

This new breed of mobility aid will retain all that the conventional walker has to offer from inside and out regarding safety, security, and stability; as well as the added bonus of utilising two small electric motors in each rear wheel to travel distances that would normally tire or discourage vulnerable users.

Within this document I will begin by detailing the background in which the concept is set and how the ageing population of baby boomers have challenged and transformed what it means to grow 'old'. A review of existing mobility products gauges the current mobility market and creates projections as to where and how these will possibly develop.

Inspiration derived through a number of case studies has helped formulate three key areas which result in direct impact on my experimentation and design development. With discussion and analysis the design details are then explained and justified, concluding overall results and success of the project.

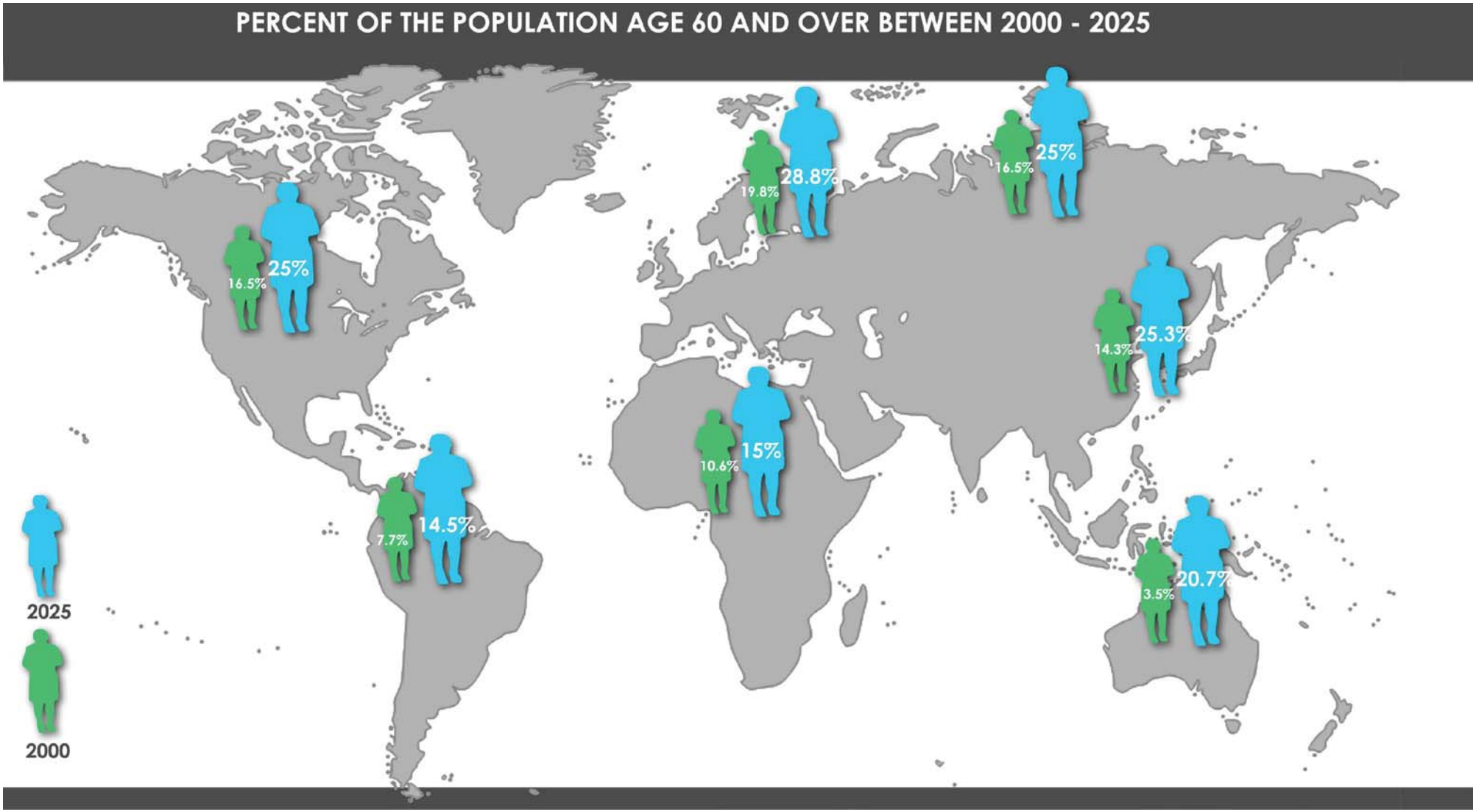


Fig. 3. Statistics regarding the global aging population. Stuff.mit.edu. (2006).

BACKGROUND

This chapter aims to outline the global demographic shift to an aged population. It will outline what it once meant to be 'old', the extent that has evolved within society, and what this means to future generations.

I have analysed products available to this emerging Silver Market, ranging from simple and conventional products to alternative means of transport which were both directly or indirectly related to this project's target market.

The Grey Face

Today we are facing an accelerating social change with an increasing aging population. This is due to declining birth rates and increased life expectancy, technological advances in health care and improved living conditions, mostly among developed nations (Bloom, Boersch-Supan, McGee, & Seike, 2011).

In 2011 New Zealand saw a surge in the 65+ age group, with 1 in every 60 New Zealanders believed to be aged 85+ (Statistics New Zealand [NZ], 2006). Population statistics manager Andrea Blackburn attributes the rise in these numbers to "longevity which has increased over time, resulting in a greater number of people in the older ages than seen previously." (Statistics NZ, 2011)

Figures from 2006 projected current numbers in New Zealand of people over 65 to be at 599,100. Further forecasts anticipated "the 65+ age group … to make up over one-quarter of New Zealand's population from the late 2030s, compared with 12% in 2005" (Statistics NZ, 2006).

The 2006 census estimated that 660,300 New Zealanders have a disability of some kind (17% of the country's population). Of these, the highest percentage amongst any age bracket was that of those 65 years and above, forming 45%. The second highest percentage was those aged 45 to 64 years old making up 20% (Statistics NZ, 2006). This emphasizes that as a country we need to develop strategies for appropriate management.

Physical safety and stability are of major concern to this ageing population. According to Fisk, Rogers, Charness, Czaja, and Sharit, falls are one of the most common issues for elderly today: "ageing brings with it changes in perception, cognition, and control of movements" (2009, p. 7).

A Change in Attitude

The past 50 years has witnessed evolving attitudes that challenge the archaic term of 'old', creating an outlook that portrays only being as old as you feel. One's physical age is less significant too, as retirees are generally healthy, educated, and active.

Baby boomers- those who were born between 1946 and early 1964- are leading the defiance of this stereotype. Herstatt & Kohlbacher claim that baby-boomers have always:

> *"innovated and redefined trends and values, challenging the standards and practices of pre-modern society through their political, social, or economic views…reinvented professional careers by aiming for the professional integration of woman,*

and redefined social concepts like family and active ageing" (p. xxiv).

A survey conducted by OpenStax College (as cited in Connexions, 2012) concluded that perception between one's physical age and one's perceived age differ greatly, as if society intends to postpone the title of 'old'.

"Respondents ages 18 to 29 believe that the average person becomes old at age 60. Middle-aged respondents put the threshold closer to 70, and respondents ages 65 and above say that the average person does not become old until turning 74" (para. 5).

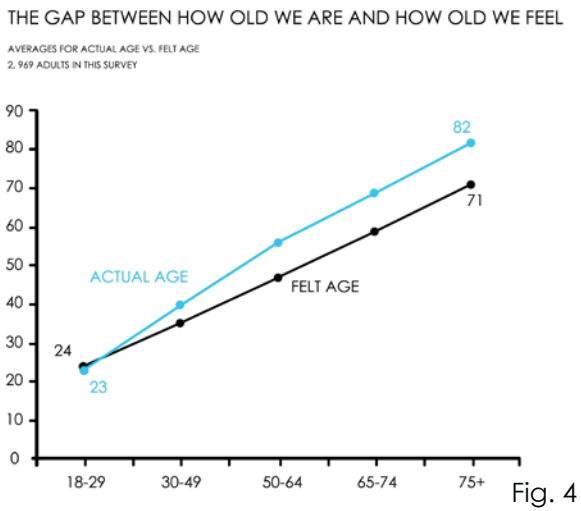


Fig. 4

No one wants to grow 'old' or wants to think that they've become 'old', therefore, in this context the concept of a mobility product must move away from becoming an 'old' persons product and focus on becoming an product 'ability'. As a designer this means I must move away from conventional processes and undertake a universal approach.

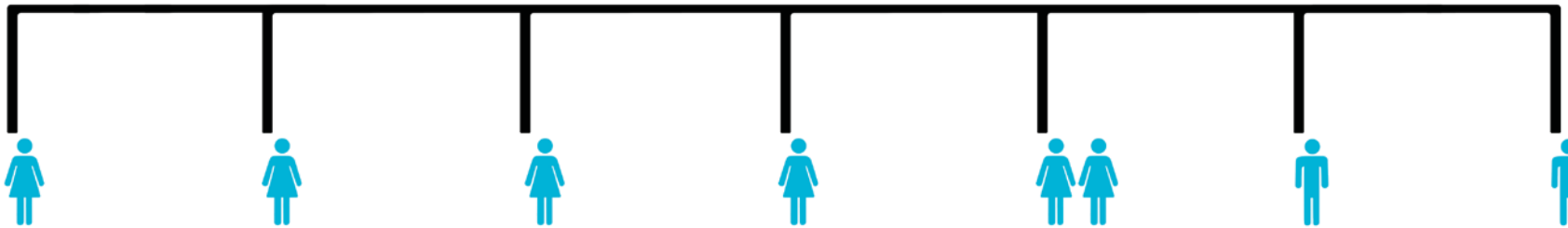
Universal design vs. Elderly Specific

Over the course of this project the target audience underwent three stages of evolution. The initial project was to enhance mobility in aging communities, but was later redirected to conform to Kim Goodwin's (2010) notion of user-centred design and move away from age to ability modelling.

The second stage began as I realised ageing is a multi-layered process and it is not adequate to focus specifically on the elderly as a target market. Herstatt, Kohlbacher and Schweisfurth (2011) claim that "Chronological age by its self is not sufficient segmentation. A promising dimension is the need for autonomy, which increases with age and which is correlated to social isolation and other individual draw backs" (p 3).

Kim Walker (2011) follows this same notion by stating that "nobody wants to feel old as a result of choosing or using a particular product or service" (as cited in Herstatt & Kohlbacher, p 295). This meant a revision of the intended market was needed to acknowledge the potential of younger user groups. The fact that products labelled largely for elderly were undesirable, preferring 'solutions for everybody' added a heightened element to the design development.

Interviews



VERONICA BERNARD

Retirement Home Registered nurse. Responsible for the medical care of all residents, maintaining their health and wellbeing, and organising staff duties. Veronica Bernard has many years behind the medical and management scene.

MERE FALLON

Retirement Home Manager. Responsible for daily operation of the Retirement home, looking after the concerns of residents and their families, and running of general facilities. Mere Fallon has many years of management experience.

TRISH STEWERT

Retirement Home Activity Coordinator. Trish is responsible for actively engaging with residents and looking after their physical and mental wellbeing. She understands the importance of maintain one's mobility and encourages residents on a daily basis to remain active.

LINDA MASON

Works retail at 'Mobility Plus' on Auckland's North Shore. Promotes and sells mobility products to elderly and disabled, and their families. Has a deep understanding of the product variants and prices for most mobility aids with many years experience.

HANA KERSE & SALLY kERSE

Hana is a teenager living with Cerebral Palsy, and Sally is her mother. Hana has a range of mobility products but prefers her wheelchair that has been stylised to her own preferences. Sally has supported Hana through every step of her life and given her the chance to expand her physical capabilities through a range of mobility products to increase her mobility.

IRA TURVEY

Ira is a 65 year old gentleman who has dealt with cerebral palsy his entire life and lives independently. He finds it rather difficult to move about but has a range of customized products to meet his needs and aid him inside and out.

JIM TURVEY

Jim is 89 years old and lives independently. He uses a walking stick for short distances and the mobility walker over longer distances. He is an active member in society and has become technologically savvy with the constant help of family members.

Grey Power Integration

DUNCAN & VALERIE McDONALD

Both Duncan and Valerie are retired and belong to Grey Power, Wellington Central. Duncan is the President of this branch, and both are active members in society. Neither use mobility aids but have had association with them in the past due regarding Grey Power. Both foresee the possibility of using a mobility product in the distant future.

LAURA NICHOLLS

Retired and lives independently. Laura also belongs to Grey power, Wellington Central and is an active member of her community. She uses public transport and keeps up her physical wellbeing with constant exercise, however, has a number of friends who utilise mobility products.

Fig. 5

The third stage grew from the underlining tension between project origins and the undisputable need of universal user consideration. This tension was addressed through compromise. I was aware of the negative effect created by stigmatising of senior-specific products, so began efforts to design inclusively but tailored to an elderly market's requirements. Theoretically, this would help future-proof the concept by creating a product attractive to both young and old. Hersatt, Kohlbacher, and Schweisfurth (2011) conclude the "way to approach the silver market without explicitly excluding younger customers is to focus on autonomy, representing an important synonym for a good life" (p. 3).

It is important to challenge this concept of elderly and disabled as age is a concept that shapes social experience. Gasman & Reepmeyer suggest that often when faced with an elderly demographic it is easy to make two assumptions: firstly, that all elderly suffer from impairments; and secondly, that younger consumers are not. Through universal design, efforts will not separate but in fact integrate each consumer group (as cited in Herstatt & Kohlbacher, 2011).

Current Mobility Aids

Research of the current products available underwent two methods. The first was straight forward which involved online market research outlining an array of varying mobility products related and unrelated to my project; but the second was accomplished through interviews (Fig. 5) involving those who were directly, and indirectly involved with mobility products. This result produced an accumulation of knowledge and personal experiences that offered a honest, unbiased and realistic view of not only mobility products but the lifestyle effects that go with them.

McDonagh & Formosa assert the "products that surround us have a profound impact on our daily lives. When they empower us to complete daily tasks with ease, speed, and dignity, they contribute to our wellbeing and independence" (as cited in Herstatt & Kohlbacher, 2011, p. 11).

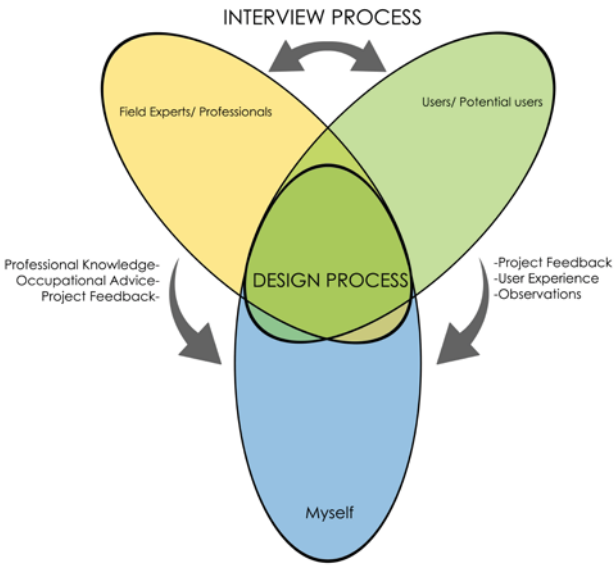


Fig. 6. The interview process.

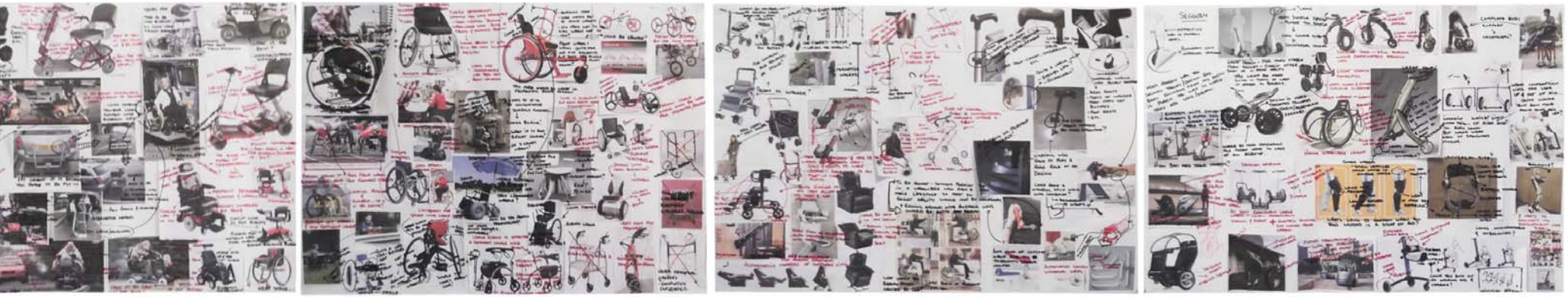


Fig. 7. Research into the market of mobility travelled down many avenues.

Overall, research shows that the majority of mobility products available today fail to meet the personal requirements of their users. They appear as sterile, functioning products designed with the overall intention of generically aiding mobility in the most basic form. (S. Kerse, personal communication, June 2, 2012). Trish Stewart also theorizes that "there is limited heart and soul in the design of mobility aids; we need to put ourselves in their [elderly users'] shoes and inject a sense of empathy and compassion" (T. Stewart, personal communication, June 6, 2012).

So why is there disconnection between what we think elderly and disabled want or need, and what it is they are actually asking for? Three main reasons are evident:

• Arnold and Krancioch suggest a lack in effort surrounding the participation of research initiatives regarding the time and effort taken to understand tasks given, compared with the faster, younger participants (as cited in Herstatt & Kohlbacher, 2011).

• Ostlund (2011) proposes that "interpretation of their preferences does not rest with the elderly themselves, but with those who care for them" (as cited in Herstatt & Kohlbacher, p 16). Similarly, this was some-what evident within the retirement scene as well, as elderly were often given products or aids that were for their own good, rather than a choice or variety.

• Or most probable, suggested by Schmidt-Ruhland and Knigge (2011), is "lack of empathy, especially on the part of young designers dealing with elderly to very old customers" (as cited in Herstatt & Kohlbacher, p. 47).

The reasons vary for the mismatch between products designed and users' needs regarding the majority of products. However, emerging trends can be seen carrying empathetic trails of personality and characteristics into new and evolved products. This will be explored later on.

The Mobility Walker

The mobility walker has developed little since first appearing in early 1950. Wheels, a seat, storage options, adjustable handles and the ability to fold compactly for storage or transport have been added (Wikipedia, 2012). Despite their outdated design they have become common place within the retirement world.

Current mobility walkers offer substantial amount of support and stability in and out-doors. Aside from primarily functioning as a walking aid, they are able to store items and valuables and act as a seat if the users tire.

But, despite the aid they offer; their ease of navigation, their durability and robustness, and their simple construct, the walker offers an efficient, affordable and necessary product within our society. However, as the demand from users increases regarding performance and usability, so must the design itself. The walker of today needs to be redesigned and recreated to meet these new arising challenges so that it may meet the needs and wants of it's futures users.

The correct way to operate a walker is for users to walk within the frame (Fig. 8 & 9), applying weight through slightly bent arms; however, Veronica Bernard notes that most users use the walker incorrectly in order to meet their own needs. "Most don't use it right; the majority push it out in front of them where it offers little support" (V. Bernard, personal communication, March 5, 2012).

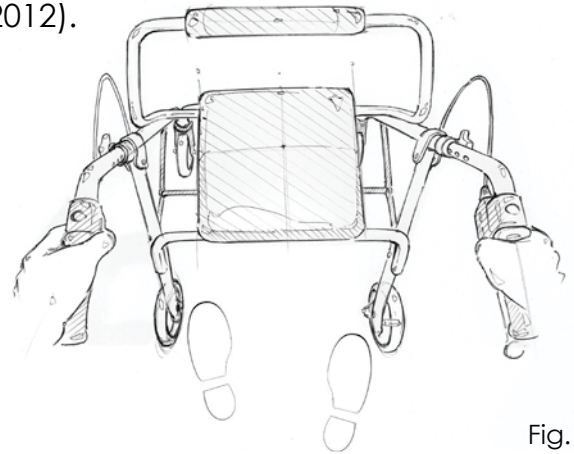


Fig. 8

Fig. 9

The product generally meets most users' needs but falls short due to:

1. The user's lack of abilities, as quite often elderly and disabled tire easily with age related syndromes; it is up to their own stamina to how far the walker may be applied.

2. Despite redesigns the overall look and feel has become stale, out-dated, and stereotypes the user as 'old'.

3. The small wheels restrict the walker, even in the slightest of uneven terrain.

Fig. 10. Walker Analysis 1

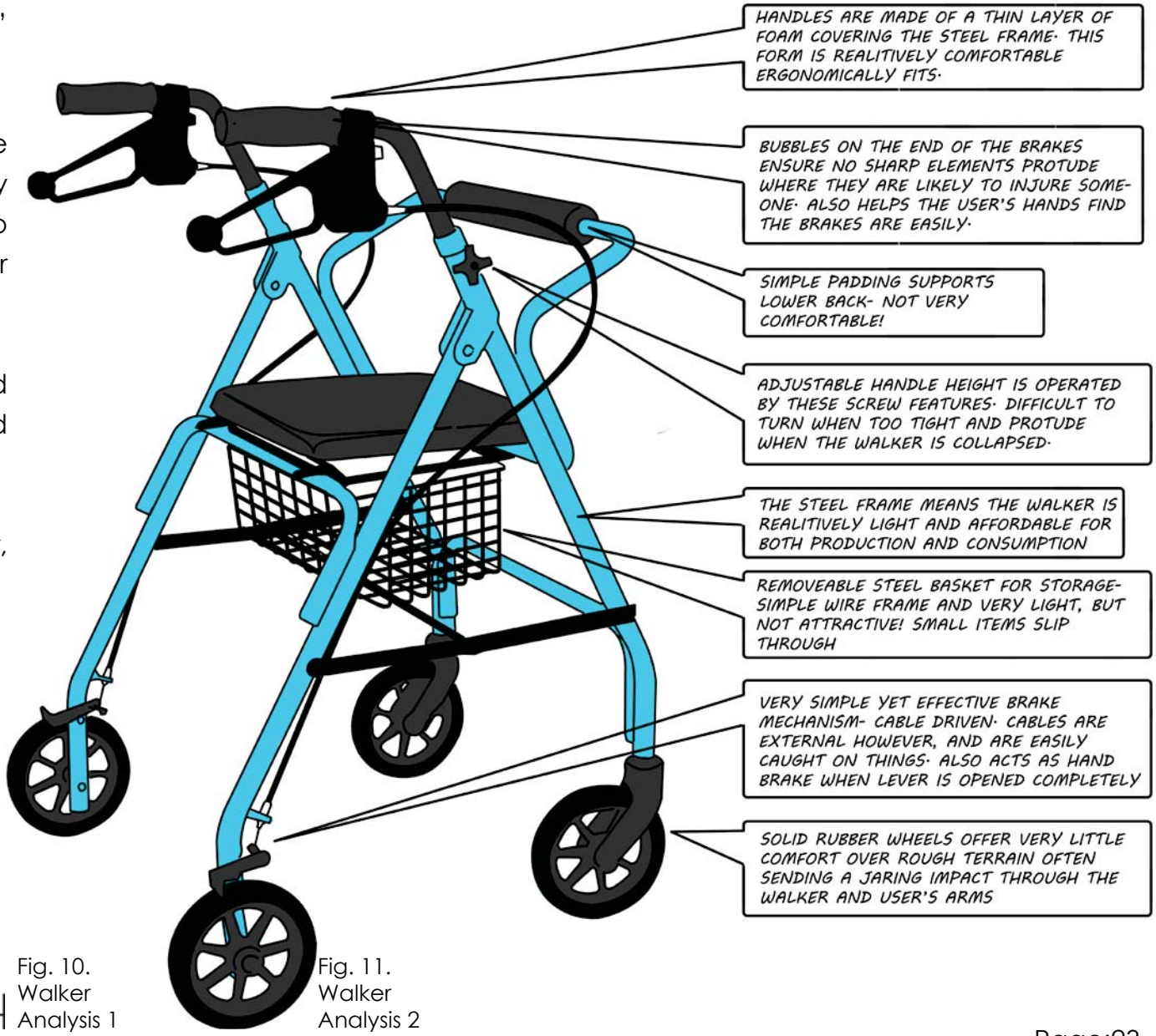


Fig. 11. Walker Analysis 2

The Mobility Scooter

Electric scooters greatly increase independence and travelling distance, allowing one to become self-sufficient and travel reasonable distances.

The mobility scooter shows clear evidence of evolution with an increasing range available. Research shows the latest of models (despite often presenting a rather large price tag) have very attractive features and abilities.

Sound design and construction means the user looks and feels safe and in control, meaning practically anyone can use one. Storage options further improve the scooters usability and large wheels allow the scooter increased off-road ability.

Quite often, the scooter will also offer an easy transition for those no longer driving a personal vehicle but still wanting to remain mobile.

Where the mobility scooter fails is largely due to:

1. Being physically large and awkward they are usually kept outside, under a cover, or garaged. For those who live in retirement homes or villages, with family, or in a generally small complex, this is simply not practical. Linda Mason agrees, "That's exactly it, the problem people face is you must have somewhere to store them, and quite often most don't" (L. Mason, personal communication, April 13, 2012).

2. The cost of mobility scooters is significantly higher than the walker. Cost analysis research found average costs of a new scooter range between $3000 and $8000, a significant price tag that could discourage potential users.

3. Their size also means that users struggle to navigate malls and crowded pathways.

4. The inability to be transported without proper equipment means they can only be used within a close proximity to home. Those that do hold the capability of compacting to improve transportation are far from attractive, and still pose problems for users lifting heavy components such as the engine and battery.

Fig. 12. Scooter Variant 1

Fig. 13. Scooter Variant 2

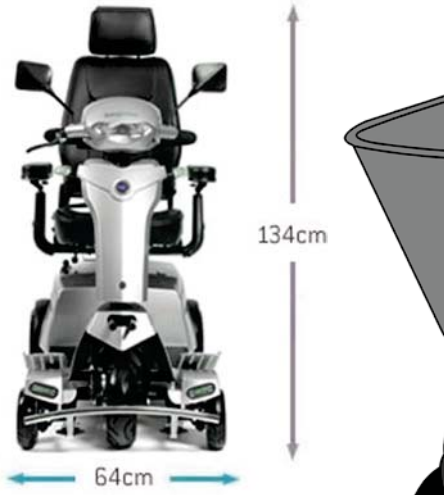


Fig. 14. Basic Scooter Dimensions

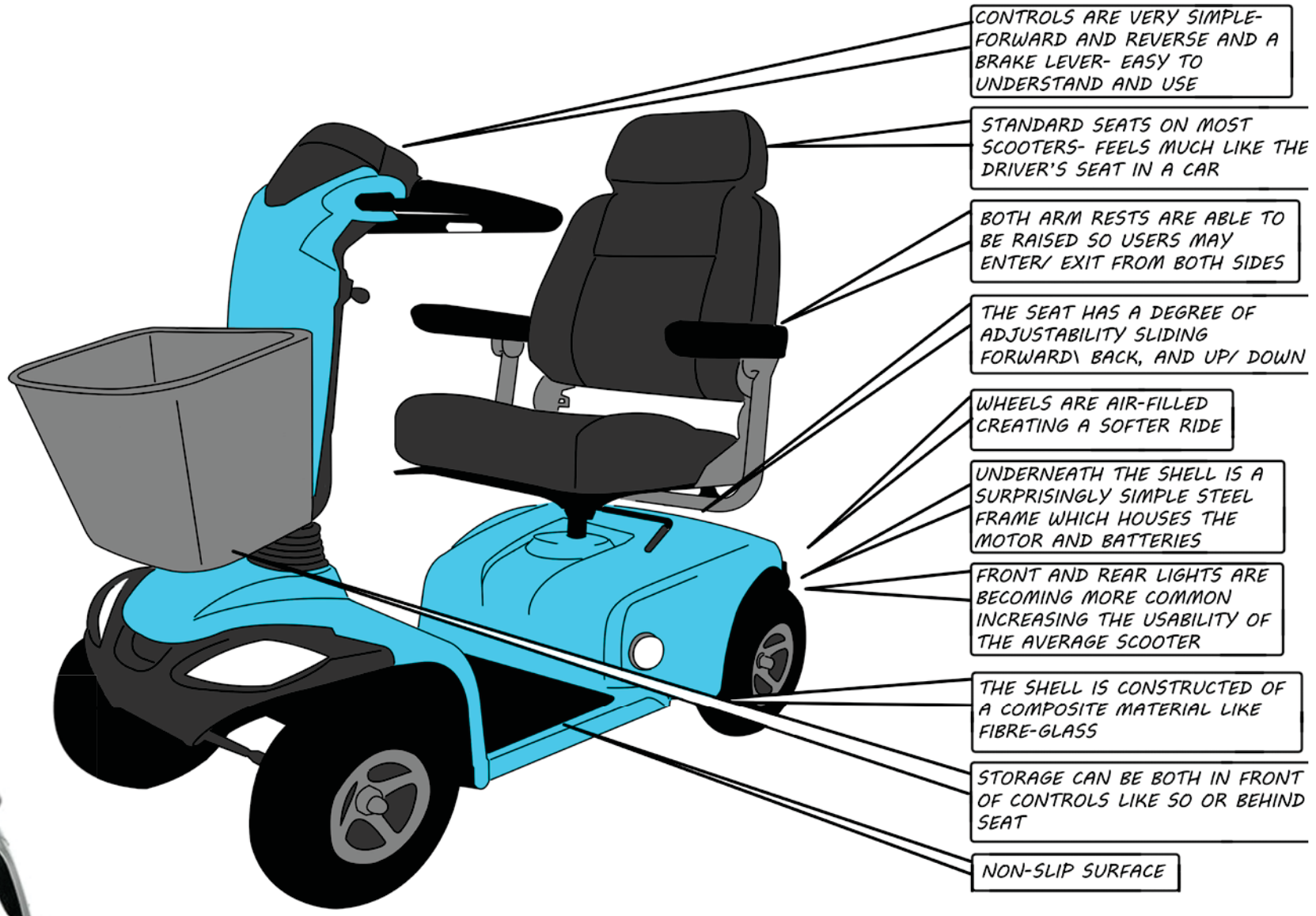


Fig. 15. Scooter Analysis.

Fig. 16. Automotive Giant Honda and two of their groundbreaking personal walking assistive devices.

Analysis

The scooter has received slightly more attention through design. However, while the walkers form and composition has evolved, it remains relatively the same; bland and far from appropriate.

The walker meets a bare minimum of requirements but integrating both products could greatly enhance the user's experience.

The most evident in this research is the need for larger wheels as the current size of 15.5cm in diameter can be easily hindered. A young mobility aids user with cerebral palsy, Hanna Kerse, reflected in an interview that something as small as a twig or pavement crack can cause serious problems (H. Kerse, personal communication, June 2, 2012). This development of wheel size would mean the walker would effectively engage a wider range of terrain opportunities and open further market opportunities.

This wheel size has been a largely accepted consensus as well through each interview, Mere Fallon summarises that "it's time for something fresh, that carries a new look and meaning" (M. Fallon, personal communication, March 5, 2012).

The Horizon

Most products appear to have been designed with function and manufacturing efficiencies far outstripping form and meaning. However, with analysis, it is evident that new products and futuristic designs that will challenge the future market of mobility aids are beginning to surface.

Projections identify a trend of aids moving away from external devices such as walkers and wheelchairs, towards merging both user and product. This essentially replicates an extension of the user's body, aiding or replacing a specific ability; becoming rather intelligent mobility in a sense. A successful example is the range of Segway scooters; while emerging concepts and products from automotive giants Honda; (Fig. 16) The Walking Assist Device (A), and the Honda Stride (B) project even further possibilities.

However, these are far from becoming mainstream products and this project proposes an realistic evolutionary step. Despite current and future markets; Alan Kay concludes rather nicely that "the best way to predict the future is to invent it" (cited in Buxton, 2007, p. 223).

Chapter Two: Design Research

I have explored a range of multi-method approaches to answer each of the three primary questions as traditional research methods have failed to produce attractive and helpful solutions for this age group. This has helped to shed light on where and how I can best identify direction and also develop an in-depth understanding behind the theory and application of the final concept.

Each question area holds direct and indirect answers which can be traced back to its core. The final solution has been formulated through the evidence gained from the way the topics interlink and form relationships; therefore building a more concise foundation to work from.

These questions originated from categorising subject matter into three concise areas which are to follow.

Question One.

What are the relationships between these mobility products and the users, the society, and the environments in which they are utilised?

Ostlund believes "it is insufficient to simply talk about old people or to categorize them in accordance with what we already assume. We need to talk with them" (cited in Herstatt & Kohlbacher, 2011, p. 16). In order to approach this question directly I decided to go straight to the source and hear what the immediate users had to say. This method offered real time information that included young and old, both abled and disabled, as well as medical staff and field professionals whom delt with these products and symptoms of the users on a daily basis (fig 5).

The interviews conducted cover areas associated or with elderly and/ or disabled life styles, as well as the mobility products involved.

The environments which these mobility products are utilised in were also taken into consideration in an attempt to understand the physical challenges that test both the product and user.

Product and User Relationship

Over the two years of working in retirement homes I developed a deep understanding of the diverse role that mobility walkers play. Some residents rely on them in everyday life, as an extension of their own physical self, but others refuse to use them with varying degrees of reluctance. Observations and past experience showed this stems from a number of conflicting causes. A prime example would be a gentleman, younger than the average resident, who refused the use of a walker to aid his unstable gait despite all efforts from staff; resenting it as an old persons' product.

Other examples showed an acceptance that soon aids will be necessary in the future. Jim Turvey owns a brand new walker he purchased with family members but still prefers to use his walking stick. However, he admits he would probably use it for longer distances, and eventually more frequently (J. Turvey, personal communication, June 5, 2012). This reflects the use of walkers being relevant to the users' individual ability. Similar attitudes were evident with Grey Power members, either referring to when they may need one in the future or other family and friends who would benefit from such an aid.

Overall there is an apparent mixed approach to mobility aids, mainly the mobility walkers, and the user or potential users. The rest home image is one built upon all residents living happily but safely while using these mobility aids (M. Fallon, personal communication, March 5, 2012); however, there is still

some resistance from individuals to utilise these aids. Oddly enough, I found those living independently were more open and approachable to admitting to eventually having to use a mobility aid, such as the walker, yet deferred using it till a later date.

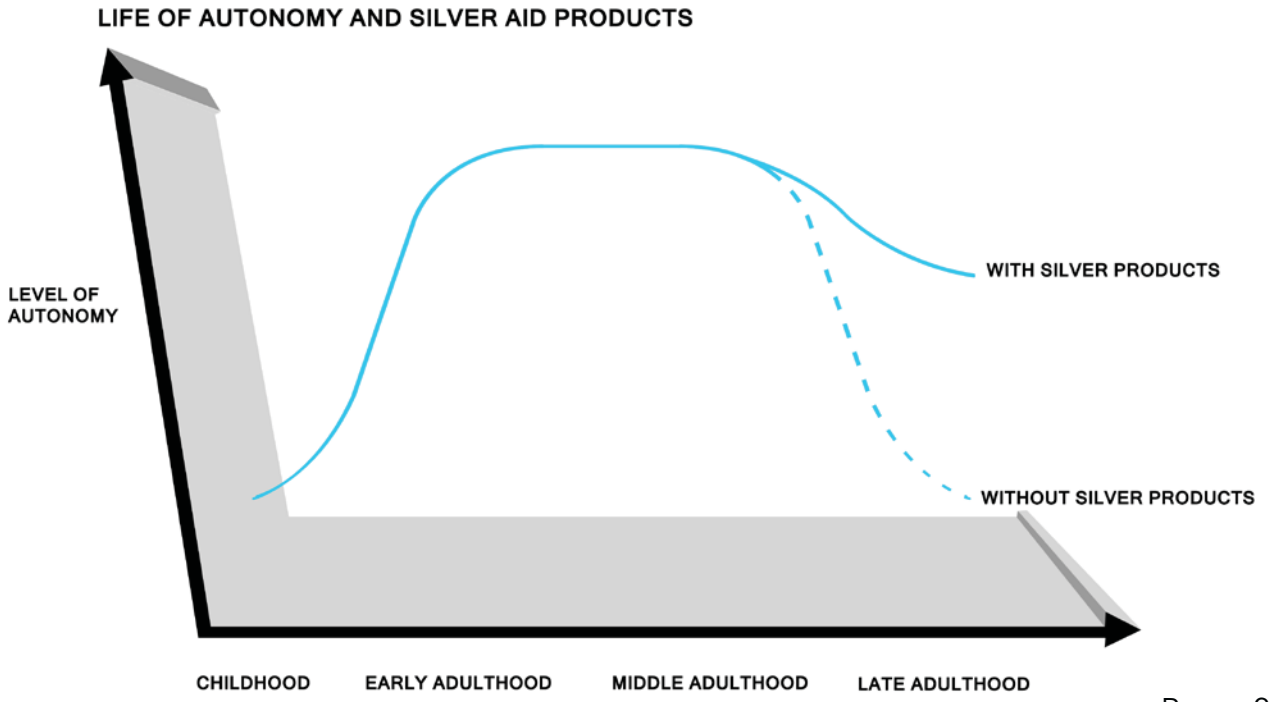
Purchasing of Mobility Aids

Within the retirement scene, elderly are often persuaded to purchase mobility products as family members might see the need for them (M. Fallon, personal communication, March 5, 2012). This could be due to the fact that in many cases people are reluctant to admit they are struggling and that creates a dangerous scenario where some really do need the support but refuse to accept these facts (V. Bernard, personal communication, March 5, 2012). Through past observations I would also suggest that some are simply unaware of their body's natural weakening and it is not until an accident occurs that they purchase an aid of some type.

Mobility aids retailer Linda Mason has observed that a lot of the time the family members are shopping for mobility aids with potential users, showing encouragement and so that they can make the best choice to accommodate the user's needs (L. Mason, personal communication, April 13, 2012).

To address this, an increase in awareness towards potential users could be designed so that they may adopt an approach earlier rather than later, towards accepting mobility aids and the safety and stability they provide. Although not a main aim, the launch of this concept could quite possibly achieve the desired public awareness.

Fig. 17. Those whom utilise silver aids are statistically retain better mobility in later years.



Environment Exploration

Fukuda (2011) believes "it is essential to understand the field with regards to the place where a product is used, the person who uses the product and the purpose of using the product" (as cited Herstatt & Kohlbacher, p. 87).

If an effort is made to understand the environment in which the walker is most commonly used, design can help make decisive changes to one's life and increase physical as well as mental independence; expanding limitations and boundaries.

"Humans create their cognitive powers by creating the environments in which they exercise those powers. At present, so few of us have taken the time to study these environments seriously as organisers of cognitive activity that we have little sense of their role in construction of thought" (Hutchins 1995, p. 153).

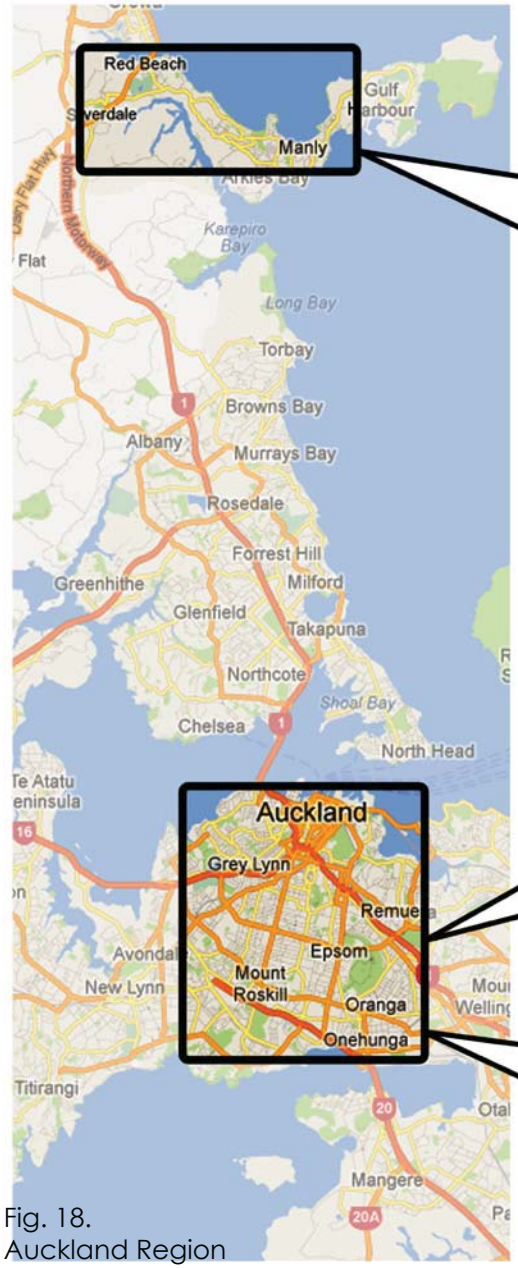


Fig. 18.
Auckland Region

Fig. 21. Retirement Home 3.

Fig. 20. Retirement Home 2.

Fig. 19. Retirement Home 1.

In an endeavour to understand the main users of mobility walkers I observed, recorded, and analysed three retirement homes (Fig.19 - 21) by exploring their interior living areas, social environments, the immediate surroundings, as well as undergoing a short journey to the local shops and back. This will allow an insight into the main elements from a situational disability caused by the environment rather than an actual disability.

This method of research uses the retirement homes as a starting point, expanding beyond to base further findings as the surrounding population of each location is wide and diverse in a number of ways. Each noticeable aspect was categorised to highlight potential obstacles which could prove to be difficult, even hazardous to elder or disabled people involved:

• Terrain.
This ranged from mild, to severe conditions caused by cracks, driveway entrances, and debris. Within approximately fifty metre radius general deterioration of footpaths was a main occurrence. Underground roots that disfigured path surfaces were also common.

• Safety and Security.
Students from local colleges surge through public facilities during school hours. This can be quite intimidating as they often walk 3-4 abreast. I was only mildly discomforted by this but more vulnerable pedestrians may be put off and possibly avoid such areas altogether.

• Environment.
Traffic (Fig. 23) was the main hindrance for both homes located in central Auckland with peak hours being worst. One has significantly less vehicle traffic but increased pedestrian traffic.

Fig. 23. Environment Exploration collection- Traffic

Fig. 22. Retirement Home 1.1

- Indoors.

o The inside environment was a highly accommodating and safe atmosphere, in contrast with external factors.

o Quiet and peaceful despite some external noise.

o Interaction of family and friends that visit bring a sense of excitement and anticipation.

o Living spaces are centrally located throughout buildings making them easily accessible.

o Although, over time I experienced a slight claustrophobic feel and a relief to go outdoors.

Fig. 24. Retirement home 3.1.

Fig. 25. Environment Exploration Collection- interior.

Fig. 26. Environment Exploration Collection- surrounding areas.

Fig. 27 Retirement Home 2.1.

Observing what was going on within these environments clearly identified issues that would cause mobility limitations that could hinder anybody, regardless of age or ability. In early exploration I utilised the mobility walker in order to recreate an average user's journey, but immediately it was evident that this was to prove inadequate as I wasn't physically disabled in any way, if fact, the walker hindered my movement to some degree. I needed to research further methods that would actively recreate a user's journey while exploring these environmental hindrances.

Fig. 28. Original Walker Trials.

Question Two

How do I build a background of understanding and empathy behind my work?

Personas and Beyond

The use of personas (fig. 30) has helped to formulate research findings into a coherent package involving user wants and needs. These characters progressed throughout my work, becoming more than fictional characters and acquiring a personal representation. Two in particular were Debbie McMillan and Fred Daleson whose characteristics reminded me of retirement home characteristics.

These personas captured a range of requirements and a diverse set of social interactions and social contexts that were continuously reflected upon throughout design development. Rather than use real photos I created illustrations which could be used to demonstrate design features, apply context in design stages, and ultimately tell a story.

On that note, the idea above of 'telling a story' resonated with me on a new level with my work. This occurred after the review into current visual modes of presenting and marketing of mobility aids appeared sterile, cold, and unattractive, as producers and retailers attempt to keep the appearance of these products as clean and hygienic. This became evident while reviewing brochures on elderly healthcare and products. (fig. 29)

Fig. 29. Brochures collected throughout research.

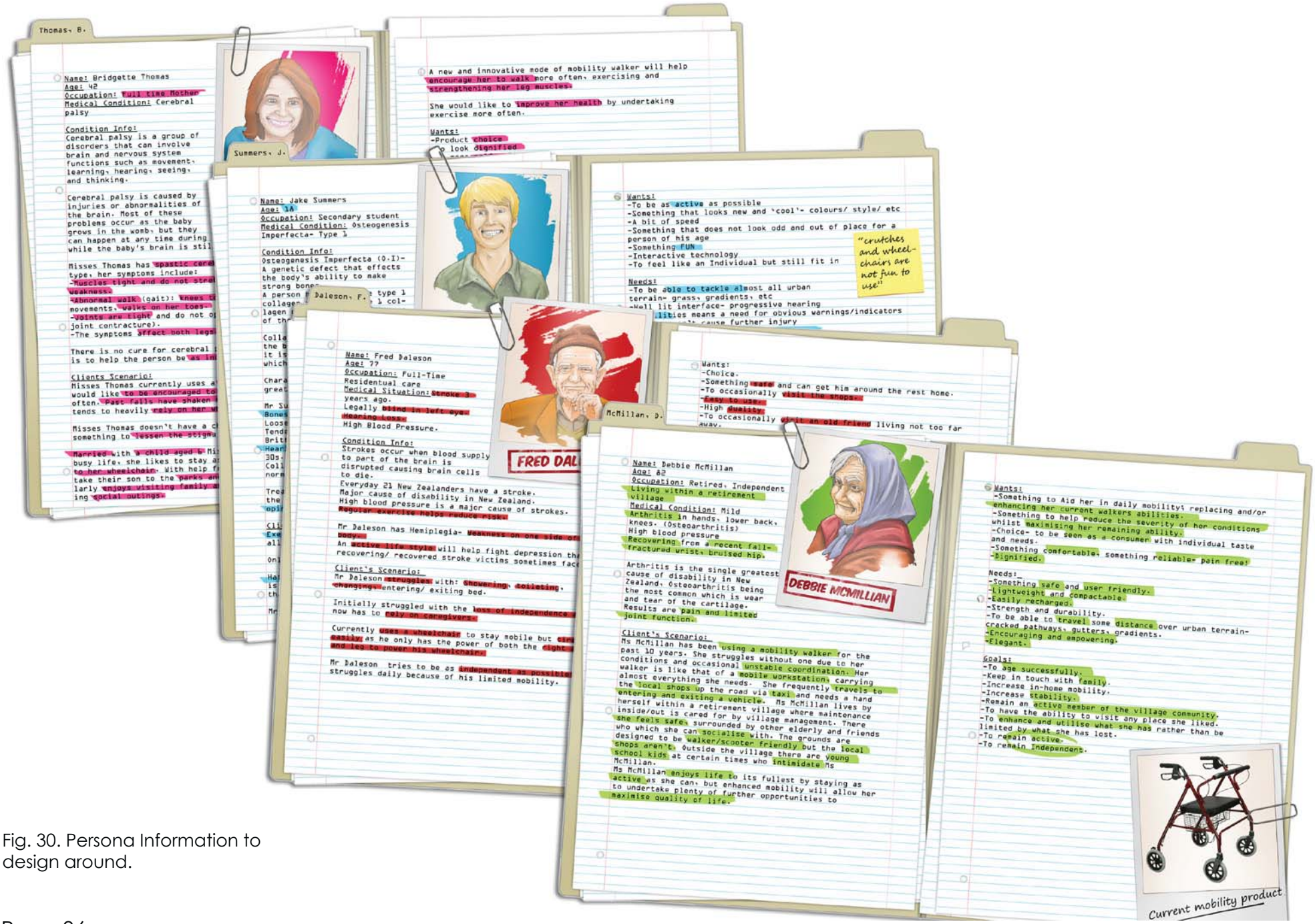
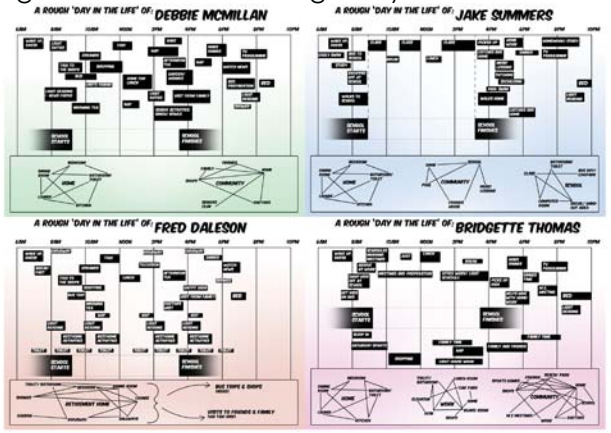
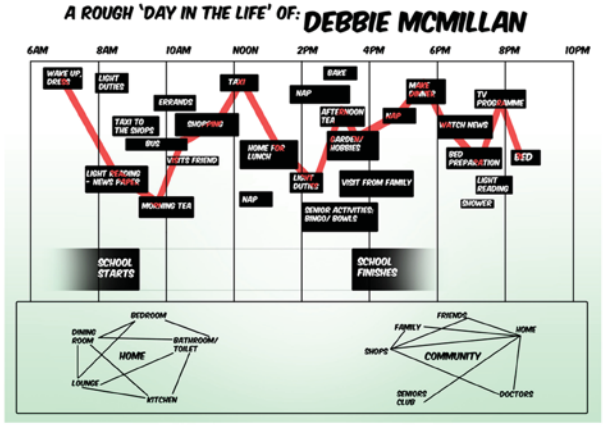


Fig. 30. Persona Information to design around.

Using the 'rough day in the life of' charts the outcome was a short and simple comic narration (fig. 32) of Debbie McMillan journeying to the shop, capturing key moments in her struggle with older age and a fast paced world, and the lack of current mobility choice.

Fig. 31. Personas- 'A Rough Day In the Life Of'.





Despite being far from a sales brochure this type of communication which is unseen in the mobility product market could be used to break down possible barriers of gender, age, and ability, and create a new product resonating with each individual user. This attempt to challenge conventional methods through illustration and interaction with the user could help encourage a closer relationship between the user and product, and ultimately create a new approach on such products.

Further development could produce an attractive read that acts as incentives for readers to fully understand the new product and how to use it, with foreseeable applications through instruction manuals and visual descriptions of design features.

Although this has not been trialled with users and the results remain undetermined, this experiment itself has aided me in my quest for enhanced empathy towards the user, and ultimately, a better design.

Fig. 32. Persona Comic Strip.

Experimentation Part One: In Their Shoes

By research into self-impairment I intended to literally put myself in the users' shoes. This experiment developed through research into areas where taking on the role of the user and self-impairment has revealed remarkable potential in the dynamics involved within emerging design methods and processes. It has helped me to gain a deeper understanding of mobility products and uncovered hidden or latent needs of the potential user.

The research that inspired these experiments originated from the works of Patricia Moore, the Helen Hamlyn Centre, SENTHA, and the work of Mike Spindle and the Trekinetic wheelchair.

Case Study: Patricia Moore

Patricia Moore (Fig.34) is an internationally renowned designer celebrated for her work with the Bethany Senior Centre. Her work is centred on designing products that are inclusive and universal in nature regardless of their age, ability or status with in society (CCAarts, 2010).

In her landmark study 'Visible', in which she was in 'character' as an old lady (Fig 33 & 35) within a variety of cities in both America and Canada. In this time, including, shopping, eating out at restaurants, and spending time with the elderly and young alike, she experienced the positive and negatives of senior life (CCAarts, 2010).

The study examined the daily lives of the very old; what tools were required and the things that are needed, and how ultimately it showed that products that are designed today had failed to meet the needs of this community, revealing a new direction for design. Moore believes that "each and every one of us is first and foremost a consumer and that quite frankly is where we have not been able to embrace graceful aging". There still is a tendency in society to exclude the aged community as we [designers] lack interest in them as potential consumers of products (CCAarts, 2010).

Driven by Patricia Moore's methods it became clear that it simply wasn't good enough to read, observe or hear about the struggles that elderly and disabled face daily. To understand I had to put myself in the position of the user.

Fig. 35

Fig. 34

Fig. 33. Patricia Moore in character.

Case Study: Helen Hamlyn Centre & SENTHA

These two organisations were the main focus in my attempts to formulate the processes of self-impairment.
The Helen Hamlyn Centre of Design focuses on developing research and projects that aim to improve people's lives through design. They take a multi-disciplinary approach that explores through co-designing with other groups and organisations. One of their main research labs embraces a primary focus on 'Age and Ability', "design for a more inclusive society irrespective of age and ability" (Helen Hamlyn Centre for Design, 2012).

'SENTHA' roughly translated to 'everyday technology for senior households' is a multi-disciplinary research project involving groups from several universities and institutes across Germany. The "goal of our research is to develop products and services for a continuously aging society so that older people can maintain their independence in everyday life for as long as possible" (SENTHA, n.d.).

The work these organisations published outlined the necessary processes for experimenting in order to gain an understanding and insight into this target market.

Fig. 36. SENTHA design excersizes.

The Ability Suit

I designed and constructed an 'Ability Suit' based on the previous works that simulated multiple impairments. Originally, the impairments replicated key persona characteristics, but subsequently evolved into sequential degrees of impairment for easy comparisons. This would help to show the increasing physical limitations brought on by older age and provide a glimpse at the rate in which it may deteriorate.

Fig. 37. Initial Ability Suit Plans.

Initial trials centred on finalising methods and combinations. These began by attempting to walk over a distance. Within a designated time period I was able to experience what it was like without any aid; progressing to a walking stick and finally to the walker itself.

Fig. 38. The initial ability suit in action.

Fig. 39. Ability Suit layout.

The second set of trials involved a number of daily tasks such as making the bed, navigating through my house, and preparing food. Additionally I experimented with entering and exiting a vehicle with a mobility walker; compacting and storing the walker in the back seat, and vice versa.

The overall results were staggering. Not only was I tired and sore by the end of the day, but I realised nearly all of the tasks required twice the amount time and effort to complete. With reduced vision and substantially constrained movements there was a noticeable increase in effort to use the devices correctly and avoid damaging objects, myself and injuring the people around me.

Fig. 40. Entering/ exiting vehicle with walker.

Without any aid I struggled, in both navigating set tasks and balancing. The walking stick offered mild support but it was the walker that I felt most comfortable using. Especially when my back was growing sore, resting on the walker brought surprising relief. This mode of the walker was often used during these tests because, ironically, adding impairments whilst impaired required increasingly more time; a suit not easily taken on and off.

This experience was truly intriguing as it transformed this project from a foundation of statistics and information to a position where I, as the researcher, truly began to understand the user. At this stage I knew that further applications of the suit were going to be essential.

Mike Spindle and The Trekinetic

The Trekinetic Wheelchair has played a vital role in formulating both my practical design processes and overall inspiration.

Former Formula-One engineer Mike Spindle, while acting as inspirational icon for young designers, redesigned the conventional wheelchair into a unique product with superior enhancement in user ability. Spindle first came up with the idea upon on seeing a "kid struggling with his wheelchair. He was so cool looking, but his wheelchair looked so cumbersome, it was so old fashioned…a completely fresh approach was what we needed" (Edward Spindle, 2007).

The main feature that separates the Trekinetic from the rest is the unique feature of 'Lean' and 'Mean', involving the adjusting of the wheel camber. Lean, for inside use through living spaces and doorways; and mean, for outdoor use that enhances stability and accessibility through uneven terrain. The user is able to switch between these modes by adjusting the bar underneath the seat. As a product that is practical and attractive James Foster describes the Trekinetic as "very much the mountain bike of wheelchairs" (Edward Spindle, 2007).

Spindle is also a motivational in the design field, not only for creativity, but also for encouragement towards persistence with your ideas. "A message to other designers: follow your first instinct; ignore convention; take some time off if you fail, and above all remember; the answers are there if you look hard enough" (BIPCTV, 2011). His work and advice enhanced my dedication to see this project through.

Fig. 41. Mike Spindle's Trekinetice Wheelchair

The Test Rig

Above all, this story provided a clear example of the importance of test rig experimentation and I applied this concept by constructing my own experimental rig. Using a pram's lower half with the layout of large rear wheels and rotating front wheels, I added a wooden lounge chair frame to the top. Aluminium composite attachments were used to marry these together with adjustable options to find the preferred combination.

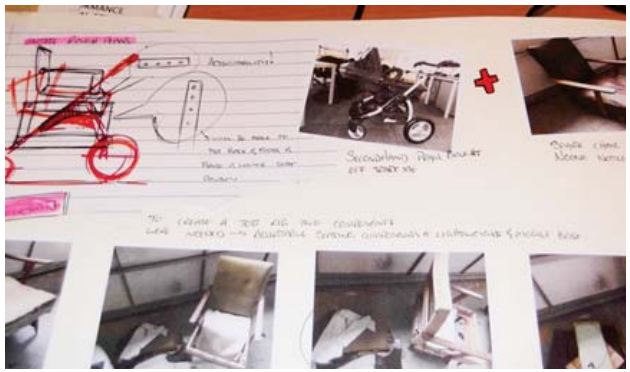


Fig. 42. Test Rig Plans.

Fig. 43

Fig. 44

Fig. 45

3.2.4 Experimentation Part Three: The Test Rig and Ability Suit

The test rig and the existing walker were run through a predetermined test track with combinations of impairments simulated. The experiment test track involved variants of steps, gradients, uneven terrain, and obstacles, each conducted in three levels of impairments: 'mild', 'medium', and 'severe'. Each phase was designed to increase reliance on these two aids and identify which elements were successful.

Results varied substantially regarding the levels of reliance on both mobility devices. The walker was lighter as the test rig had not been constructed with weight in mind. This resulted in increased manoeuvrability over stairs and gradients; however, the lack of lifting options for the walker was evident. The test rig's handle setup allowed multiple options through all track elements regarding lifting and supporting.

Fig. 46

Fig. 47

Fig. 48

Fig. 49

The wheels of the walker were inadequate over uneven ground, which included a combination of grass, dirt, and upturned pavement. The larger wheels of the rig handled overall terrain with ease and little disruption for any impairment level.

Where the walker excelled was with the handle brakes. This aspect of the aid was vital over all test terrain and hindered the use of the test rig consistently. Brakes were left off the rig intentionally due to cost, but were always intended to be included in final designs. It did, however, succeed in underlining the importance of the brake by how often they were used as well as their obvious absence.

Question Three

How can user experience be used to improve this new mode of transport? How will this effectively contribute to the overall aesthetics and practicality?

To answer this I decided to reduce my focus on self-impairment and search for the voice behind potential users. As I did this I realised my work had lacked the essential key element in order to be a valid concept. I found that the answers lay not within my own personal experiences and experiments, but within those of the aging community itself, whose lifelong experience with aging and mobility was a wealth of knowledge.

Grey Power- Part One

The integration of Grey Power offered support from a respected and recognised organisation an integrated elderly consumers in the design process. "In order to understand the market, close interaction with potential users of their products in an appropriate and empathetic way, is needed" (Herstatt & Kohlbacher, 2011, p 9). Their active participation spoke volumes of their support and the relevance this research stages within aged communities.

With the help of these three members I was able to create an ergonomic package to design to as well as apply consideration towards each individual's wants and needs. Ostland (2011) claims the "value added by integrating life-experienced people into the design process is that their experiences, needs, and knowledge of them correspond to the demands put on successful innovation and design process" (as cited in Herstatt & Kohlbacher, p. 17).


Fig. 50. Laura Nicholls.


Fig. 51. Duncan & Val McDonald.

Their involvement began through initial impressions and feedback surrounding the concept, and by trialling the test rig added perspective and real user information.

The test rig was also evaluated within potential living environments, where it was easily operated and navigated. It brought to light elements of the concept that needed to be addressed:

1. A multi-purpose seat

When lifting the test rig for stairs, the users' knee acts as a lower pushing force while the hands and upper body pull the rig towards them. The seat of my design may follow similar proportions as its predecessor with a fixed seat.

2. Foot rests.

Each member expressed the need for a comfortable riding position and where to place feet.

3. Indoor safety.

The fact that wheels and sides would potentially be more susceptible to daily wear, especially in confined living areas, is something that needs to be considered.

4. Lighting at night.

As this design will potentially be operated at night in both modes, the need for lighting to navigate and operate will be relatively important.

5. The seat position will need to be addressed, particularly weight distribution in riding mode. It was discovered that the test rig seat was set too far forward, becoming unbalanced.

In all other aspects the rig was well suited to the task. Opinions regarding the general idea were promising, with the overall feel and layout of the test rig and the current proposed design being accepted rather enthusiastically.


Fig. 52. Test Rig- Foot placement 1.


Fig. 53. Test Rig- Foot placement 2.


Fig. 54. Test Rig- Knee Placement.

Grey Power- Part Two

To gain the final design's approval, a full scale mock-up was made to gauge if users can navigate easily and effectively. This was extremely successful and resulted in overall approval from each participant.

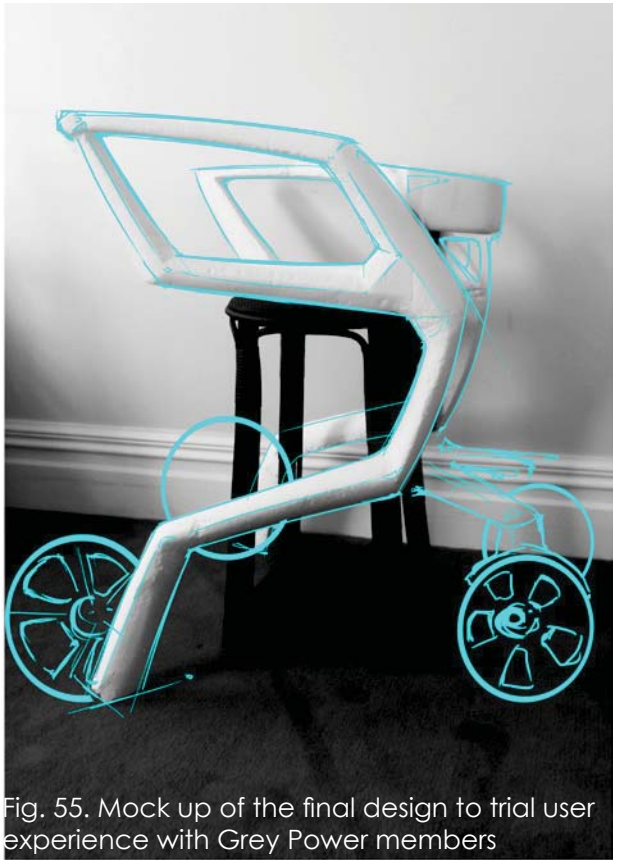


Fig. 55. Mock up of the final design to trial user experience with Grey Power members

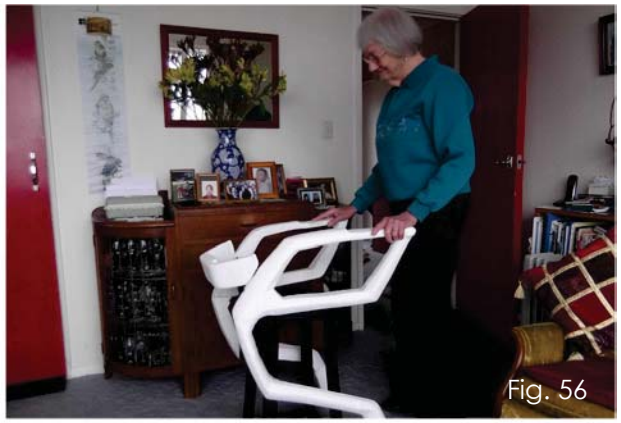


Fig. 56

Fig. 57

Fig. 58

Fig. 59

Fig. 60

Involving Grey Power successfully integrated the user's voice into this project. Such participants offered a wide range of varying social and physical environments and allowed collaboration with an extremely relevant organisation.

Fig. 61

Chapter Three: Design Description

The final design was inspired from a wall of visual works that touched upon many areas of design, as seen in figure 61. This chapter will offer a brief insight into the conceptual stages which led up to the finalising of the design, and then further explain each element involved in the final concept.

Fig. 61

Fig. 62. Inspirational Material.

Fig. 63. Cardboard mockup-forming design.

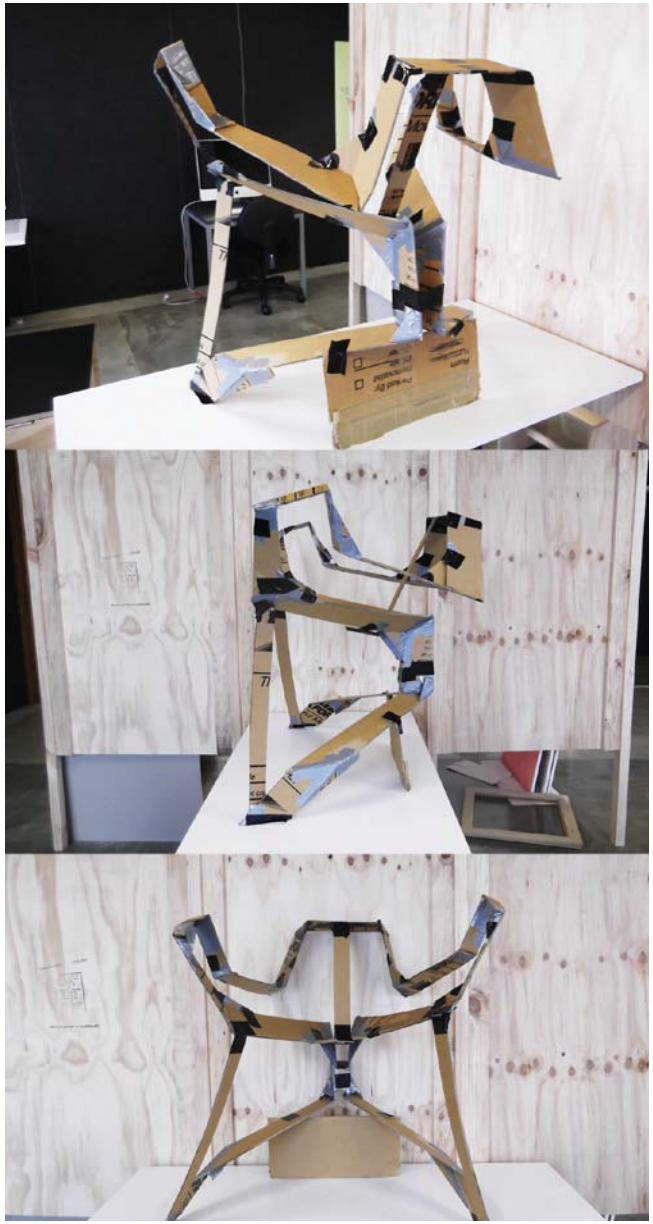


Fig. 64. Cardboard mockup full size-adding perspective.

Fig. 65. Design Development

WALK

RIDE

Fig. 66.

Fig. 67

Central body

These external casings clip onto the internal frame. With the varying degrees of pressure being applied to this central piece it is essential that it remain as strong as possible, as well as light. Within this central piece run cavities which house the wires for lights, engine controls, and brake cables.

The twin openings in the back rest result from research findings regarding the lack of lifting options on current walkers. This grants the user an almost 180 degree lifting option, and secondly, increased options when users move between positions in applying their strength and weight. By supplying multiple options the design significantly increases ease of usability and the context of application.

External Casings

The plastic casings, identifiable as the twin coloured features, intentionally draws the eye over the design, but aside from just aesthetics these effectively play a number of other important roles. As non-weight bearing casings they conceal inner cables and wires that run from the battery pack, controls, and brakes, down to the rear wheels and throughout the frame. With the heightened demand for customizable products this also introduces the opportunity for individual personalisation. Due to the nature in which such a concept would face constant daily wear these coloured features are designed to be light and durable, but also easily replaceable if damaged.

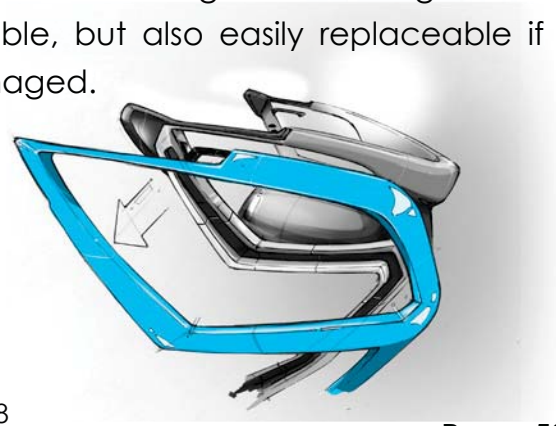


Fig. 68

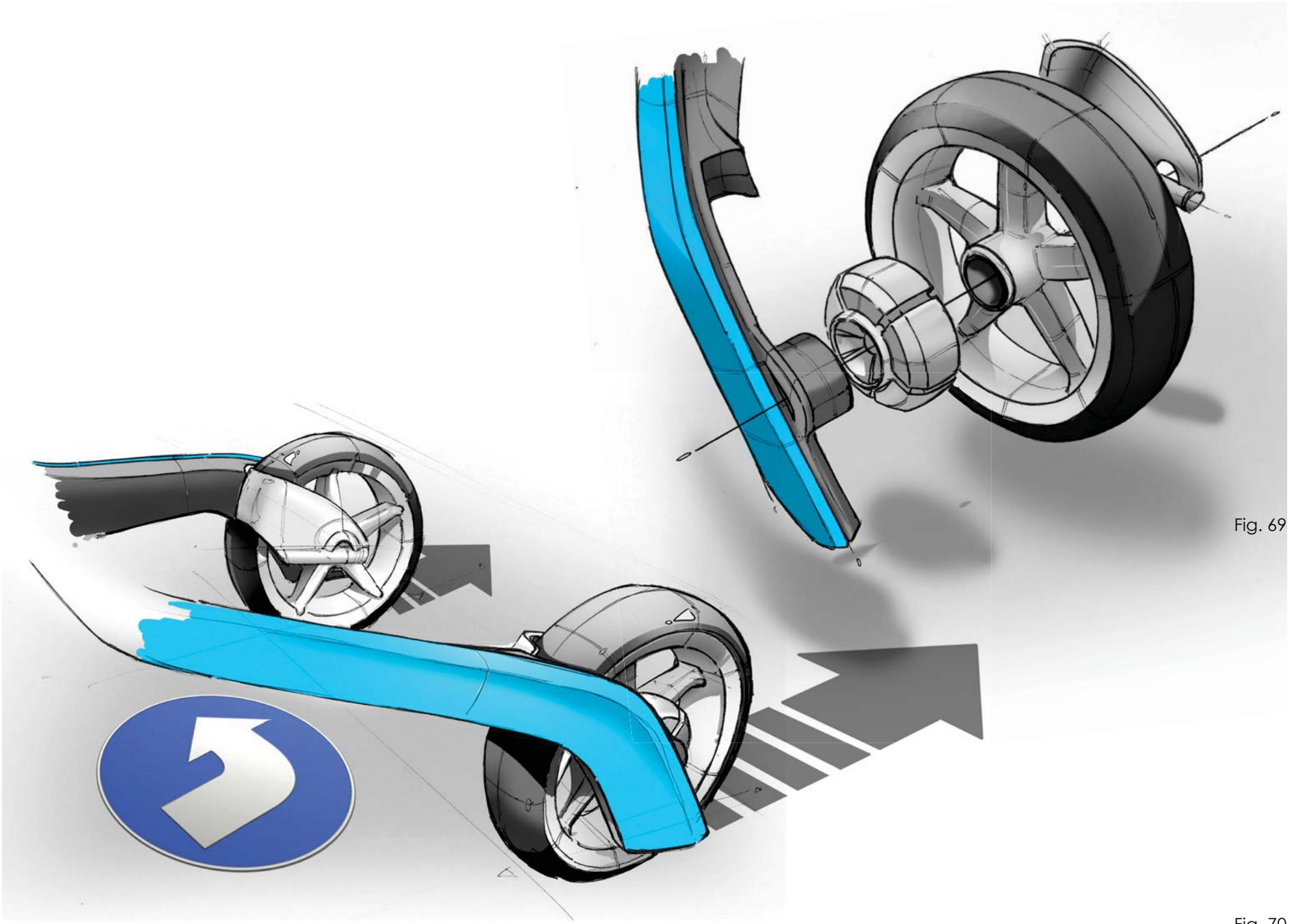


Fig. 69

Fig. 70

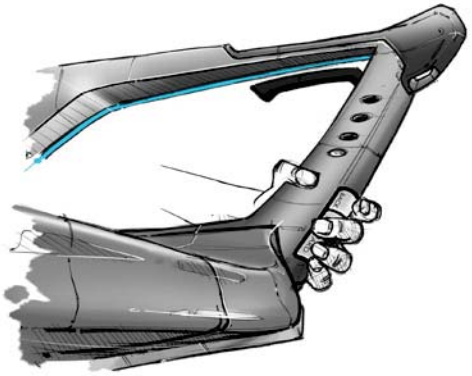


Fig. 71

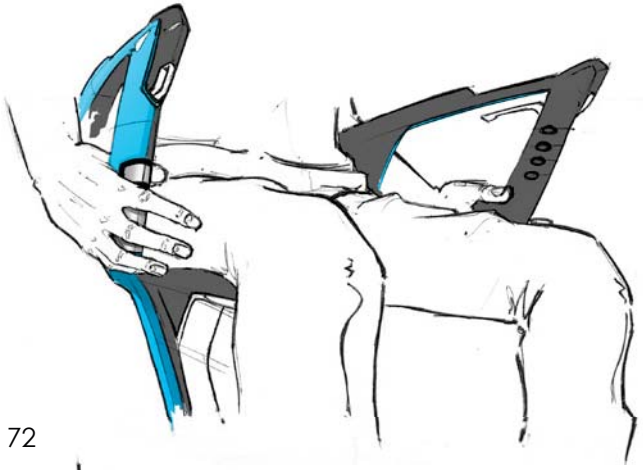


Fig. 72

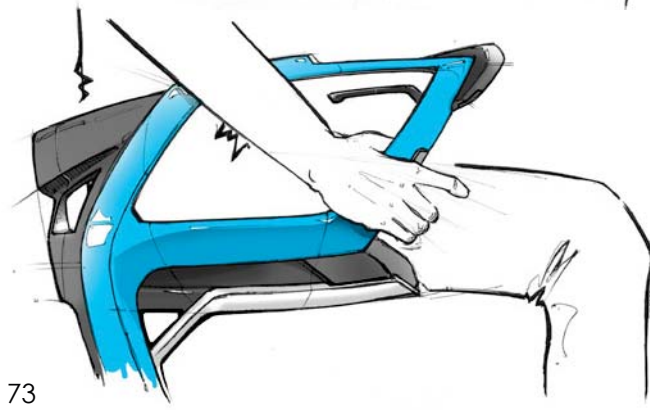


Fig. 73

Rear Motors

Twin motors propel the walker's rear wheels while in 'Ride' mode. Due to their position and weight these are currently not detachable; however, there is further room for development into an attachment clip style similar to the battery pack on the front storage casement. A massive benefit regarding their low centre of gravity means their weight will help to keep the Strider stable whilst travelling along inclines.

Engine statistics are only rough estimations at this stage due to the fact that the project remains in a conceptual state. Although, after briefly looking into current electric wheelchair specifications regarding range and speed, the Silver Strider will most likely hold a travelling distance of 10km, and a speed of between 5-10km/h (ElectricWheelchairs.co.uk).

Steering

An experiment involving radio controls was conducted to replicate how the concept would steer (See appendix 1). Considering the primary goal was to minimise weight the engines will steer the design, rather than additional weight from steering mechanisms.

This will work rather like the tracks of a tank, where power is applied one engine more than the other in order to turn. This means the Silver Strider can turn 360 degrees on the spot making it ideal for indoor use, especially within confined areas such as living environments and parts of shopping centres.

Fig. 74

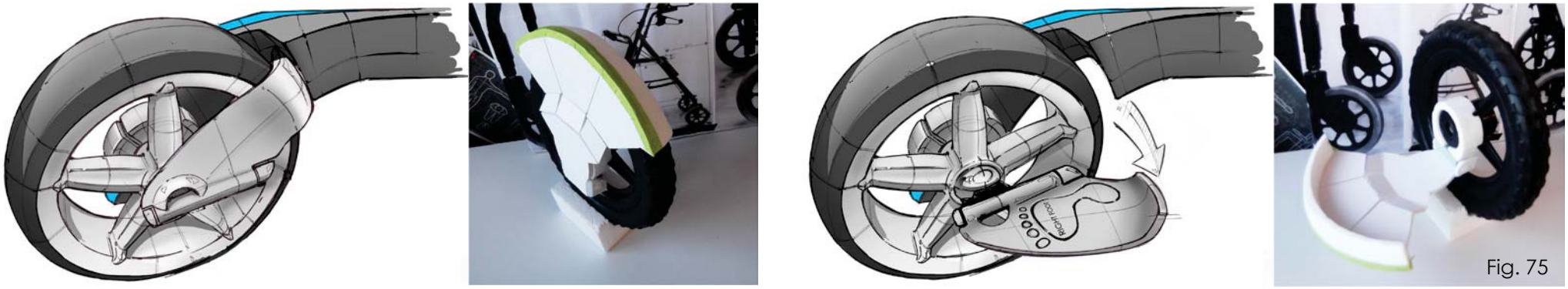


Fig. 75

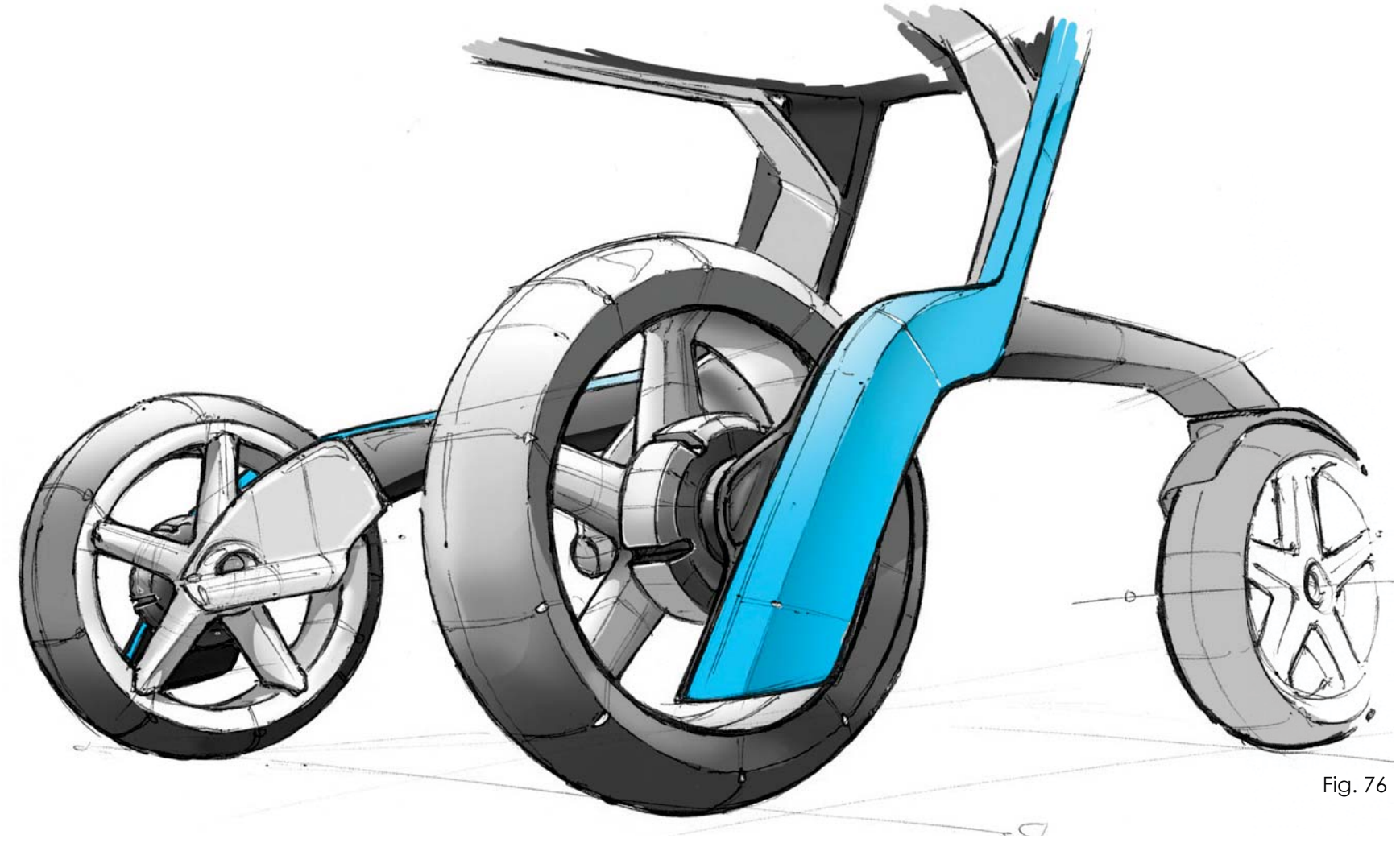


Fig. 76

Foot rests

This is the conceptual answer regarding concerns of Grey Power members asked concerning the placement of their feet during the test rig trials.
Conventional methods of footrests are, quite frankly, ugly, large and cumbersome. An innovative method to hold the user's feet would be required to not only replace existing footrest types, but blend in with the design; potentially having multiple uses.
The solution is a versatile mudguard. At first appearance this seems to protect the user's leggings or dress from possibly being caught by the wheel, but this spring loaded guard folds down to support each foot. This maintains the comfortable pose of current foot rests with feet placed slightly apart and in a natural position.
This could be potentially made from an anti-slip surface or a material that is shaped so it secures the foot.

Lighting

Lighting has proven to play an essential role in creating a safer mobility aid, increasing usability to effectively operate at night. Therefore, the integration of navigation lights at either end help illuminate in both modes, with additional lighting in each corner. Driving lights will be stronger and all will only be able to operate in conjunction with the battery pack application.

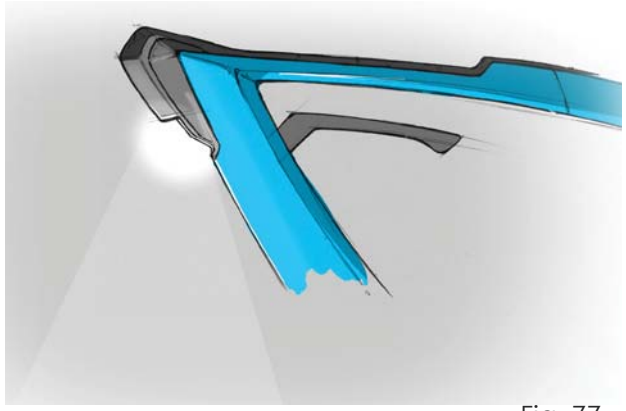


Fig. 77

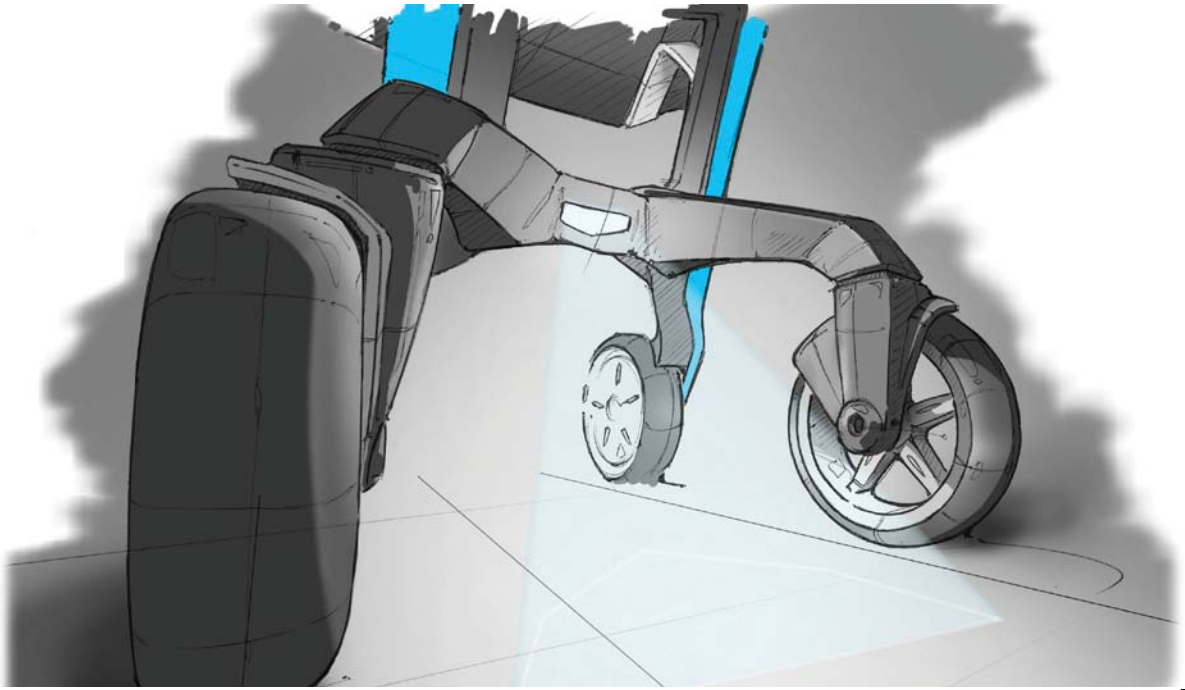


Fig. 78

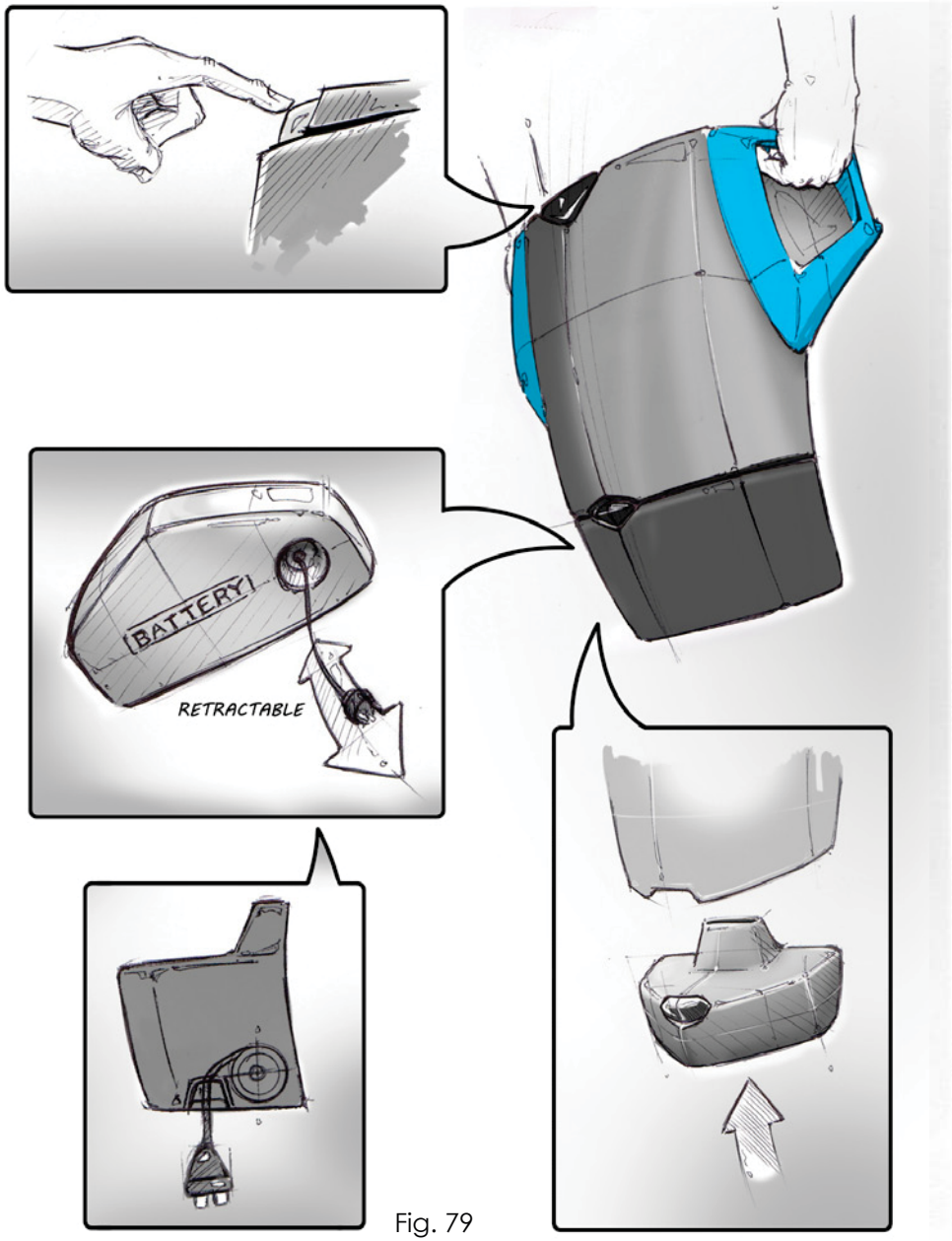


Fig. 79

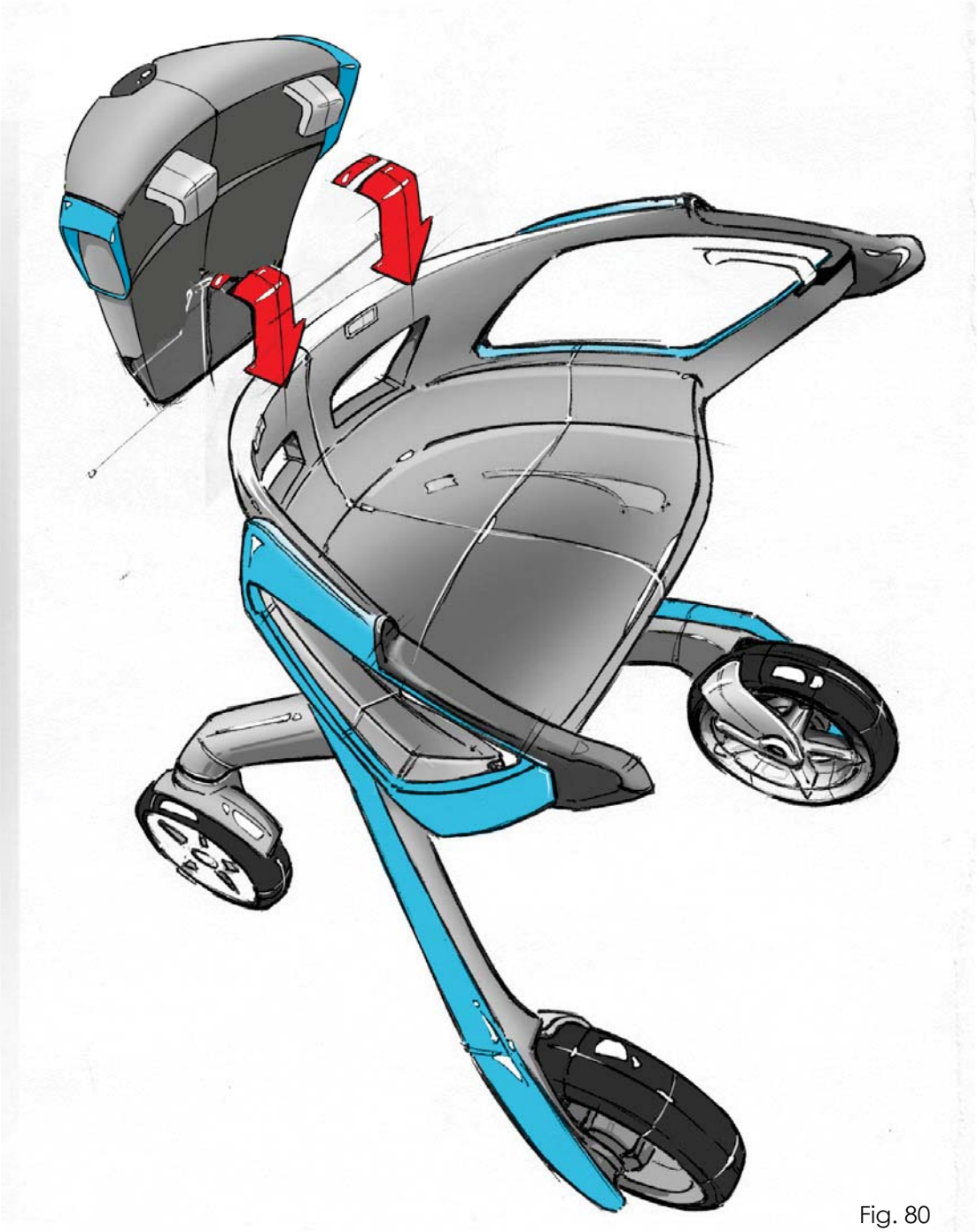


Fig. 80

Recharging

Efforts to keep the design as light as possible and avoid constantly transporting the battery pack weight, even when not in use, meant the battery pack had to be detachable. Also, to avoid straining a user with current mobility issues meant that this had to be an easy and simple procedure.

It was essential that the design keep a low centre of gravity so that any intended outdoor use carried very little possibility of tipping, as the battery pack and charging cable carry a sizable weight.

This design concludes that the battery pack be located at the bottom of an easily attachable, front storage compartment; again, able to separate from this as well.
This addresses the need for potential storage options as this was found to be a necessity for current users. Therefore, the user has the option of just storage or the combination of storage and battery.

A retractable power cable housed in the battery compartment will mean the walker is able to be recharged almost anywhere, reinforcing the relationship of trust between user and product as it significantly reduces the concern of becoming stranded while travelling.

This idea was initially trialled to be stored under the seat but it proved to be a possible hindrance to the user and an awkward position to recharge from, therefore, confirming its position within the carry case.

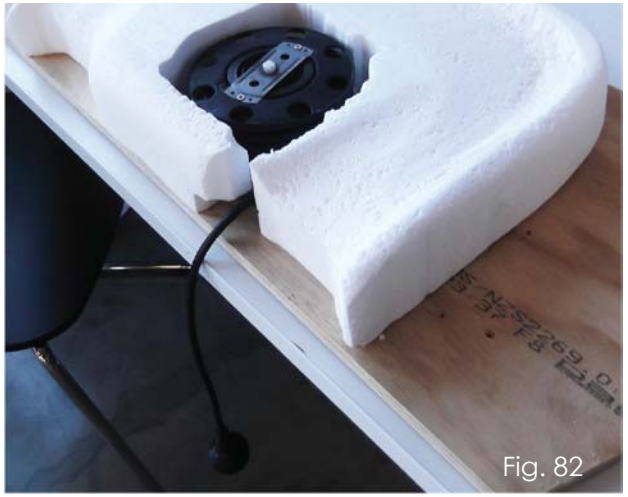


Fig. 82

Side saddle storage containers are also an option as ergonomically this is easy to reach when user is sitting, effectively utilise spare space, and reduces hindrances.

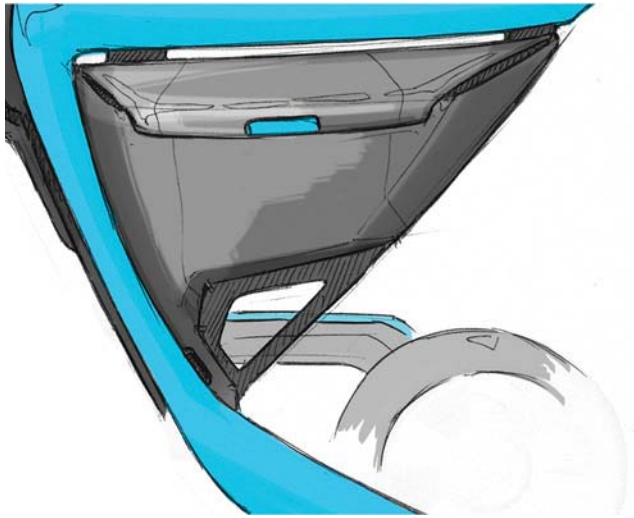


Fig. 81

Fig. 83

Seat Design

Research has defined specific needs for elements of the seat design. Firstly, it is not adjustable as it has major structural significance, and it must be a certain height to ensure the users' knee to be effectively used as leverage while navigating stairs. However, this could certainly be altered so that alternative storage options may be housed underneath, such as the original walker's design.

The front surface of the seat is padded so that the users' knee is comfortable while applying pressure; helping reduce any harm this may have, especially for the elderly whose physical conditions are more susceptible to damage.

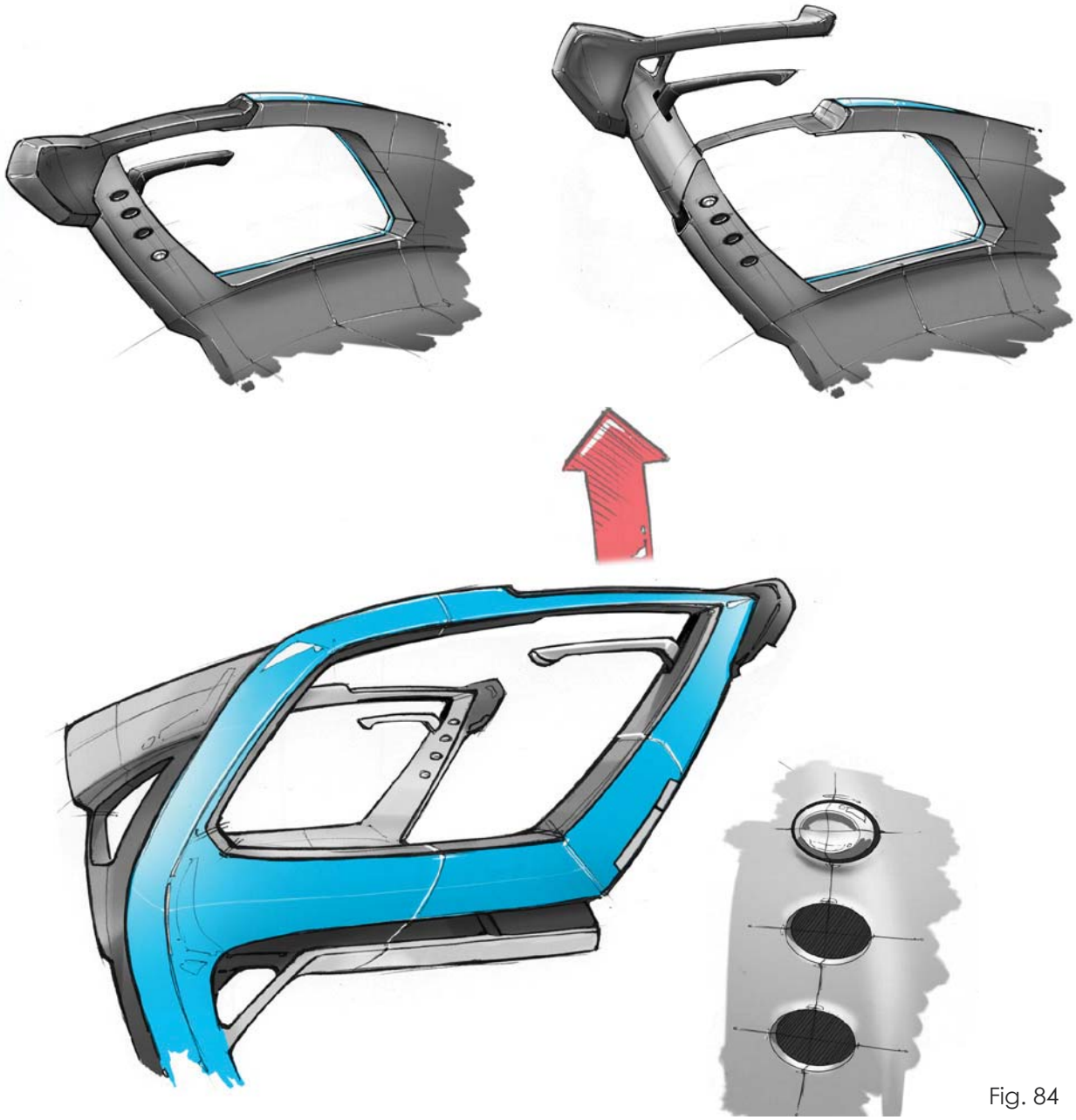


Fig. 84

Adjustable Handles

Each handle is able to be raised several levels in order to meet individual requirements which can be accomplished by a simple pressure button found on the inside area of the seat. Originally the walker was designed to be produced in three sizes of small, medium and large, much like bicycles are today, however, this was unfeasible and raised concerns over increased production cost.

This alternative, simple and effective method meets all the set requirements that a universal market demands as well as increasing additional opportunities of future development. Through my research I found some users are not able to apply their full weight upon the handles, usually due to arthritis, which means my concept would have the potential to supply these users with an arm rest add on, instead of the standard handle version.

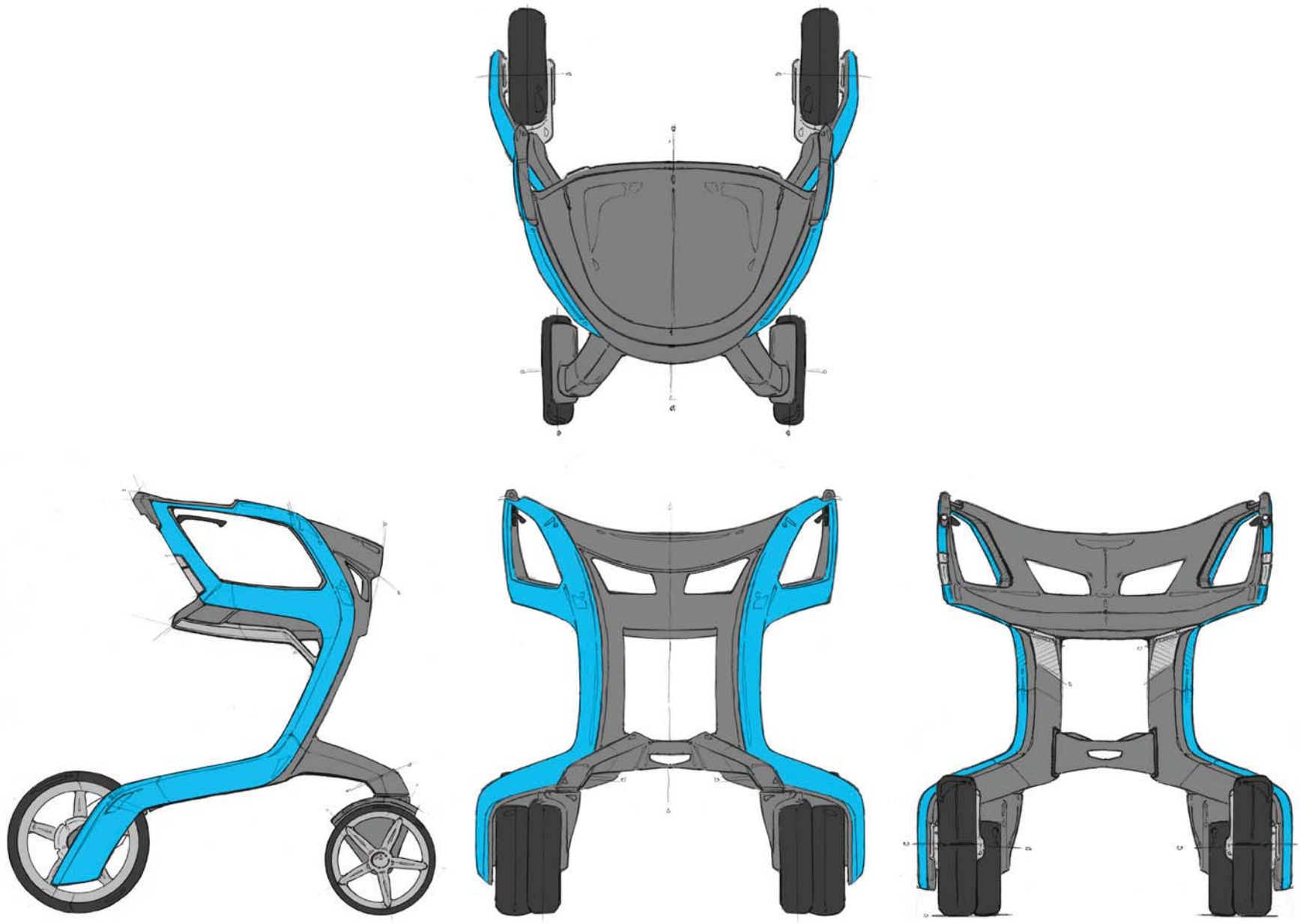


Fig. 85

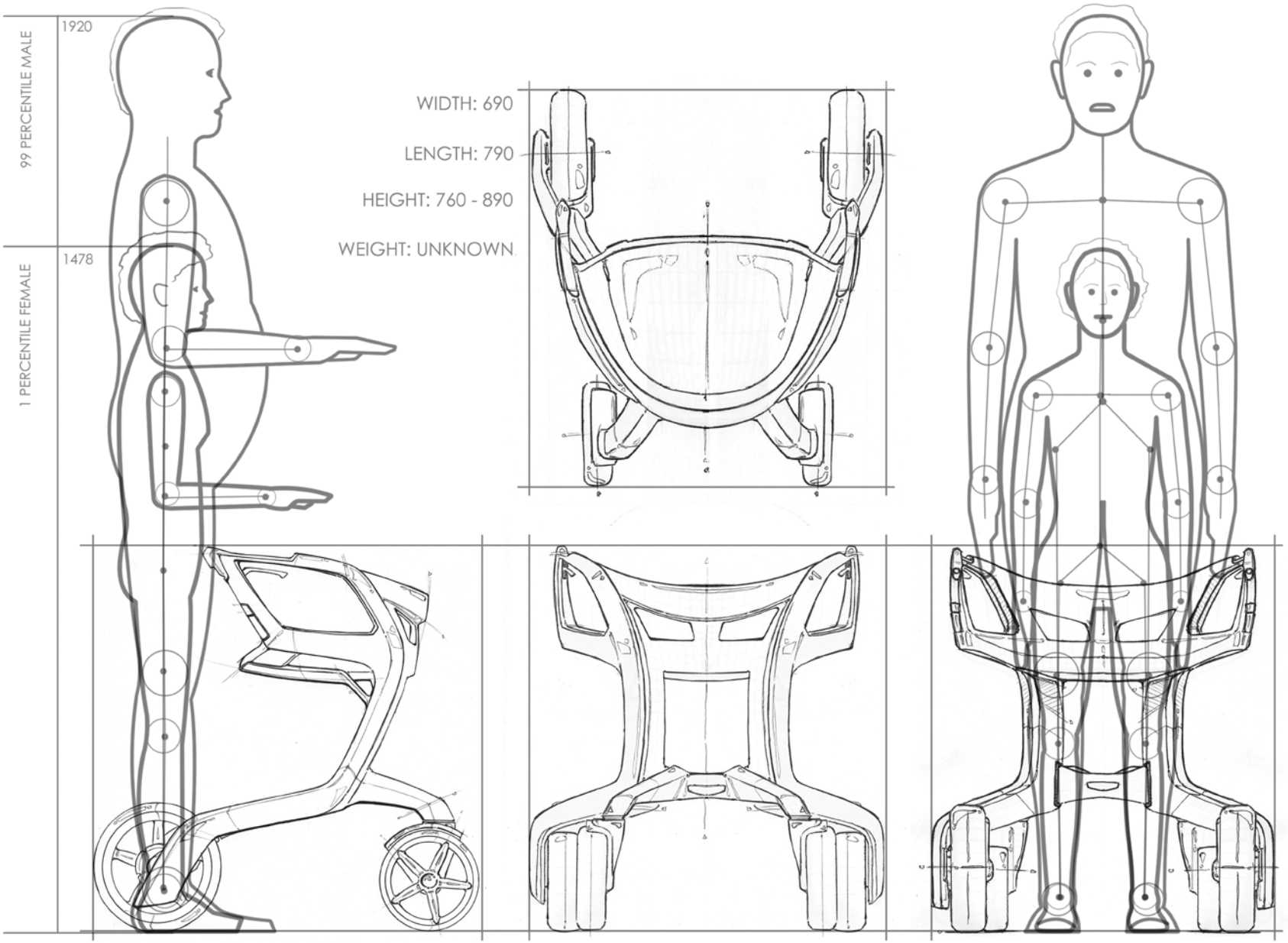

99 PERCENTILE MALE
1920
1 PERCENTILE FEMALE
1478
WIDTH: 690
LENGTH: 790
HEIGHT: 760 - 890
WEIGHT: UNKNOWN

Fig. 86

Fig.87

Potential cost

The potential cost is unforeseeable at this stage considering the list of components and material remain in a conceptual state. However, when it comes to personal mobility aids, especially those that users rely on and live with constantly, research has proven consumers will go to considerable lengths to create as much of a 'normal' sense of ability as possible. Sally Keara, mother of Hana, purchased the previously mentioned Trekinetic wheelchair at considerable cost, declaring she would do anything for her daughter- "you can't put a price on mobility and freedom" (S. Kerse, personal communication, June 2, 2012).
The emerging grey market has also shown considerable spending ability. Unlike previous generations who tend to keep hold of their savings, this active senior group spends to make the most of their later years. I myself have witnessed family and retirement home residents exercising this spending ability by travelling often and purchasing the latest gadgets at whim.

Fig.88

Suspension

The Test Rig contained suspension in the front wheels from the original pram, to which added comfort during trial 'ride' modes but reduced stability when in 'walk' mode. The solution to this was twin suspension bars underneath the seat that would soften the users ride when 'riding'.

Potential Future

Like many products that come to market there is a high chance of future variants. The Segway is a perfect example, with the commonly known version breeding modified models that meet a large selection of the needs and wants of other markets; the technology itself being surprisingly adaptable.

Considering this, the Silver Strider could provide a number of choices so users can customise their experience to meet their preferences.
This may include:

• A dual front wheel adaption to help with weight distribution. This will reduce the possibility of becoming immobile in softer terrain as less weight is applied to each front wheel, especially in 'Ride' mode where the user will be applying more weight on the wheels.

• Because of the ability to detach the main side features, a range of colour schemes and patterns could be released to offer users the chance to individualise their Silver Strider mobility aid.


S2 SILVER STRIDER
THE SILVER STRIDER INTEGRATES THE TRAVELING CAPABILITIES OF A CONVENTIONAL MOBILITY SCOOTER WITH THE PRACTICAL FUNCTIONS AND ROLE OF THE MOBILITY WALKER; CREATING A HYBRID PRODUCT FREE OF PREVAILING SOCIAL STIGMA OF WHICH SURROUNDS CURRENT MOBILITY AIDS, AND ULTIMATELY CREATING A MARKET OPPORTUNITY THAT HAD NOT EXISTED BEFORE.
THIS NEW BREED OF MOBILITY AID WILL RETAIN ALL THAT THE CONVENTIONAL WALKER HAS TO OFFER FROM INSIDE AND OUT REGARDING SAFETY, SECURITY, AND STABILITY, AS WELL AS THE ADDED BONUS OF UTILISING TWO SMALL ELECTRIC MOTORS IN EACH REAR WHEEL TO TRAVEL DISTANCES THAT WOULD NORMALLY TIRE OR DISCOURAGE VULNERABLE USERS.
CHOOSE TO WALK
COMPACTING
ADJUSTABILITY
INCREASED INDEPENDENCE
OR RIDE
ENGINES / STEERING
FOOTRESTS / MUDGUARDS
MDES 2013
STUDENT NO. 06067581

Fig. 89


WALK
RIDE
EXTERNAL CASINGS
SEAT SUSPENSION
NAVIGATION LIGHTING
STORAGE / RECHARGING
STEP 1
STEP 2
STEP 3
STORAGE
BATTERY
FREEDOM
WITH CHOICE
INDEPENDENCE
WITH STLYE
HARRY WEST HENRIKSEN
H.HENRIKSENDESIGN@GMAIL.COM

Fig. 90

Fig. 91

Conclusion

This project became as much about creating a new product as it was about creating a new and positive experience for users, as modern aging presents new demands. Initial aims of solely developing a mobility aid rose to actively engage with elderly and disabled within a society that is on the brink of unprecedented change; with new technologies and services making it ever-possible to redefine the roles of these members in our community, as both citizens and consumers.

Current mobility products are failing to meet the ever-growing needs of an evolving demographic, it is only through design that we can strive to implement procedures to support the rising mobility demand and guarantee improved quality of life for these elderly and disabled individuals. In fact, by defining the course of this emerging 'Silver Market', what first appears to be a rising issue, can truly be transformed into an opportunity for creativity, innovation and invention.

It was observed that the current mobility walker was only applicable up to each user's ability, meaning users who tire easily struggled to utilise the aid past a certain point. The current solution would be the mobility scooter, but potential users required the space and ability to house one, and in most cases this was impractical. Therefore the solution is lying in a product of similar proportions as the walker but with the electric capabilities of the scooter, creating a hybrid mobility aid targeted at a universal market.

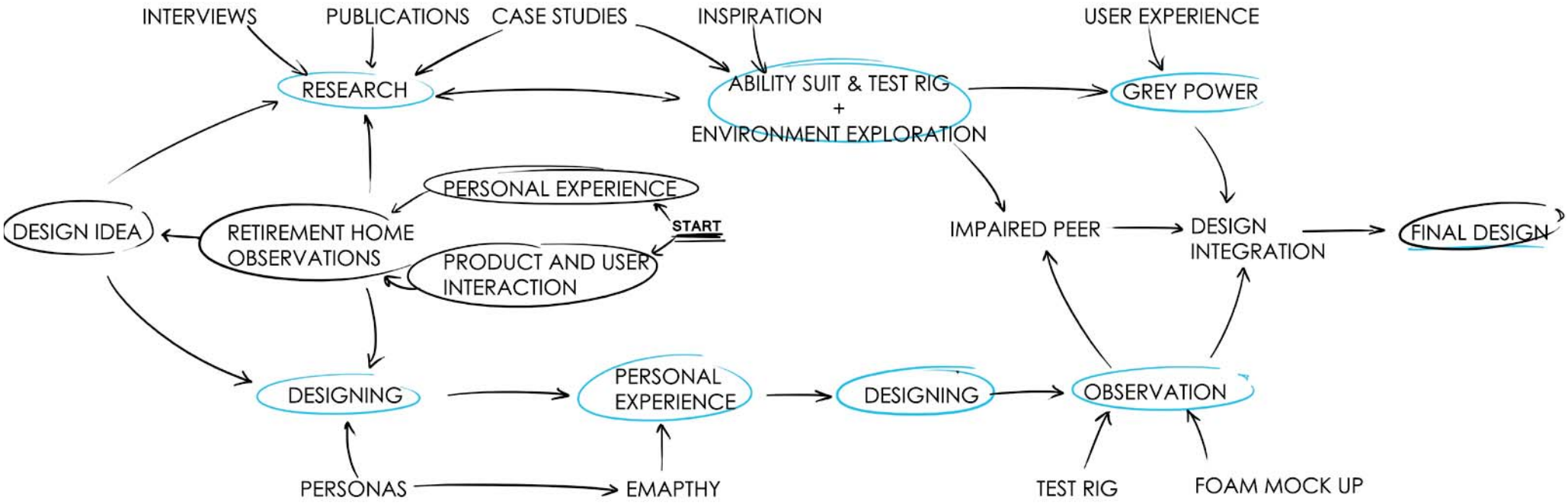
The research processes and methods involved with this collaboration of information and the development process of my final product consisted of personal interviews, surveys, user groups, test rigs, self-impairment, and general publications.

The study of Patricia Moore was also vital in helping me to obtain a psychological perspective of the target audience. Combining Moore's methods with the research and development techniques of the Helen Hamlyn Centre, SENTHA, and the story or the Trekinetic, I gained a deeper empathetic understanding about what it means to be impaired while undertaking tasks and utilising mobility aids. This was accomplished through the use of the Ability Suit, with comparisons between the original walker and the prototype test rig. Results were heavily influential on the project as it allowed an understanding of the relationship that is built between the user and aid.

Finally the implementation of direct user experience and feedback from Grey Power members assured the final design had justification and approval as a successful concept by an intended user group. Creating this empathetic approach has successfully lead to a more intuitive, experience-focused design. of the stigmatising label senior-specific

products, and fuels a more universal standpoint. Styling was influenced by modern and futuristic aesthetics directed at forming a mobility product for everyone, whereas justification of design intentions tailor to the needs and wants of the elderly; ultimately making the design accessible and flexible for current and future generations.

Fig.92. The design process on reflection, retracing my steps.



References

Bateni, H, PhD, & Maki, B. E, PhD. (2005). *Assistive Devices for Balance and Mobility: Benefits, Demands, and Adverse Consequences*. 86: 134-145. DOI:10.1016/j.apmr.2004.04.023.

Bloom, Boersch-Supan, McGee, & Seike, (May, 2011). *Population Aging: Facts, Challenges, and Responses. Program of the Global Demography of Aging*. Retrieved from http://www.hsph.harvard.edu/pgda/WorkingPapers/2011/PGDA_WP_71.pdf

Brandt, Ase., Iwarsson, S., & Stahle, A. (2004). *Older People's Use of Powered Wheelchairs for Activity and Participation*. 36: 70–77. DOI:10.1080/16501970310017432

Buxton, B. (2007). *Sketching User Experiences*. San Francisco, USA: Elsevier Inc.

Burgstahler, S. (n.d.). *Universal Design of Instruction (UDI): Definition, Principles, Guidelines, and Examples*. Retrieved from University of Washington, http://www.washington.edu/

Cerebral Palsy. (2010). *A Guide For Family Needs*. Retrieved from www.swifamilies.org30/4/2012

Creating Walkable Communities. (1998). *A Guide for Local Governments*. Retrieved from www.bikewalk.org/pdfs/ncbwpubwalkablecomm.pdf29/4/2012

Cumming,H.,Henry,k.(1961). *Age, Generation and Life Course: Introducing Social Geography*. London,Routledge.

Ferriss, A. L. (2010). *Approaches to Improving the Quality of Life*. New York: Springer.

Fisk, A. D., Rogers, W. A., Charness, N., Czaja, S. J., Sharit, J. (2009). *Designing For Older Adults* (2nd ed). USA: Taylor & Francis Group.

Fujii, N., Nakamura, N., & Nakamura, T. (2010). *The Study of Making Frail Elderly To Go Out Safely by Using 4-Wheeled Walkers*. Institute of Transport Studies, Monash University Social Research in Transport (SORT) Clearinghouse. Retrieved from http://www.sortclearinghouse.info/

Garret, L. (2012). *ID Interaction and Interfaces: What Industrial Designers Need to Know About Intimate Product Design* [Handout]. Wellington, New Zealand: Massey University.

Grey Power. (2012) *Grey Power: The Active Organisation for Those 50+*. Retrieved from http://www.greypower.co.nz/

Helen Hamling Centre of Design. (2012). Retrieved from http://www.hhc.rca.ac.uk/193/all/1/About-Us.aspx

Herstatt. C., Kohlbacher . F (2011). *The Silver Market Phenomenon: Marketing and Innovation in the Aging Society* (2nd ed). New York: Springer.

Jansson, D. G., Condoor, S. S., & Kroll, E. (2001). *Innovative Conceptual Design: Theory and Application of Parameter Analysis*. New York, USA: Cambridge University Press.

Jedeloo, S., Witte, L., Linssen, B., & Schrijvers, G. (2000) *Satisfaction with and the Use of Assistive Devices and Services for Outdoor Mobility*. 13: 173–181. The Netherlands: ISO Press.

Jonsson, L. (2001). *The Importance of the 4-Wheeled Walker for Elderly Women Living In Their Home Environment - A Three Year Study*. Karlskrona, Sweden: Swedish Handicap Institute.

Kim, S., & Ulfarsson, G. F. (2004). *Travel Mode Choice of the Elderly: Effects of Personal, Household, Neighbourhood, and Trip Characteristics*. Transportation Research Record: Journal of the Transportation Research Board, 117-126. DOI: 10. .3141/1894-13

Koncelik, J. A., & Reeder, K. (2008) *Conceptual Drawing: Freehand Drawing and Design Visualization for Design Professions*. New York, USA: Delmar Cengage Learning.

Kroemer, K. H. E. (2006) *Extra-Ordinary Ergonomics: How to Accommodate Small and Big Persons, the Disabled and Elderly, Expectant Mothers and Children*. CA, USA: Taylor and Francis Group.

Macey, S., Wardle, G. (2008) *H-Point: The Fundamentals of Car Design & Packaging*. Co-Published: Pasadena, CA, US: Art Center College of Design., & Culver City, CA, US: Design Studio Press.

Morchin, W., & Oman, H. (2006) *Electric Bicycles: A Guide to Design and Use*. USA: John Wiley &

Fig. 93

Sons Inc.

Oxley J., Langford, J., & Charlton, J. (2010). *The Safe Mobility of Older Drivers: A Challenge for Urban Road Designers*. 18: 642-648. DOI:10.1016/j.jtrangeo.2010.04.005.

Pedersen, M. F. (2009). *Mobility in Daily Life: Between Freedom and Unfreedom*. England: Ashgate Publishing Limited.

Pheasant, S. (2001). *Body Space: Anthropometry, Ergonomics and the Design of Work*. (2nd ed). Taylor and Francis.

Phillips, E.M., Schneider, J, C., & Mercer, G. R. (2004). *Motivating Elders to Initiate and Maintain Exercise*. 85(Suppl 3):52-57. doi:10.1016/j.apmr.2004.03.012.

Regnier, V., Hamilton, J., & Yatabe, S. (1995). *Assisted Living For The Aged and Frail*. New York, US: Columbia University Press.

Rentschler, A. J., Cooper, A. R., Blasch, B., & Boninger, M. L. (2003). *Intelligent Walkers for the Elderly: Performance and Safety Testing of VA-PAMAID Robotic Walker*. Journal of Rehabilitation Research and Development
Vol. 40, No. 5, 423-432. Retrieved from Department of Veterans Affairs.

School of Public Health, University at Albany. (2006). *The Impact of the Aging Population on the Health Workforce in the United States: Summary of Key Findings*. NY, USA: School of Public Health, University at Albany.

Spirduso, W. W., Francis, K. L., & Macrae, P. G. (2005). *Physical Dimensions of Aging* (2nd ed.). USA: Edward Brothers.

Statistics New Zealand. (2006). *Disabilities Survey 2006 – Hot off The Press*. Retrieved from http://www.stats.govt.nz/browse_for_stats/health/disabilities/DisabilitySurvey2006_HOTP06/Commentary.aspx

Statistics New Zealand. (2000). *Population Ageing in New Zealand*. Retrieved from http://www.stats.govt.nz/browse_for_stats/people_and_communities/older_people/pop-ageing-in-nz.aspx

Statistics New Zealand. (2006). *Demographic Aspects of New Zealand's Ageing Population*. Retrieved from http://www.stats.govt.nz/browse_for_stats/people_and_communities/older_people/demographic-aspects-nz-ageing-population.aspx

Statistics New Zealand. (2011). *Demographic Aspects of New Zealand's Ageing Population*. Retrieved from http://www.stats.govt.nz/browse_for_stats/people_and_communities/older_people/demographic-aspects-nz-ageing-population.aspx

Stefano, M. D., Stucky, R., & Lovell, R. (2012). *Promotion of Safe Community Mobility: Challenges and Opportunities for Occupational Therapy Practice*. 59, 98–102. DOI: 10.1111/j.1440-1630.2011.00993.x

Stein, J., Schettler J., Rohrer, B., & Valenti, M. (2008). *Environmental Threats to Healthy Aging: With a Closer Look at Alzheimer's and Parkinson's Diseases*. Boston, USA. Greater Boston Physicians for Social Responsibility and Science and Environmental Health Network.

Wasson, G., Gunderson, J., Graves, S., & Felder, R. (n.d.). *Effective Shared Control in Cooperative Mobility Aids*. University of Virginia. Retrieved from http://www.cs.virginia.edu/

Wagner, F., & Caves, R. (2012). *Community Livability: Issues and Approaches to Sustaining the Well-Being of People and Communities*. NY, USA: Taylor and Francis Group.

Wressle, E., & Samuelsson, K. (2004). *Scandinavian Journal of Occupational Therapy: User Satisfaction with Mobility Assistive Devices*. 11: 143-150. DOI: 10.1080/11038120410020728

Wessels, R. D., De Witte, L. P., Jedeloo. S., Van den Heuvel. W. PM., & Van den Heuvel, W. JA. (2004). *Effectiveness of Provision of Outdoor Mobility Services and Devices in the Netherlands*. 18: 371. DOI: 10.1191/0269215504cr755oa.

Design Platform. (2009, December 16). A-Z *Lezingen: Chris Lefteri – Interview* [Video file]. Retrieved from http://www.youtube.com/watch?v=fupcwoB_U2M
Stanford University. (2010, September 17). Designing a Unified Experience [Video file].

Fig. 94

Retrieved from http://www.youtube.com/watch?v=NKtsHzUFwMM

BIPCTV. (2011, January 12). *Mike Spindle: Trekinetic Wheelchair*. [Video File] Retrieved from http://www.youtube.com/watch?v=TB4MeEYeJlM

BIPCTV. (2010, September 16). *Mike Spindle: Trekinetic*. [Video File]. Retrieved from http://www.youtube.com/watch?v=Octzv5uwMMg

CCAarts. (2010, March 9). *Patricia Moore Lecture*. Retrieved from http://www.youtube.com/watch?v=Xr3ibtQuf2o

Sentha. (n.d.). Retrieved from http://www.sentha.udk-berlin.de/engl/index.htm

Spindle, E. (2009, November 8). *The Trekinetic Story*. [Video File]. Retrieved from http://www.youtube.com/watch?v=ZqIf8OSZerk

Stanford University. (2012, March 8) *Kim Goodwin It's Our Research interview* [Video file] Retrieved from http://www.youtube.com/results?search_query=kim+goodwin&oq=kim+goodwin&gs_l=youtube.12..0.1477.1477.0.2569.1.1.0.0.0.0.244.244.2-1.1.0...0.0...1ac.1.TwusqmBvan4

Taylor, P. (2009). *Growing Old in America: Expectations vs. Reality*. Pew Research Center. Retrieved from http://www.pewsocialtrends.org/2009/06/29/growing-old-in-america-expectations-vs-reality/

The Free Dictionary. (2012). Retrieved from http://www.thefreedictionary.com/disability

Trekinetic. (2009, December 29). *Trekinetic in the Snow*. [Video File]. Retrieved from http://www.youtube.com/watch?v=VkQoVDzMnNw

Walker (mobility), (2012). In Wikipedia. Retrieved November 14, from http://en.wikipedia.org/wiki/Walker_%28mobility%29

Figures.

i. Henriksen W H. (2013). Old man on park bench.
1. Henriksen H W. (2012). Original Mobility Walker.

2. Getty Images. (Unknown). Senior Woman Standing with a Walking Frame. Retrieved from http://www.gettyimages.co.uk/detail/photo/senior-women-standing-with-a-walking-frame-royalty-free-image/71917993t

3. Stuff.mit.edu. (2006). Statistics regarding Global Aging Population. Retrieved from http://stuff.mit.edu/afs/athena/dept/agelab/about_agelab.shtml

4. Pew Research and Social Demographic Trends. (2012). The Gap Between How Old We Are and How Old We Feel. Retrieved from http://www.pewsocialtrends.org/2009/06/29/growing-old-in-america-expectations-vs-reality/
5. Henriksen H W. (2012). Interviews.
6. Henriksen H W. (2012). Interview Process.
7. Henriksen H W. (2012). Market Research.
8. Henriksen H W. (2012). Correct Way to Use Mobility Walker 1.
9. Henriksen H W. (2012). Correct Way to Use Mobility Walker 2.
10. Henriksen H W. (2012). Walker Analysis 1.
11. Henriksen H W. (2012). Walker Analysis
12. Find The Best. (2013). Golden Buzz Around XL Scooter. Retrieved from http://mobility-scooters.findthebest.com/l/18/Golden-Buzz-Around-XL
13. Euro Scooters. (2013). Mobility Scooters. Retrieved from http://www.euroscooters.co.uk/mobility-scooters/index.php?dispatch=categories.view&category_id=93&page=3
14. Mobility Scooters In UK. (2013). Quingo Vitness. Retrieved from http://www.quingoscooters.com/mobility-scooter-quingo-vitess.htm
15. Henriksen H W. (2012). Scooter Analysis.
16. Gizmag. (2012). Duel-Mode Transport- The Trend Takes Off. Retrieved from http://www.gizmag.com/dual-mode-transport/22284/pictures#86
17. Pew Research and Social Demographic Trends. (2012). Life of Autonomy and Silver Aid Products. Retrieved from Pew Research and Social Demographic Trends. (2012).
18. Google Maps. (2013). Auckland Region. Retrieved from https://maps.google.co.nz/maps?hl=en&tab=wl
19. Google Maps. (2013). Retirement Home

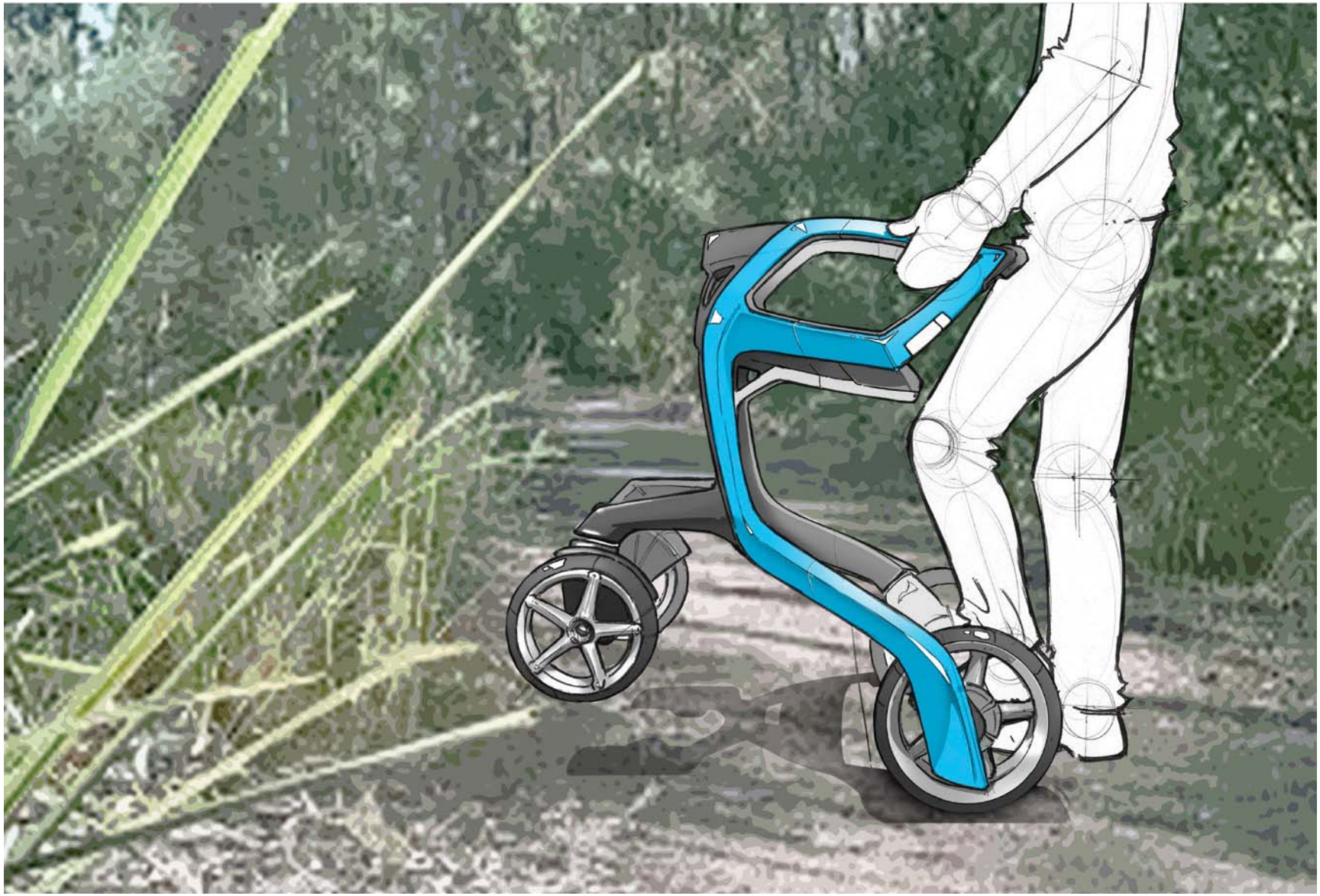


Fig. 95

1. Retrieved from https://maps.google.co.nz/maps?hl=en&tab=wl
20. Google Maps. (2013). Retirement Home 2. Retrieved from https://maps.google.co.nz/maps?hl=en&tab=wl
21. Google Maps. (2013). Retirement Home 3. Retrieved from https://maps.google.co.nz/maps?hl=en&tab=wl
22. Google Maps. (2013). Retirement Home 1.1. Retrieved from https://maps.google.co.nz/maps?hl=en&tab=wl
23. Henriksen H W. (2012) Environment Exploration Collection- Traffic.
24. Google Maps. (2013). Retirement Home 3.1. Retrieved from https://maps.google.co.nz/maps?hl=en&tab=wl
25. Henriksen H W. (2012). Environment Exploration Collection- Interior.
26. Henriksen H W. (2012). Environment Exploration Collection- Surrounding Areas.
27. Google Maps. (2013). Retirement Home 2.1. Retrieved from https://maps.google.co.nz/maps?hl=en&tab=wl
28. Henriksen H W. (2012). Original Walker Trials.
29. Ministry Of Health. (2011). YES [Brochure]. Publisher: Unknown.
30. Henriksen H W. (2012). Persona Information To Design Around.
31. Henriksen H W. (2012). Personas- 'A Rough Day in the Life Of'.
32. Henriksen H W. (2012). Persona Comic Strip.
33. The Builder Buzz. (2011). Patricia Moore Uncovers Need for Universal Design. Retrieved from http://www.thebuilderbuzz.com/2011/04/18/655/
34. The Builder Buzz. (2011). Patricia Moore Uncovers Need for Universal Design. Retrieved from http://www.thebuilderbuzz.com/2011/04/18/655/
35. SGI Quarterly. (n.d) Designed for Life. Retrieved from http://www.sgiquarterly.org/feature2005Jly-8.html
36. Sentha. (n.d.). Retrieved from http://www.sentha.udk-berlin.de/engl/index.htm
37. Henriksen H W. (2012). Initial Ability Suit Plans.
38. Henriksen H W. (2012). Ability Suit 1.
39. Henriksen H W. (2012). Ability Suit Layout.
40. Henriksen H W. (2012). Entering and Exiting Vehicle with Walker.
41. Developed 3D. (2009). Forward Thinking. Retrieved from http://develop3d.com/profiles/forward-thinking
42. Henriksen H W. (2012). Test Rig Plans.
43. Henriksen H W. (2012). Rig 1.
44. Henriksen H W. (2012). Rig 2.
45. Henriksen H W. (2012). Rig 3.
46. Henriksen H W. (2012). Test Rig and Ability Suit 1.
47. Henriksen H W. (2012). Test Rig and Ability Suit 2.
48. Henriksen H W. (2012). Test Rig and Ability Suit 3.
49. Henriksen H W. (2012). Test Rig and Ability Suit 4.
50. Henriksen H W. (2012). Test Rig and Grey Power 1- Laura Nicholls.
51. Henriksen H W. (2012). Test Rig and Grey Power- Duncan and Val McDonald.
52. Henriksen H W. (2012). Test Rig and Grey Power- Foot Placement 1.
53. Henriksen H W. (2012). Test Rig and Grey Power- Foot Placement 2.
54. Henriksen H W. (2012). Test Rig and Grey Power- Knee Placement.
55. Henriksen H W. (2012). Test Rig and Grey Power- Foam Mock Up 1.
56. Henriksen H W. (2012). Test Rig and Grey Power- Foam Mock Up 2.
57. Henriksen H W. (2012). Test Rig and Grey Power- Foam Mock Up 3.
58. Henriksen H W. (2012). Test Rig and Grey Power- Foam Mock Up 4.
59. Henriksen H W. (2012). Test Rig and Grey Power- Foam Mock Up 5.
60. Henriksen H W. (2012). Test Rig and Grey Power- Foam Mock Up 6.
61. Henriksen H W. (2012). Main Render Intro.
62. Henriksen H W. (2012). Inspirational Material.
63. Henriksen H W. (2012). Mini Cardboard Mock Up.
64. Henriksen H W. (2012). Full-size Mock Up.
65. Henriksen H W. (2012). Design Development.
66. Henriksen H W. (2012). Walk and Ride Modes.
67. Henriksen H W. (2012). Range of Colours of Design.
68. Henriksen H W. (2012). Casings being removed.
69. Henriksen H W. (2012). Engine Exploded.
70. Henriksen H W. (2012). Turning View.
71. Henriksen H W. (2012). Inside Shot of Hand Controls.
72. Henriksen H W. (2012). 'Ride' Controls 1.
73. Henriksen H W. (2012). 'Ride' Controls 2.
74. Henriksen H W. (2012). Turn Ability of Wheels.
75. Henriksen H W. (2012). Foot Rest/ Mudguard- Up and Down.
76. Henriksen H W. (2012). Wheel Close Up.

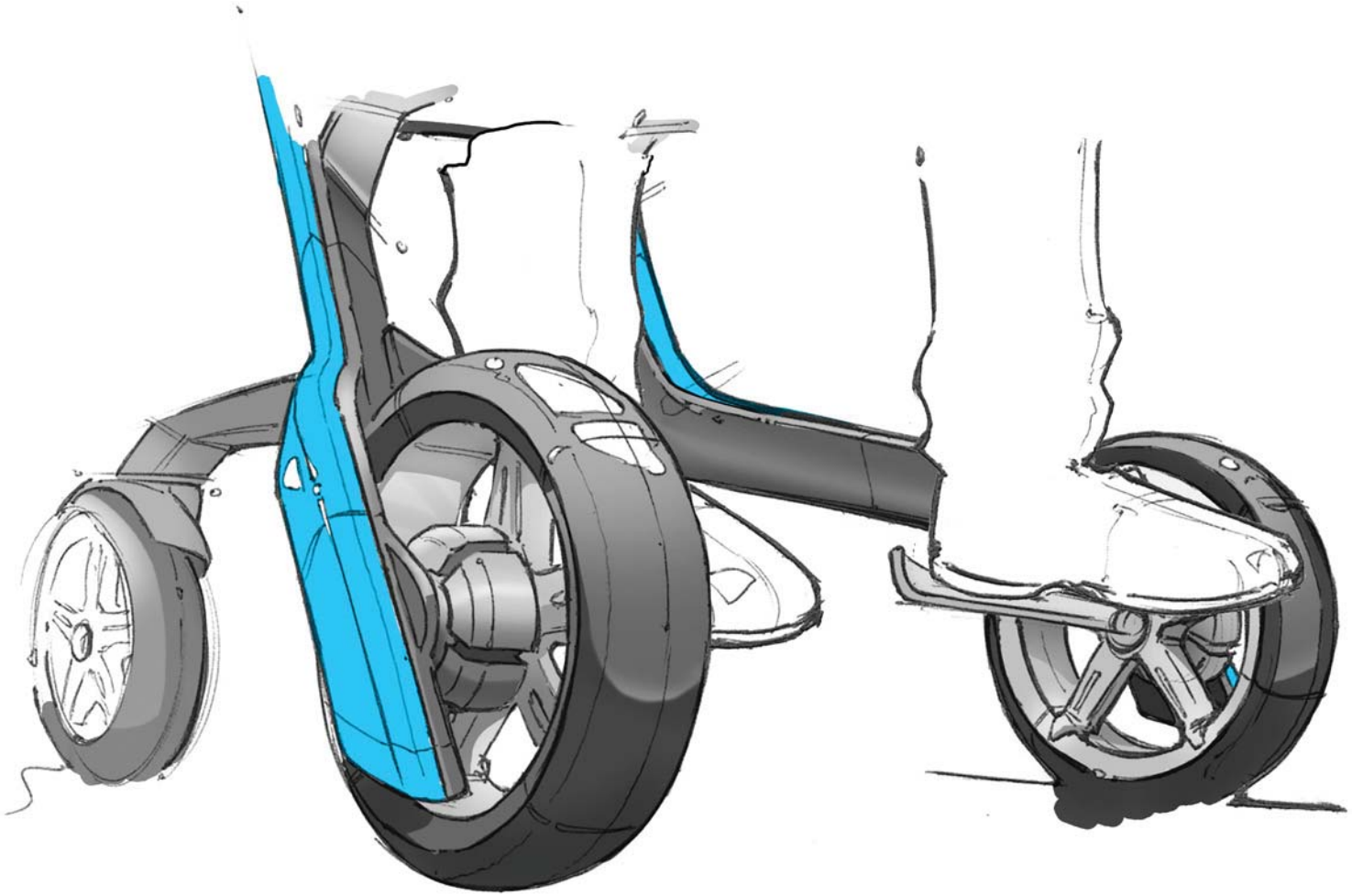


Fig. 96

77. Henriksen H W. (2012). Handle Light.
78. Henriksen H W. (2012). Wheel Light.
79. Henriksen H W. (2012). Carry Case Description.
80. Henriksen H W. (2012).Carry Case Deployment.
81. Henriksen H W. (2012). Side Saddle Storage.
82. Henriksen H W. (2012). Trial Retractable Cable.
83. Henriksen H W. (2012). Seat Design.
84. Henriksen H W. (2012). Handle adjustment.
85. Henriksen H W. (2012). GA Colour.
86. Henriksen H W. (2012). GA.
87. Henriksen H W. (2012). Collapsed.
88. Henriksen H W. (2012). Seat Suspension.
89. Henriksen H W. (2012). Final Exhibition Board One.
90. Henriksen H W. (2012). Final Exhibition Board Two.
91. Henriksen H W. (2012). CAD.
92. Henriksen H W. (2012). Design Process.
93. Henriksen H W. (2012). Final Perspective 1.
94. Henriksen H W. (2012). Final Perspective 2.
95. Henriksen H W. (2012). Final Perspective 3.
96. Henriksen H W. (2012). Final Perspective 4.
97. Henriksen H W. (2012). Rubber Band Trial.
98. Henriksen H W. (2012). End Shot.
99. Henriksen H W. (2012). Closing Sketch.

Fig. 97

Appendix 1

The final design is powered by twin electric motors housed in each rear wheel. In order to demonstrate the theory of operating this concept I decided to incorporate the motors of two remote control (RC) cars into each rear wheel (fig. 91). The idea being that they would be easily controlled via remote and only have to power the weight of the frame. I found after dissecting both cars that they had very small engines, but I believed the power to weight ratio might be just enough to interpret what I was trying to achieve.

This would have potentially led to experiments that included navigating a test course over even ground to prove that twin engines working in unison could in fact succeed in powering, steering and braking on this type of design. This idea also fuelled a range of possibilities for presentations and final model concepts.

A number of approaches were taken. Initial trials included a belt drive that was simply a rubber band and the spare RC wheels that were left over (fig. 92), but the tension generated was too great for the motors and prompted alteration.

By pre-stretching the rubber bands I believed I could encompass both the RC wheel and the walker's wheel, but again the strain was too great.

I partially succeeded in moving the walker around the workshop by altering the mounting bracket, meaning that the RC wheel was in direct contact with the walker's wheel (fig. 93). However, this lasted momentarily as I realised the second hand walker I possessed had a rather large flat spot on one wheel, resulting in loss of traction between both counterparts, and inevitably, one side stopping.

It did occur that larger motors would certainly have seen these experiments succeed but the cost of components meant this was not possible.

Overall, I believe the trail was successful in more ways than one. It made me start to think of how the engines would be placed, the housing and capacity of the batteries, and the requirements of the engines themselves in the final concept.

Appendix 2

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA

24 May 2012

Harry Henriksen
28 Blue Heron Rise
Stanmore Bay
WHANGAPARAOA 0932

Dear Harry

Re: Silver Innovation

Thank you for your Low Risk Notification which was received on 9 May 2012.

Your project has been recorded on the Low Risk Database which is reported in the Annual Report of the Massey University Human Ethics Committees.

The low risk notification for this project is valid for a maximum of three years.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis that it is safe to proceed without approval by one of the University's Human Ethics Committees.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:

> *"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.*
>
> *If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director (Research Ethics), telephone 06 350 5249, e-mail humanethics@massey.ac.nz".*

Please note that if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to provide a full application to one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely

J. O'Neill

John G O'Neill (Professor)
Chair, Human Ethics Chairs' Committee and
Director (Research Ethics)

cc Mr Chris Jackson
Institute of Design for Industry and Environment
Wellington

Mr Lyn Garrett
Institute of Design for Industry and Environment
Wellington

Mr Rodney Adank, HoI
Institute of Design for Industry and Environment
Wellington

Massey University Human Ethics Committee
Accredited by the Health Research Council

Research Ethics Office, Massey University, Private Bag 11222, Palmerston North 4442, New Zealand
T +64 6 350 5573 +64 6 350 5575 F +64 6 350 5622
E humanethics@massey.ac.nz animalethics@massey.ac.nz gtc@massey.ac.nz
www.massey.ac.nz

Appendix 3

Massey University
COLLEGE OF CREATIVE ARTS

COLLEGE OF CREATIVE ARTS
Massey University Wellington
PO Box 756
Wellington
6140
New Zealand
0800 MASSEY
www.massey.ac.nz

'SILVER INNOVATION'

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree to participate in this study under the conditions set out in the Information Sheet.

I agree/~~do not~~ agree to the interview being image recorded.

I wish/~~do not~~ wish to have my recordings returned to me.

Signature: [signature] **Date:** 16-10-12

Full Name - printed LAURA NICHOLLS.

Grey Power Details: No 215711

Massey University
COLLEGE OF CREATIVE ARTS

COLLEGE OF CREATIVE ARTS
Massey University Wellington
PO Box 756
Wellington
6140
New Zealand
0800 MASSEY
www.massey.ac.nz

'SILVER INNOVATION'

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree/do not agree to the interview being image recorded.

I wish/do not wish to have my recordings returned to me.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: [signature] **Date:** 3/4/2012

Full Name - printed Trish Stewart

Massey University
COLLEGE OF CREATIVE ARTS

COLLEGE OF CREATIVE ARTS
Massey University Wellington
PO Box 756
Wellington
6140
New Zealand
0800 MASSEY
www.massey.ac.nz

'SILVER INNOVATION'

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree to participate in this study under the conditions set out in the Information Sheet.

I agree/do not agree to the interview being image recorded.

I wish/do not wish to have my recordings returned to me.

Signature: [signature] **Date:** 16.10.12

Full Name - printed Valerie Joy McDonald

Grey Power Details: Wellington Central Grey Power Ass. Inc.
Po Box 13755
Johnsonville.

Massey University
COLLEGE OF CREATIVE ARTS

COLLEGE OF CREATIVE ARTS
Massey University Wellington
PO Box 756
Wellington
6140
New Zealand
0800 MASSEY
www.massey.ac.nz

'SILVER INNOVATION'

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I wish/do not wish to have my recordings returned to me.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: [signature] **Date:** 23-11-2012.

Full Name - printed MERE FALLON.

Appendix 3- continued

Massey University
COLLEGE OF CREATIVE ARTS

COLLEGE OF CREATIVE ARTS
Massey University Wellington
PO Box 756
Wellington
6140
New Zealand
0800 MASSEY
www.massey.ac.nz

'SILVER INNOVATION'

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree to participate in this study under the conditions set out in the Information Sheet.

I agree/do not agree to the interview being image recorded.

I wish/do not wish to have my recordings returned to me.

Signature: [signature] **Date:** 16-10-2012

Full Name - printed Duncan B McDonald.

Grey Power Details: Wellington Central Grey Power Ass. Inc.
PO Box 13755
Johnsville

Massey University
COLLEGE OF CREATIVE ARTS

COLLEGE OF CREATIVE ARTS
Massey University Wellington
PO Box 756
Wellington
6140
New Zealand
0800 MASSEY
www.massey.ac.nz

'SILVER INNOVATION'

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree/do not agree to the interview being image recorded.

I wish/do not wish to have my recordings returned to me.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: [signature] **Date:** 29-5-2012

Full Name - printed VERONICA BERNARD

Massey University
COLLEGE OF CREATIVE ARTS

COLLEGE OF CREATIVE ARTS
Massey University Wellington
PO Box 756
Wellington
6140
New Zealand
0800 MASSEY
www.massey.ac.nz

'SILVER INNOVATION'

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

~~I agree/do not agree~~ to the interview being image recorded.

~~I wish/do not wish~~ to have my recordings returned to me.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: [signature] **Date:** 1.6.20

Full Name - printed LINDA MASON.

Massey University
COLLEGE OF CREATIVE ARTS

COLLEGE OF CREATIVE ARTS
Massey University Wellington
PO Box 756
Wellington
6140
New Zealand
0800 MASSEY
www.massey.ac.nz

'SILVER INNOVATION'

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree/do not agree to the interview being image recorded.

I wish/do not wish to have my recordings returned to me.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: Ira Turney **Date:** 27.5.2012

Full Name - printed Ira Turney

MEETING WAS ALSO ATTENDED BY IRA'S NIECE BRIAR TURVEY: 27.5.2012

Massey University
COLLEGE OF CREATIVE ARTS

COLLEGE OF CREATIVE ARTS
Massey University Wellington
PO Box 756
Wellington
6140
New Zealand
0800 MASSEY
www.massey.ac.nz

'SILVER INNOVATION'

PARTICIPANT CONSENT FORM - INDIVIDUAL

ve read the Information Sheet and have had the details of the study explained to me. My questions
s been answered to my satisfaction, and I understand that I may ask further questions at any time.

ree/do not agree to the interview being audio recorded.

sh/do not wish to have my recordings returned to me.

ree to participate in this study under the conditions set out in the Information Sheet.

gnature: Hannah **Date:** 2/6/2012.

ll Name - printed HANNAH KERSE

interview was also attended by: Sally Kerse (Mother)

Massey University
COLLEGE OF CREATIVE ARTS

COLLEGE OF CREATIVE ARTS
Massey University Wellington
PO Box 756
Wellington
6140
New Zealand
0800 MASSEY
www.massey.ac.nz

'SILVER INNOVATION'

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree/do not agree to the interview being image recorded.

I wish/do not wish to have my recordings returned to me.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: **Date:** 27-5-12

Full Name - printed JAMES TURVEY.

Fig. 98

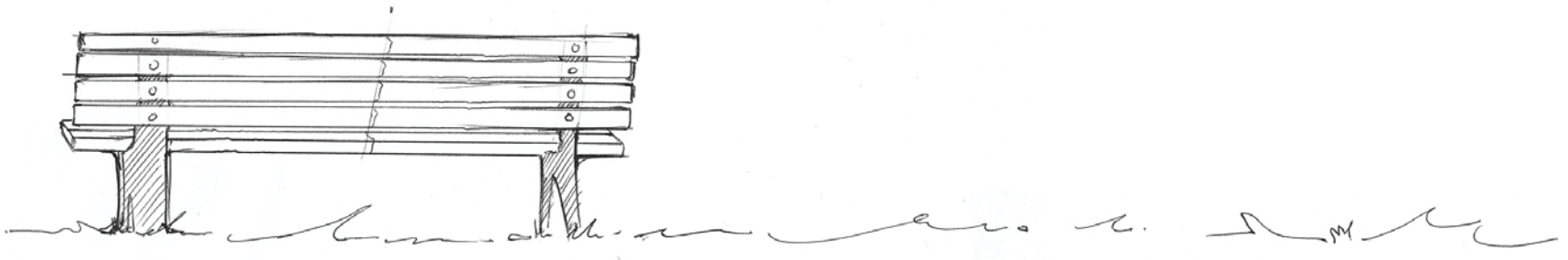


Fig. 99